




FUTURE CITIZEN COMPETENCES IN THE CONTEXT OF COMMUNITY INITIATIVE

Eneken TITOV ^{1*}, Ly HÖBE ²,
Mare KURVITS ³, Anneli RUMM ⁴

^{1,2,3,4}*Estonian Entrepreneurship University of Applied Sciences, Suur-Sõjamäe 10a, Tallinn, Estonia*

Received 29 February 2024; accepted 3 April 2024

Abstract. Recently, there has been an increased focus on different competence models to define and assess the skills and abilities needed in various domains. These models provide a comprehensive framework for understanding and evaluating the competencies required for success in specific fields or contexts. Some correspond well with the definition of the Future Citizen and are dedicated to solving the same general questions – how do we describe the human being, who we expect to rise, who will be successful in the future, and who can handle the challenges that the world and environment will give. The future citizen competence model should describe the multifaceted nature of Future Citizens (FC) in a rapidly changing world. This article aims to identify the most critical competencies for the young person to participate successfully and actively in citizen initiatives. In pursuing understanding and cultivating the skills required for Future Citizenship (FC) in an ever-evolving world, our methodology draws inspiration from and aligns with four prominent European competence models and scientific research. EntreComp, Lifecomp, DigComp, and GreenComp collectively provide a comprehensive foundation to explore, define, and assess the competencies essential for the Future Citizen.

Keywords: future citizen, competence model, community, coping with change, digital and entrepreneurship competences.

JEL Classification: J24.

1. Introduction

The last 25 years have brought about more significant changes in education and social interaction than Gutenberg's invention of the printing press in the 15th century. Thanks to the Internet, new technology, and devices, young people's brains are flooded with information, constantly keeping them connected. (Giedd, 2012). These changes have led to a situation where young people relate to the world differently than today's middle-aged and older people. Leijen et al. (2022) found differences in generational human values; millennials valued hedonism more than the Silent-generation, Baby-boomers, and Generation X, while they were the least stable on self-management, achievement, and benevolence.

In a changing world, we need a comprehensive and modern model that reflects the opinions of young people. Fridays for Future movement has shown how young people are aware of the risks their communities face in terms of environmental risks and the impact of inequalities and

discrimination. So, they are naturally open to developing or applying skills and competencies that might give them an active role in knowing the real needs of their communities, framing the problems, and thinking of solutions. Involving young people and other interest groups from several countries provides a more broad-based input for describing the competencies of the citizens of the future smart city.

The European Future Citizens project is based on the need to “build” profiles of future citizens, considering key competencies and applying them through challenge-based learning approaches, product and service ideas, design methodologies, and youth-oriented activities to become the future citizens of Europe able to give visibility to local challenges (awareness), understand the skills gaps to solve those challenges, develop new skills to think about solutions and to solve problems at community level. To achieve the desired goal, it is crucial to identify the most critical competencies for the young

* Corresponding author. E-mail: eneken.titov@eek.ee

persons, defining them based on the four European competence frameworks (Bacigalupo et al., 2016; Vuorikari et al., 2022; Sala et al., 2020; Bianchi et al., 2022) and other appropriate researches.

The general vision in developing all the future competence models is to allow European youth to be the first to embody the concept of smart citizens as residents of the city of the future, to successfully and actively participate in the civic initiative and to prepare European youth to be active, knowledgeable, digitally savvy, and environmentally sustainable citizens to strengthen the European competitiveness.

This article provides an overview of the theoretical background of competencies and introduces the method of creating the competence model of Future Citizens. Within the framework of the future citizen project, the existing competency models were analysed, based on which the experts from partner organizations in Denmark, Italy, Romania, Estonia, and Portugal, together with youth, prepared the primary framework. The article concludes with the authors' discussion of the importance of the sub-competencies presented within the model.

2. Theoretical background

Starting with the definition of “competence”, it is worth mentioning that many different approaches and schools are slightly distinguished. Still, the competencies generally have been treated in many approaches as relying on three pillars: knowledge, skills, and attitudes (Spencer & Spencer, 1993; Stoof, 2005; Lackeus, 2013; Delamare Le Deist & Winterton, 2005). Notably, the definitions also emphasize “other abilities” and abilities to apply skills, attitudes, and knowledge in various contexts for various tasks (e.g., Campion et al., 2011; Martinelli et al., 2010). In the light of focusing on the competence model to have an educational purpose, the understanding that competencies, defined in the way mentioned above, are changeable, learnable, and attainable through experience, training, or coaching (Man et al., 2002). Competency is a general capability based on knowledge, experience, values, and dispositions that a person has developed through involvement with educational practices (Hutmacher, 1997) and a set of skills, knowledge, and attitudes to be successful in specific situations (Wesselink & Wals, 2011; Bartram, 2005). As a summary, to give meaningful content for the term, it can be elaborated as it is done in the work of Vitello et al. (2021) – competence is the ability to integrate and apply contextually appropriate knowledge, skills, and psychosocial factors (e.g., beliefs, attitudes, values, and motivations) to consistently perform successfully within a specified domain.

According to the previous discussion, the competence model describes a combination of specific knowledge, skills, and other personal qualities required to perform effectively. The competence model should give a clear definition of each (sub)competence (Staskevica,

2019), including measurable or observable indicators (incl. learning outcomes). The holistic competence model contextualizes activities and skills, which are the prerequisites of competent action (Wesselink & Wals, 2011; Mulder, 2015). The main principles of the competency model development can be brought out: 1) The model focuses on achieving a clear and holistic understanding and definition of competence. Competence is a holistic concept (Vitello et al., 2021); 2) Competence is the set of the (sub)competencies necessary to describe the whole set of different skills, knowledge, and attitudes that are needed. Competence cannot be observed outside of a context (Hager & Gonczi, 1991); 3) The competence model does not prioritize or put sub-competencies to the hierarchy but brings out the general construct of competence; 4) The model focuses on the final stage of the target group development and describes the situation when the person is achieved at a minimum level. The model is not a progression model; 5) The model is descriptive, uses a learning-outcome-based approach, and therefore enables use as the basis of study programs and other educational goals; 6) The competence model focuses on constructive alignment (Biggs, 1996) which can be achieved only when the aim and definitions are transparent and aligned; 7) The critical aspect of knowledge and skills in competence is that it is applied, integrated, and adapted to meet the needs of the context (Oates, 2003).

According to the European Commission's (2020) definition, a Smart City is “a place where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business. A smart city goes beyond the use of digital technologies for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply and waste disposal facilities, and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an aging population”. This is one of the broader approaches to the Smart City, highlighting beyond the technological aspect and a little for the people/citizen layer. More modern definitions bring the human aspect into the light – no city without people. Angelidou (2016) presents an integrated model of the smart city comprising the following assets: human capital—citizen empowerment (informed, educated, and participatory citizens), intellectual capital and knowledge creation; social capital – social sustainability and digital inclusion; behavioral change – the feeling that we are all owners and equally responsible for our city; and humane approach – technology responsive to needs, skills, and interests of users, respecting their diversity and individuality. What is important is the recent evolution toward the concept of “smart city intellectual capital” (Dameri & Ricciardi, 2015). Manville et al. (2014) identify three key factors for successful smart cities: 1) a vision of social inclusion and participation; 2) people: inspired leaders to foster participative environments and empowered citizens; and 3) a sound process through the creation

of a smart city central office that coordinates a multi-stakeholder approach, maintains an open data availability, and communicates clearly the vision for the city. The layer of liveability can be perceived and added in terms of survival, that is, related to personal and environmental health, as well as to safety (Smith et al., 2013), being one of the most crucial city aspects that contributes to better urban quality of life (Weziak-Białowska, 2016).

Considering the different approaches of researchers from various fields to the definition of a smart city, the following functions/dimensions of a smart city can still be highlighted (Finger, 2018; Caragliu et al., 2011; Giffinger et al., 2007; Monzon, 2015; Stübinger & Schneider, 2020): Smart transport, Smart environment, Smart infrastructure, Smart services (use of technology and ICT to control and enable access to health, education, tourism, safety, etc. throughout the city), Smart (city) governance (smart (ICT-based) city management, including service provision, participation, and inclusion technology, application of technology and innovation to strengthen business development, employment, and city development and smart participation (communication between citizens and the city). Measures that increase people's creativity and open innovation and its application for the good of the city).

According to the given aspects and requirements, the Future Smart Citizen (FSC) is an individual who possesses a set of competencies, skills, and values that enable them to thrive in a rapidly changing world and contribute to the sustainable development of their communities and society. A Future Smart Citizen is knowledgeable, digitally literate, socially responsible, and globally aware. They can critically analyze complex problems, communicate effectively, collaborate with others, and use creativity and innovation to develop sustainable solutions to social, economic, and environmental challenges (Bibri, 2021). Future Smart Citizens are also emotionally intelligent, adaptable, flexible, and committed to promoting social justice, equity, and environmental sustainability. A Future Smart Citizen is a forward-thinking and proactive individual equipped to navigate the complex and interconnected challenges of the future and contribute to building a better world for all. Whether any FC should be smart to cope with the environment, the word "smart" should not be emphasised.

3. Methodology

A methodical mapping of FCC's core competencies was undertaken, drawing insights from existing models and scientific evidence. This process ensured a holistic approach, encompassing knowledge, skills, and attitudes vital for navigating future challenges (Figure 1).

A critical aspect of our methodology is the analysis of four key European competence frameworks: EntreComp, designed to foster entrepreneurship skills; LifeComp, focusing on lifelong learning; DigComp, addressing digital competence; and GreenComp, emphasising environmental sustainability, which provides invaluable insights.

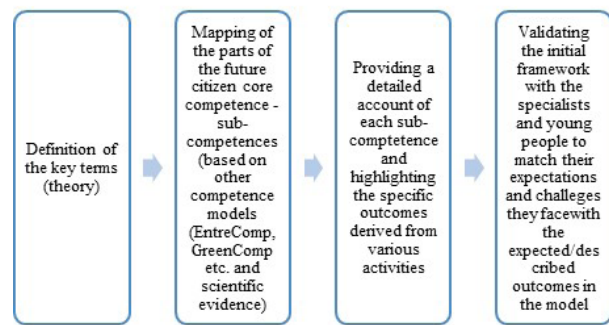


Figure 1. The process of creating the future citizen competence model

By aligning with these established frameworks, authors aimed to capture the multifaceted nature of Future Citizens and ensure our model resonates with contemporary challenges. Challenge was considered a key action 'sharing the challenges from local to European level and opening the access to solutions ideated in other territorial contexts promoting the idea that even if communities are different, challenges might be similar and solutions can be transferred. Scientific papers were analysed to lay an evidence-based foundation for the framework. Authors build up a process to work out the future citizen competence model.

The research team analyzed all the data collected through the activities described above, using the study objectives and the framework of understanding as guidance. Based on the requirements and principles that apply to the competence model, the expert group described the initial model as having 14 sub-competencies in three categories (vision-oriented, action-oriented, and values-oriented). In the next stage, the young people (aged 16–30, from 5 EU countries) assessed the described sub-competencies on a 5-point scale. They matched competencies with the possible real work scenarios where those competencies would be needed. Sub-competencies were divided between 5 workgroups; each group worked with the three sub-competencies. During the workshop, each group worked for 7–10 minutes on one "competence" with the list of skills needed, and they described real-life scenarios where this competence would be required. It can be scenarios that fail because the competence is not activated or scenarios that work well because it is activated and used correctly. A significant limitation is that each group worked with just three sub-competencies and didn't have a comprehensive overview of the whole model. According to their estimations and feedback, the described sub-competencies were analysed and improved if necessary, and the final list of Future Citizen competencies was confirmed.

4. Results and discussion

Following the research process and set topics, the model of the Future Citizen competencies was presented (Figure 2).

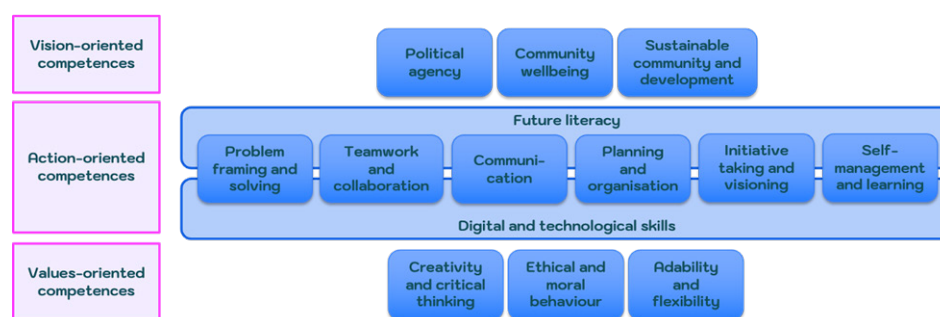


Figure 2. The Future Citizen competencies framework

The first three steps of the research process concluded with the list of the sub-competencies with the lists of learning outcomes. Validation gave valuable input for the learning outcomes level, but no sub-competencies were excluded in this stage. The short explanation for all sub-competencies above gives the definition and justifies its main contribution to the holistic Future citizen competence model.

Political Agency competence for FC refers to individuals' skills, knowledge, and abilities to engage actively in the political process, contribute to policymaking, and drive positive change in society. (Bianchi et al., 2022; Beaumont, 2010; Smith, 2013; David & Buchanan, 2020; Zhu & Alamsyah, 2022; van Twist et al., 2023). Future Citizen competencies play a critical role in shaping and in the visioning of political agency, which refers to an individual's ability to understand and participate in the policymaking process as well as to influence political decisions and policies that affect their lives (Zhu & Alamsyah, 2022; van Twist et al., 2023). This sub-competence enables individuals to analyse political decisions and policies, develop innovative political solutions, and promote political agency and social justice. By developing this, individuals can become effective political agents who envision and work towards a better future for themselves and their communities. In other words, individuals need to participate effectively in policymaking processes and contribute to developing policies that address the complex challenges of the 21st century.

Community wellbeing for FC refers to the knowledge, skills, and attitudes that individuals possess to actively promote individual and community safety, health, and wellbeing, which refers to the quality of life and contributes to the overall welfare and development of their communities (Bianchi et al., 2022; Sala et al., 2020; Vuorikari et al., 2022; de Waal & Dignum, 2017; Butot et al., 2020). This sub-competence is essential for promoting individual and community safety, health, and wellbeing, which refers to a community's quality of life and overall health. Future citizens with safety, health, and wellbeing competencies are aware of factors influencing health and wellbeing, such as individual behaviour, personal characteristics, and social and environmental factors. They are sensitive toward nature and sustainability issues (Butot et al., 2020). They know that our wellbeing, health, and

security depend on damage to human health and all life forms (precautionary principle). They promote and create nature-based solutions. Future Citizen competencies are critical for promoting community wellbeing and creating healthy, resilient, and sustainable communities.

Sustainable community and development competence for a Smart Future Citizen refers to the skills, knowledge, and abilities that enable active contributions to environmentally, socially, and economically sustainable communities. It involves understanding complex issues, promoting responsible practices, and generating innovative solutions to foster sustainability (Bacigalupo et al., 2016; Bianchi et al., 2022; Vuorikari et al., 2022; Sala et al., 2020; Kramers et al., 2014; Chen & Liu, 2020; Bibri, 2021). This competence is critical in promoting responsible, sustainable community and development, which refers to communities' vision and long-term development that balances economic, social, and environmental considerations (particularly regarding green issues) (Bibri, 2021). Responsibility refers to an individual's obligation to act in ways that contribute to society's greater good and wellbeing. At the same time, sustainability is the practice of meeting the needs of the present without compromising the ability of future generations to meet their own needs. This sub-competence enables individuals to develop innovative solutions to environmental challenges, promote sustainable practices, and contribute to creating healthy and resilient communities. In addition, this is essential for creating healthy, resilient, and sustainable communities that benefit current and future generations.

Future literacy competence for FC refers to the knowledge and skills of imagining diverse and multiple futures and using futures as lenses through which we look at the present as new (Bianchi et al., 2022; Sala et al., 2020; Bacigalupo et al., 2016; Vuorikari et al., 2022; Gazi, 2016; Lewis-Spector, 2016; de Waal & Dignum, 2017; Picatoste et al., 2018; Giachino et al., 2021). Future literacy is not only the ability to read and write; the term covers competencies and knowledge in specific contexts such as financial, digital, economic, and law. The main context of future literacy is knowing how to imagine the future and why it is necessary in all these fields (finance, economy, digital, law, sustainability), as the future can only be imagined (Giachino et al. 2021). Future literacy

improves the ability to harness the power of images of the future, enabling people to fully appreciate the diversity of the world and the choices they make.

Digital and technological competencies for FC refer to knowledge and skills to use technological and digital solutions, communication applications, and networks to access and manage information and interact with the digital world (Bianchi et al., 2022; Vuorikari et al., 2022; Sala et al., 2020; Ahvenniemi et al., 2017; de Waal & Dignum, 2017). Looking at the development of society, we can no longer imagine regular communication and daily transactions without technological or digital solutions.

Problem framing and solving competence for FC refers to the knowledge, skills, and attitudes that enable individuals to solve cross-disciplinary and real-world problems by applying cognitive skills in identifying problems, brainstorming, and analysing alternatives, and implementing the best solutions (Bacigalupo et al., 2016; Sala et al., 2020; Bianchi et al., 2022; Vuorikari et al., 2022; Ellerton & Kelly, 2021; Svihla et al., 2022; Jonassen, 2011). Future citizens have a good understanding of what happens around them either in society and in the community and what are the trends and processes which impact our rights and wellbeing. They can see their role and are willing to take it in finding solutions to societal problems and challenges.

Collaboration and teamwork competence for FC refers to the knowledge, skills, and attitudes that enable building and maintaining collaborative relationships to work effectively together as a team through shared responsibility, respect, and empathy to complete a shared goal for the common good (Bacigalupo et al., 2016; Sala et al., 2020; Bianchi et al., 2022; Vuorikari et al., 2022; Salas et al., 2008; Suto, 2013; Nguyen et al., 2020). Future citizens work together with others to achieve common goals. Teamwork is essential in every step of their activity and should be the basis for all the processes - ideation and initiation, planning, implementation, analysis, and improvement. Working together and collaborating with others to develop ideas and turn them into action. FC works with diverse stakeholders to create inclusive and participatory decision-making processes that promote collective action. Future citizens take a leading position if needed and can inspire and motivate others to follow the goal/vision. (Suto, 2013; Salas et al., 2008)

The communication competence of FC refers to using the relevant communication strategies, codes, and tools to express oneself and understand communication partners, achieve social goals, and cope with various social situations (Sala et al., 2020; Bianchi et al., 2022; Vuorikari et al., 2022; Chen & Wang, 2021; Zhu & Alamsyah, 2022). Future citizens with communication skills use critical thinking, relevant communication strategies, codes, and tools depending on the context. Communication skills are expressed in an individual's ability to cope in various social situations to achieve social goals, requiring mutual interaction where one expresses oneself and simultaneously tries to understand one's communication

partners. It combines communication skills with self-awareness, self-management, social awareness, responsibility, and ethical decision-making.

Planning and organisation competence for FC refers to the knowledge, skills, and attitudes that enable individuals to determine goals and priorities and assess the actions, time, and resources needed to achieve those goals (Bacigalupo et al., 2016; Sala et al., 2020; Bianchi et al., 2022; Pennetta et al., 2023). Planning means that FC thinks through activities and organizes them to reach a desired goal. Planning includes selecting, articulating, and evaluating the sequence of thoughts and actions that will lead to an expected goal. The prerequisite for successful planning is the ability to monitor and direct this process yourself, being aware of the goal, the steps leading to it in an appropriate order, and the ability to analyse after each action whether it brought you closer to the final goal. Each planning stage includes process monitoring and feedback on whether the sub-goal was reached. At the same time, the overall goal of the planned activity must be kept in mind, ensuring that the sub-stages of the action lead in the desired direction. Therefore, having the flexibility to change goals and means when the situation changes is part of good planning skills. Organisation means implementing planned activities based on plans but with the ability to change those according to the changes in environment or circumstances. Planning and organising are all about getting and keeping everything on track.

Initiative taking and envisioning competence for FC refers to the attitudes and ability to see something that needs to be done, spot opportunities to make a difference with the courage to act without being prompted by others (Bianchi et al., 2022; Bacigalupo et al., 2016; Wang et al., 2020; Barachi et al., 2022). For the further development of society, it is essential to look and see the future, find and spot new opportunities, and use them fearlessly and creatively.

Self-management and learning competence for FC refer to skills of keeping motivation and development, self-belief, and orientation to long-term goals and achieving results (Bacigalupo et al., 2016; Vuorikari et al., 2022; Sala et al., 2020; Igalla et al., 2019; Chen & Wang, 2021). Future citizens with self-management and learning skills are motivated, believe in themselves, and keep developing. They can set long-term goals and achieve the results. They stay focused and don't give up.

Adaptability and flexibility competence for FC refers to the knowledge, skills, and attitudes to integrate new information and draw conclusions from it, to anticipate and plan to allow for contingencies and varying behaviour based on the situation to suit those best around (Bianchi et al., 2022; Bacigalupo, et al., 2016; Sala et al., 2020; Galanti et al., 2023). The future labour market is more automated, digital, and dynamic. Considering that the world of the future is changing even faster than today and the future labour market is more automated, digital, and dynamic, the future citizen must be ready to cope with changes and adapt to new situations.

Ethical and moral behaviour competence for FC is the set of knowledge and action that defines right and wrong behaviour and compasses their behaviour to be in harmony with the ethical principles (Bianchi et al., 2022; Bacigalupo et al., 2016; Vuorikari et al., 2022; Sala et al., 2020; Dutta et al., 2022; Kulju et al. 2016). The ethical behaviour of FC means that he/she refers to rules provided by an external source, e.g., law, codes of conduct in the community, or principles in religions. Ethical behaviour is about following rules, keeping secrets, remaining loyal, and telling the truth. Moral behaviour reflects an individual's principles regarding right and wrong. Ethical behaviour is focused on improving how we live. By being moral, FC enriches their lives and the lives of those around them. Being a moral citizen means knowing all sides of the issue, understanding why things are the way they are, and being open-minded to diverse opinions. FC must understand the system before changing it. Assuming that the behaviour is conscious, behaviors aligning with ethical and moral values are chosen. The prerequisite for successful activity is, among other things, the existence and application of ethical values, beliefs, and virtues. An ethically thinking FC uses knowledge of societal norms, accepted practices, and values as advantages and opportunities to offer/create new value without harming stakeholders' interests.

Creativity and critical thinking competence refer to FC as the use of imagination or original ideas to create something and the ability to analyse facts, form a judgment, and think clearly and rationally when the situation demands it (Bacigalupo et al., 2016; Bianchi et al., 2022; Vuorikari et al., 2022; Sala et al., 2020; Dennett, 2013; Craft & Hall, 2015; Ellerton & Kelly, 2021; Barachi et al., 2022; Marangio et al., 2023). It is a form of emotional intelligence that effectively allows problem-framing, problem-solving, and decision-making.

All the sub-competencies are equipped with lists of expected outcomes based on what is possible to evaluate the achievement of competence and describe the minimum level of competence.

5. Conclusions

The Future Citizen competence model is created based on the educational methodology resulting from challenge-based learning and can be used as a capacity-building model for young people to become community problem solvers by applying product and service ideation and design methodologies. It is also a descriptive, learning-outcome-based model, facilitating its integration into educational programs and aligning with the principles of constructive alignment. It does not prioritise sub-competencies hierarchically but encapsulates the general construct of FCC.

The competency model adopts a holistic perspective, emphasising the interconnectedness of knowledge, skills, and attitudes within a specific context, such as future communities. To ensure relevance and effectiveness, the model underwent validation with specialists and young

individuals, aligning outcomes with expectations and real-world challenges. The model can be used to increase the competence of young people to be part of active citizenship, to become the motors of their closed societies and to develop skills that will make young people able to know how to identify the needs of their community, to edge the identified obstacles, to find solutions for them.

It can also be potentially applied to other members of the local communities, primarily adult, with their need, even if harder, to modify their behaviours to support young people in the struggle to detect and solve local challenges.

Our methodology blends the wisdom of established European competence models, empirical evidence, and stakeholder validation to craft a comprehensive Future Citizen Competence model. By acknowledging the dynamic nature of competence and its application in context, we pave the way for a forward-thinking, adaptable, and socially responsible generation of Future Smart Citizens.

Finally, we recognize a significant limitation in methodology: each group of young assessors worked with three sub-competencies and didn't have a comprehensive overview of the whole model. Another limitation is the small number of assessors and their education-oriented mindset as students. Since FC affects all young people, the assessors should include young people with different educational levels and social backgrounds in future studies, diversifying real-life scenarios.

The crucial keywords in future competencies are diversity, change, challenges, and development. It refers to quick changes in communities and ecosystems. Due to that, the limitation can be that the competencies may lose relevance quickly in some areas (e.g., digital and technological).

As our partners and our assessor were from EU countries, we encourage future studies to investigate the model and competencies in other cultural and social contexts outside Europe and examine their suitability in various ecosystems.

Topics for further investigation might include integrating the competencies and desired outcomes like the quality of life of a community or Smart City.

Acknowledgements

Successful projects are born only in cooperation. Thank you: FO Aarhus (Denmark), Fundatia Centrul Educativ Spektrum (Romania), Consorzio Materahub Industrie Culturali E Creative Scarl (Italy), Pot in Pot Società Cooperativa (Italy) and Dypall Network: Associacao Para O Desenvolvimento Da Participacao Cidadã (Portugal).

Our special thanks also go to Marina Jarvis, the long-term project leader on the Estonian side.

Funding

The creation of the model was supported by the Erasmus+ KA220-YOU [KA220-YOU-511CDAA6].

References

- Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities? *Cities*, 60, 234–245. <https://doi.org/10.1016/j.cities.2016.09.009>
- Angelidou, M. (2016). Four European smart city strategies. *International Journal of Social Science Studies*, 4, 18–30. <https://doi.org/10.11114/IJSS.V4I4.1364>
- Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). *EntreComp: The entrepreneurship competence framework*. Publications Office of the EU. <https://data.europa.eu/doi/10.2791/160811>
- Barachi, M., E., Salim, T. A.; Nyadzayo, M.W., Mathew, S., Badewi, A., Amankwah-Amoah, J. (2022) The relationship between citizen readiness and the intention to continuously use smart city services: Mediating effects of satisfaction and discomfort. *Technology in Society*, 71, 102115. <https://doi.org/10.1016/j.techsoc.2022.102115>
- Bartram, D. (2005). The great eight competencies: A Criterion-centric approach to validation. *Journal of Applied Psychology*, 90(6), 1185–1203. <https://doi.org/10.1037/0021-9010.90.6.1185>
- Bianchi, G., Pisiotis, U., & Cabrera Giraldez, M. (2022). Green-Comp The European sustainability competence framework. In Punie, Y., & Bacigalupo, M. (Eds.), EUR 30955 EN, Publications Office of the European Union, Luxembourg. https://green-comp.eu/wp-content/uploads/2022/02/jrc128040_greencomp_f2.pdf
- Bibri, S. E. (2021). Data-driven smart sustainable cities of the future: An evidence synthesis approach to a comprehensive state-of-the-art literature review. *Sustainable Futures*, 3, 100047. <https://doi.org/https://doi.org/10.1016/j.sfr.2021.100047>
- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, 32, 347–364. <https://doi.org/10.1007/BF00138871>
- Butot, V., Bayerl, P. S., Jacobs, G., & de Haan, F. (2020). Citizen repertoires of smart urban safety: Perspectives from Rotterdam, the Netherlands. *Technological Forecasting and Social Change*, 158, 120164. <https://doi.org/10.1016/j.techfore.2020.120164>
- Campion, M. A., Fink, A. A., Ruggeberg, B. J., Carr, L., Phillips, G. M., & Odman, R. B. (2011). Doing competencies well: Best practices in competency modeling. *Personnel Psychology*, 64(1), 225–262. <https://doi.org/10.1111/j.1744-6570.2010.01207.x>
- Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart Cities in Europe. *Journal of Urban Technology*, 18(2), 65–82. <https://doi.org/10.1080/10630732.2011.601117>
- Chen, L.-C., & Wang, T.-H. (2021). Scale for assessing undergraduates' interdisciplinary competences related to the smart living Industry. *Studies in Educational Evaluation*, 71, 101096. <https://doi.org/10.1016/j.stueduc.2021.101096>
- Chen, S. Y., & Liu, S. Y. (2020). Developing students' action competence for a sustainable future: A review of educational research. *Sustainability*, 12(4), 1374. <https://doi.org/10.3390/su12041374>
- Craft, A., & Hall, E. (2015). Changes in the landscape for creativity in education. In *Creativity in Primary Education* (3rd ed.), pp. 7–24. SAGE Publications, Inc. <https://doi.org/10.4135/9781473909403>
- Dameri, R. P., & Ricciardi F. (2015). Smart city intellectual capital: an emerging view of territorial systems innovation management. *Journal of Intellectual Capital*, 16(4), 860–887. <https://doi.org/10.1108/JIC-02-2015-0018>
- David, P. N., & Buchanan, A. (2020). Planning our future: Institutionalizing youth participation in local government planning efforts. *Planning Theory & Practice*, 21(1), 9–38. <https://doi.org/10.1080/14649357.2019.1696981>
- de Waal, M., & Dignum, M. (2017). The citizen in the smart city. How the smart city could transform citizenship. *Information Technology*, 59(6), 263–273. <https://doi.org/10.1515/itit-2017-0012>
- Delamare Le Deist, F., & Winterton, J. (2005). What Is Competence? *Human Resource Development International*, 8(1), 27–46. <https://doi.org/10.1080/1367886042000338227>
- Dennett, D. C. (2013). *Intuition pumps and other tools for thinking*. Allen Lane.
- Dutta, D., Mishra, S. K., & Budhwar, P. (2022). Ethics in competency models: A framework towards developing ethical behaviour in organisations. *IIMB Management Review*, 34(3), 208–227. <https://doi.org/https://doi.org/10.1016/j.iimb.2022.10.002>
- Ellerton, P., & Kelly, R. (2021). *Creativity and critical thinking*. In A. Berry, C. Bunting, D. Corrigan, R. Gunstone, & A. Jones (Eds.), *Education in the 21st Century: STEM, Creativity and Critical Thinking* (pp. 9–27). Springer. https://doi.org/10.1007/978-3-030-85300-6_2
- European Commission. (2020). *Smart City*. https://commission.europa.eu/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en
- Finger, M. (2018). Smart City – Hype and/or Reality. *IGLUS Quarterly*, 4(1), 2–6.
- Galanti, T., De Vincenzi, C., Buonomo, I., & Benevene, P. (2023). Digital transformation: Inevitable change or sizable opportunity? The strategic role of HR management in Industry 4.0. *Administrative Sciences*, 13(2), 30. <https://doi.org/10.3390/admsci13020030>
- Gazi, Z.A. (2016). Internalization of digital citizenship for the future of all levels of education. *Education and Science*, 41(186), 137–148. <https://doi.org/10.15390/EB.2016.4533>
- Giachino, C., Pattanaro, G., Bertoldi, B., Bollani, L., & Bonadonna, A. (2021). Nature-based solutions and their potential to attract the young generations. *Land Use Policy*, 101, 105176. <https://doi.org/https://doi.org/10.1016/j.landusepol.2020.105176>
- Giedd J. N. (2012). The digital revolution and adolescent brain evolution. *The Journal of Adolescent Health: official publication of the Society for Adolescent Medicine*, 51(2), 101–105. <https://doi.org/10.1016/j.jadohealth.2012.06.002>
- Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N. & Meijers, E. (2007). *Smart Cities – Ranking of European Medium-Sized Cities*. Vienna University of Technology.
- Hager, P., & Gonczi, A. (1991). Competency-based standards: a boon for continuing professional education? *Studies in Continuing Education*, 13(1), 24–40. <https://doi.org/10.1080/0158037910130103>
- Hutmacher, W. (1997). Key competencies in Europe. *European Journal of Education*, 32(1), 45–58.
- Igalla, M., Edelenbos, J., & van Meerkerk, I. (2019). Citizens in action, what do they accomplish? A Systematic Literature Review of Citizen Initiatives, Their Main Characteristics, Outcomes, and Factors, 30, 1176–1194. <https://doi.org/10.1007/s11266-019-00129-0>
- Jonassen, D. (2011). *Learning to Solve Problems. A Handbook for Designing Problem-Solving Learning Environments*. Routledge.

- Kramers, A., Höjer, M., Lövehagen, N., & Wangel, J. (2014). Smart sustainable cities e Exploring ICT solutions for reduced energy use in cities. *Environmental Modelling & Software*, 56, 52–62. <https://doi.org/10.1016/j.envsoft.2013.12.019>
- Kulju, K., Stolt, M., Suhonen, R., & Leino-Kilpi, H. (2015). Ethical competence: A concept analysis. *Nursing Ethics*, 23(4), 401–412. <https://doi.org/10.1177/0969733014567025>
- Lackeus, M. (2013). *Developing Entrepreneurial Competencies: An Action-Based Approach and Classification in Education* (Doctoral thesis). Chalmers University of Technology.
- Leijen, I., van Herk, H., & Bardi, A. (2022). Individual and generational value change in an adult population, a 12-year longitudinal panel study. *Scientific reports*, 12(1), 17844. <https://doi.org/10.1038/s41598-022-22862-1>
- Lewis-Spector, J. (2016). Building strong futures: Literacy practices for developing engaged citizenship in the 21st century. *The Australian Journal of Language and Literacy*, 39(1), 86–95. <https://doi.org/10.1007/BF03651909>
- Man, T.W.Y., Lau, T., & Chan, K.F. (2002). The competitiveness of small and medium enterprises. A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing*, 17(2), 123–142. [https://doi.org/10.1016/S0883-9026\(00\)00058-6](https://doi.org/10.1016/S0883-9026(00)00058-6)
- Manville, C., Cochrane, G., Cave, J., Millard, J., & Pederson, J. K. (2014). Policy department A economic and scientific policy. *Mapping Smart Cities in the EU*. European Parliament.
- Marangio, K., Carpendale, J., Cooper, R., & Mansfield, J. (2023). Supporting the Development of Science Pre-service Teachers' Creativity and Critical Thinking in Secondary Science Initial Teacher Education. *Research in Science Education*, 54(1), 65–81. <https://doi.org/10.1007/s11165-023-10104-x>
- Martinelli, R. J., Rahschulte, T. J., & Waddell, J. M. (2010). *Leading global project teams. The new leadership challenge*. Multi-Media Publications Inc.
- Monzon, A. (2015). Smart cities concept and challenges bases for the assessment of smart city projects. In *Proceedings of the International Conference of Smart Cities and Green ICT Systems*, Lisbon Portugal. <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7297938&tag=1>
- Mulder, M. (2015). *Professional Competence in Context – a Conceptual Study*. <https://www.researchgate.net/publication/302887715>
- Nguyen, D., Ng, D., Luo, W., & Mansor, S. (2020). Exploring the relationships between instructional leadership and teacher competences: Singapore primary school teachers' perceptions. *International Journal of Leadership in Education*. <https://doi.org/10.1080/13603124.2020.1731765>
- Oates, T. (2003). Key skills/key competencies: Avoiding the pitfalls of current initiatives. *Definition and Selection of Key Competencies: Contributions to the second DeSeCo symposium*, Geneva, Switzerland.
- Pennetta, S., Anglani, F., & Mathews, S. (2023). Navigating through entrepreneurial skills, competencies and capabilities: a systematic literature review and the development of the entrepreneurial ability model. *Journal of Entrepreneurship in Emerging Economies*, ahead-of-print. <https://doi.org/10.1108/JEEE-09-2022-0257>
- Picatoste, J., Pérez-Ortiz, L., Ruesga-Benito, S.M. & Novo-Corti, I. (2018). Smart cities for wellbeing: youth employment and their skills on computers. *Journal of Science and Technology Policy Management*, 9(2), 227–241. <https://doi.org/10.1108/JSTPM-04-2017-0014>
- Sala, A., Punie, Y., Garkov, V. & Cabrera Giraldez, M. (2020). *LifeComp: The European Framework for Personal, Social and Learning to Learn Key Competence*, EUR 30246 EN. Publications Office of the EU, Luxembourg. <https://publications.jrc.ec.europa.eu/repository/handle/JRC120911>
- Salas, E., Cooke, N. J., & Rosen, M.A. (2008). On teams, teamwork, and team performance: Discoveries and developments. *Human Factors*, 50(3), 540–548. <https://doi.org/10.1518/001872008X288457>
- Smith, L. (2013). Towards a model of critical information literacy instruction for the development of political agency. *Journal of Information Literacy*, 7(2), 15–32. <https://doi.org/10.11645/7.2.1809>
- Spencer, L. M., & Spencer, S. (1993). *Competence at Work*. Wiley.
- Staskevica, A. (2019). The Importance of Competency Model Development. *Acta Oeconomica Pragensia*, 27(2), 62–71. <https://doi.org/10.18267/j.aop.622>
- Stoof, A. (2005). *Tools for the Identification and De-scription of Competencies* (Thesis Dissertation). Open University of Nederland.
- Stübinger, J. & Schneider, L. (2020). Understanding Smart City – A Data Driven Literature Review. *Sustainability*, 12(20), 8460. <https://doi.org/10.3390/su12208460>
- Suto, I. (2013). 21st Century skills: Ancient, ubiquitous, enigmatic? *Research Matters: A Cambridge Assessment publication*, 15, 2–8.
- Svihla, V., Chen, Y., & Kang, S. “Pil”. (2022). A funds of knowledge approach to developing engineering students' design problem framing skills. *Journal of Engineering Education*, 111(2), 308–337. <https://doi.org/10.1002/jee.20445>
- van Twist, A., Ruijter, E., & Meijer, A. (2023). Smart cities & citizen discontent: A systematic review of the literature. *Government Information Quarterly*, 40(2), 101799. <https://doi.org/10.1016/j.giq.2022.101799>
- Vitello, S., Greatorex, J., & Shaw, S. (2021). *What is competence? A shared interpretation of competence to support teaching, learning and assessment*. Cambridge University Press & Assessment
- Vuorikari, R., Kluzer, S. & Punie, Y. (2022). *DigComp 2.2: The Digital Competence Framework for Citizens – With new examples of knowledge, skills, and attitudes*, EUR 31006 EN. Publications Office of the European Union, Luxembourg. <https://publications.jrc.ec.europa.eu/repository/handle/JRC128415>
- Wang, T., Olivier, D.F., & Chen, P. (2020). Creating individual and organizational readiness for change: conceptualization of system readiness for change in school education. *International Journal of Leadership in Education*, 26, 1037–1061. <https://doi.org/10.1080/13603124.2020.1818131>
- Wesselink, R., & Wals, A. E. J. (2011). Developing competence profiles for educators in environmental education organisations in the Netherlands. *Environmental Education Research*, 17(1), 69–90. <https://doi.org/10.1080/13504621003637037>
- Weziak-Białowolska, D. (2016). Quality of life in cities – Empirical evidence in comparative European perspective. *Cities*, 58, 87–96. <https://doi.org/10.1016/j.cities.2016.05.016>
- Zhu, Y.-Q., & Alamsyah, N. (2022). Citizen empowerment and satisfaction with smart city app: Findings from Jakarta. *Technological Forecasting and Social Change*, 174, 121304. <https://doi.org/10.1016/j.techfore.2021.121304>