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ScienceDirect

Procedia Computer Science 237 (2024) 107–114

Procedia Computer Science

www.elsevier.com/locate/procedia

International Conference on Industry Sciences and Computer Science Innovation

The use of IT and OER to support remote sustainable work in Europeans Green Economy

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Abstract

Remote work is becoming much more important in Europe. Employees are working from home and this means that they have to develop their digital skills concerning the use of computers and IT. They have to get accustomed to the use of software and need new transversal skills. Such skills and abilities will support them within the adaption process to the new accelerated international trend of working remotely. At home employees are often not so close to further education measures and knowledge management. Therefore, new ways of fostering the needed skills are required as well as modern ways how IT can support a modern knowledge management. Here, eLearning and Open Educational Resources are adequate ways to deals with these challenges. The article presents insights into results derived from the EU-project Reliable Green, which focusses on remote work in Europeans Green Economy.

Keywords: remote work; digital skills; Open Educational Resources (OER); IT, E-Learning, European Education, Green Economy: Sustainability

1. The current situation in the field of IT supported remote work

Nowadays, professional activity at the level of small and medium-sized enterprises is increasingly dynamic and in constant change. Digitisation is becoming a crucial aspect of workflows and daily tasks. Business reengineering processes have to take the opportunities of IT and industry 4.0 into account and this goes in line with global trends and

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1877-0509
10.1016/j.procs.2024.05.085

accelerated technological development. Before 2020, when teleworking was optional, a maximum of 5.4% of freelancers or SMEs in the occasional sectors worked from home. However, according to EU statistics compiled by EUROSTAT, in 2020 already 12,0% of the employed people aged 15-64 were usually working from home [1]. In 2018 more that 40% did this at least sometime or partwise [2]. After the COVID-19 pandemic working remotely regularly shooted up to 40% [3]. So, since 2020 over 40% of workers in the European Community moved to full telework and use IT as a working and communication tool. This trend continues to this day. This is further confirmed by the fact that EU statistics reflect the situation in such a way that over 50% of workers have no experience or only a few experiences in telework. Transition to such a new type of work organization is becoming more difficult with less experiences. And this may affect the productivity of employees and the companies. With regard to a short and medium term view the employees have to be supported in such a challenging transition process toward remote work.

In Europe we see a mismatch between the skills of employees and the needs and demands of the different parts of the labour market. This became already obvious in 2016, when the European Parliament discussed this situation [4]. Matching people to the right skills is important. The CEDEFOP stated in 2020: “It is estimated that, in 2020, 31.5% of all jobs will need tertiary-level qualifications and that around 34% of the labour force will have them.” [5]. This leads to business reengineering processes and digital transformation. To foster remote work this means that a culture of mistakes is necessary to create an excellent and fitting solutions, because the real situations in companies and at different IT and remote workplaces can be extremely different. The use of IT in remote work scenarios has become increasingly popular due to advancements in information technology and the appropriate use of the internet. IT enables employees to communicate and collaborate effectively without being physically present in the same location as their colleagues or employer. But, it influences the communication processes, too.

1.1. Remote work and the use of IT

Looking at the benefits of telework, this form of professional work organisation brings a number of challenges but also a number of advantages. One of the most often mentioned aspects are travel time savings and resource savings at the company [6 and 7]. Already in 2015 Bloom at al. found an increase in employee productivity when the worked from home or remotely [8]. Moreover, the employee can work from virtually anywhere and often enjoy a more flexible work schedule [9].

In addition, due to travel reduction and savings of offices this is a green professional approach which focusses sustainability. Characterised by less transfer to the workplace this approach can be associated with a reduction of pollutant emissions. This means a saving of mineral resources like oil.

IT offers an easy way of virtual communication, cooperation and collaboration [10]. Therefore, a clear need can be identified for the development of the necessary competences and approaches at the management level for the permanent integration of telework into the different professional activities. However, benefits of telework are currently not accessible to employers and employees who do not have the necessary skills and competences to organise work from home [11] provide the appropriate environment. Employees who do not have the necessary skills and competences face the risk of possibly even losing their jobs if this trend continues. In the worst case, this could lead to an increase in the unemployment rate at European level. There is therefore a need to redefine the competences and skills of employees at all professional levels. Remote work offers numerous benefits, such as flexibility, reduced commute times, and access to a wider talent pool which will be focused in the research provided here. However, it also comes with its own set of challenges that both employees and employers need to address. Some of the key challenges of remote work include exactly IT as well as communication and collaboration. Effective communication can be more difficult when team members are not physically present [12]. Misinterpretations, delays in responses, and difficulties in conveying tone can hinder smooth collaboration. IT support with conferencing tools and virtual meetings as well as digital communication tools may not fully replace all aspects of usual face-to-face interaction. In addition to that, this lack of social interactions and informal office conversations can impact mental well-being [13] and create a sense of detachment from the team. With regard to technology and connectivity a reliable internet connectivity and access to necessary technology are essential for remote work. Technical glitches, slow internet, or incompatible software can disrupt workflow and communication. Moreover, this can go hand in hand with security concerns and the wish for professional development, because remote workers might have limited access to in-person training and

networking opportunities which are often more accessible in traditional office environments. In addition to that, IT can also support performance evaluation because assessing the performance of remote employees can be more complex than evaluating those in an office setting. It requires well-defined metrics and consistent evaluation methods to ensure fairness.

1.2. The Reliable Green Project

The Reliable Green Project - ´Remote work, telework and learning with innovative and accessible educational resources for businesses and labor markets in Europeans Green Economy´ - is a European project in the field of vocational education and training and is funded by the ERASMUS+ programme of the European Union [14]. Research organisations and education providers from Cyprus, Germany, Ireland, Portugal and Romania work together to focus on the use of remote work and IT in VET and solutions for working from home as well as digital working solutions in European sustainable and green economy contexts and related training offers. The Reliable Green project is based on and aims for: (1) establishing a labour market centre at each partner country level to support the introduction of telework, (2) addressing the gap in the provision of vocational training for SME employees to improve their skills for remote work, (3) equipping VET tutors with skills, competences and attitudes needed for innovative and technology-oriented design, (4)Training activities and services for companies, (5) fostering the digital, social and cross-sectoral skills of SME employees to adapt to a teleworking environment, (6) improving the well-being, motivation and productivity of employees when working online, (7) creating innovative and easily accessible educational resources for innovative work practices, (8) developing an e-learning platform focused on self-assessment and training, accessible to all, (9) providing management tools for SME leaders to enable them to digitally manage organizational activities as well as (10) increasing the flexibility of working patterns at SME level.

2. Further Education and the use of OER to support remote work

The concept of providing learning, teaching, and educational resources freely was initiated back in 2001 through the project Open Courseware, abbreviated as OCW, by the Massachusetts Institute of Technology (MIT). In this endeavor, course contents were openly released as Open Educational Resources (OER) under the Creative Commons license, allowing unrestricted access, use, modification, and sharing by others [15-17]. OER currently encompass "educational materials, teaching aids, and research resources, in any medium, digital or otherwise, that are published under an open license or are in the public domain." OER's accessibility and cost-free availability facilitate an inclusive approach to education, overcoming spatial, temporal, and financial constraints [18].

Especially in the context of remote work, OER present a legally secure means of sharing, collaborative editing, and further development of knowledge, materials, and products, without violating copyright laws. Despite the evident advantages of using and creating OER – such as enhancing teaching and learning processes, improving the quality of educational resources, promoting media literacy, and addressing legal and licensing concerns, ultimately saving time [18] – OER adoption remains limited both in educational and corporate settings. This is primarily due to a lack of awareness about OER's potential, coupled with the absence of incentives from educational institutions and companies to encourage their utilization and creation [19]. To counteract this circumstance, Schneider (2023) has formulated specific recommendations for incentive systems and intervention measures aimed at promoting the creation and dissemination of OER across various levels of intervention [18]. On the micro-level, which pertains to the individual professional context, it becomes evident that individual training in handling OER fosters their use, creation, and sharing. This necessitates a foundational awareness and understanding of producing and exchanging OER within the educational context. Comparable to an "OER primer" [18], this basic knowledge includes topics such as understanding licenses, designing and releasing OER, as well as actively participating and contributing to OER platforms and networks. Attaining OER competencies can notably enhance work quality, particularly in remote work models, and contribute to improving the quality of work outcomes. Moreover, this approach facilitates building upon existing work, avoiding unnecessary duplication of efforts. The legal advantages stemming from OER's open licenses facilitate compliant sharing within internal colleagues as well as with external stakeholders such as clients, partners, or other interested parties. Simultaneously, it's essential for employers to encourage cooperative networks, which might offer

expert support and "Teach-the-Trainer" networks. Additionally, OER advisory services can help establish personal connections and dismantle barriers associated with OER utilization [18, 19]. These advisory services can complement digital, remote work setups, providing support in physical, in-person work environments. Furthermore, it's recommended to integrate regular training and professional development in the field of OER, including them in existing initiatives with diverse thematic focuses. This approach fosters awareness of OER across various contexts, communicating and actively promoting the associated opportunities and potentials. It's apparent that the requisite skills for handling Open Educational Resources should be an integral part of professional development efforts to harness the full potential of OER and support education in an inclusive, cooperative, and sustainable manner. Specifically, the cultivation and acquisition of the following OER competencies should be imparted and obtained through fundamental OER training to meet contemporary professional demands [18, 20]:

Table 1. OER-Primers – Core Competencies

OER-Core Competencies	Description
Licensing Knowledge and Copyright Aspects	- Understanding of different license variants, their significance, and their impact upon usage
	- Knowledge of copyrights, fair use, Creative Commons licenses, and other legal aspects is necessary to ensure that OER can be used in compliance with applicable laws
Creation and Editing of OER	- Ability to create, adapt, edit, and expand content in the form of texts, images, videos, or other media
	- Encompasses proficiency in using tools for creating and editing digital resources
Sharing and Publishing of OER	- Understanding how to effectively publish OER and make them available on suitable platforms
	- Includes choosing the appropriate license, uploading to OER platforms, and providing metadata
Evaluation of OER	- Ability to assess the quality and suitability of existing OER for specific educational and work contexts
	- Encompasses the ability to assess the accuracy, currency, and relevance of resources
Media literacy	- Understanding the use of media formats and tools to design OER engaging, user-friendly, and effective
	- Includes the ability to create and integrate multimedia content
	- Involves the use of technology tools and platforms for creating, editing, publishing, and networking OER
Collaboration and Networking	- Ability to work in collaborative environments, share resources, and learn from others
	- Involves participation in online communities and networks to exchange knowledge and experiences

In summary, it can be stated that OER are relevant for the continuously evolving work environment, particularly characterized by the growing structures of remote work. In this context, substantial potentials and opportunities are manifested. The benefits of adaptable spatial and structural work modalities can be harnessed in new work paradigms through the application of OER: (a) due to the flexibility of OER, which allows creators spatial and temporal autonomy, (b) through legal certainty, and (c) by establishing networks and communities. At this juncture, consideration should also be given to an internal OER network within the company, enabling both internal and external employees to access existing materials during remote work as well as in the operational context. It would also be feasible to store or collaboratively develop created materials within this network. The implementation of procedural rules and guidelines can systematically accompany this process of establishing and consolidating the OER network, rendering it transparent in its individual steps. Furthermore, it should be emphasized that existing knowledge transfer platforms, repositories, and repositories can be expanded and updated with information about Creative Commons licensing. In this way, the established structures that have already been successfully integrated into operational processes can persist and serve as the foundation for further development. This approach leads to a reduction in costs and temporal resources that would otherwise be required for establishing an entirely new OER network [18].

All of these structural considerations and implementations can also be imparted and practiced through Deeper Learning training programs in individual self-learning phases, in the in-person phases of a course, or in combinations within Blended Learning concepts [21]. The fundamental contemplation on the nature, scope, and design of learning and teaching holds pivotal importance for both corporate and educational deliberations. It contributes to solidifying

and expanding the potentials of OER. Deeper Learning, in this context, emphasizes a deeper understanding, critical thinking, and applicable skills [22]. In contrast to mere knowledge dissemination, competency-based learning takes precedence. Active and collaborative methodologies encourage employees and supervisors to explore both existing and novel concepts, yielding profound insights. The aim is to prepare employees for complex tasks by creatively applying and harnessing their knowledge. This approach fosters sustainable engagement within an evolving world.

The deliberation concerning the design of learning and teaching is fundamentally significant for businesses and schools alike. Especially within the context of Deeper Learning, this reflection can bolster the potential of OER. This foundational consideration about the modality, extent, and configuration of learning and teaching represents a fundamental element within the broader corporate and educational discourse. This has the potential to fortify and enhance the capacities of OER.

3. Insights in results on the use of IT and OER in remote work derived from the project Reliable Green

Within the European Reliable Green Project, we contacted 172 persons working remotely from home using IT, especially conferencing tools, databases and office applications. 125 individuals responded to our questionnaire. The basis for the questionnaire were 12 interviews in which we focused on benefits and challenges of remote work and the requirements of working from home. These interviews were analysed according to qualitative standards using content analysis with regard to basic structures of Mayring 2000 [23]. We combined this with elements of Strauss / Corbin 1998 [24]. We added interview tables and used MAXQDA for labelling and text analysis as well as paraphrasing. The interview participants pointed on the following benefits of working remotely with IT support: ´Enhancement of productivity, Time savings for commuting, Money savings, Flexibility concerning the work schedule, Possibility to work from virtually anywhere, Increasing motivation, Better work-life balance, Having own working times, Gaining distance from office politics, Having an individual workspace, Feeling of local independence, Recognising a positive environmental impact, Less stress, Improving inclusivity of the company, Freedom for employees, Increasing job satisfaction and Increasing concentration.´ In addition to that the interviewed persons were also able to share risks and challenges they recognise, when it comes to of working remotely with IT support: ´Leading a group is more difficult, Teamwork is challenging, Disturbance from family and children, General distractions at home, Risk of losing work-life balance, Risk of isolation, Feeling of being disconnected, IT and Internet challenges, Energy cost at home increases, No or less face-to-face contacts, Decreased collaboration, High technological dependency, Missing promotion opportunities, Lack of a designated workspace, Lack of insight into employee activities, More management responsibilities and Signs of fatigue.´ Theses interviews helped to create the items of the questionnaire, into which we´d like to present some insights concerning the results here. We conducted the interviews in June and July 2023 and the 125 respondents include 61 female and 63 male persons. No responded reported under the diverse option. With regard to the question ´How do you feel about the situation concerning remote work / telework?´ 44.26% of the female answered with good or excellent and 58.73% of the male also answered this way.

Table 2. How do you feel about the situation concerning remote work / telework? In percent.

	excellent	good	fair	poor	bad
female	13.11	31.15	11.48	32.79	11.48
male	19.05	39.68	7.94	23.81	9.52

With regard to IT and its effect on remote work 77.6% of the participants answered, that there will be a relative strong / strong or very strong increase of the intensity of remote work in the next five years.

Table 3. To what intense will remote work and work from home fostered by IT increase within the next five years?

	no change	very weak	weak	relatively weak	relatively strong	strong	very strong	no answer
absolute frequency	7	5	4	8	26	42	29	4
relative frequency in percent	5.6	4	3.2	6.4	20.8	33.6	23.2	3.2

With regard to the question if the respondents have all IT support they need while working remotely 44.8% agreed. But, 54.4% stated that there is need for more support and just 0.8%, which was only one person, stated that less support would be appropriate. Due to the fact that Reliable Green is an educational project in the field of remote work and green solutions we also asked if sustainability and sustainable work is fostered by remote work with IT support. The mean of this question was 2.3. which indicates an average answer between ´just a bit fostered´ and ´fostered´, which underpins that remote work with IT support is not effectively fostering sustainability / sustainable work.

Table 4. Is sustainability and sustainable work fostered by remote work which is supported by IT? In percent.

	4 Totally fostered	3 fostered	2 Just a bit fostered	1 Not fostered
absolute frequency	5	57	34	29
relative frequency in percent	4.0	45.6	27.2	23.2

With regard to OER and its use within IT supported remote work the participant gave a set of different answers. They see the importance of OER and 82.4% agreed totally or agreed to the wish that OER competences should be developed at employees who work remotely.

Table 5. OER within IT supported remote work. In percent.

	4 Totally agree	3 agree	2 disagree	1 Totally disagree	0 No comment
OER are important in further education.	67.2	15.2	12.8	4,8	0
Companies should increase the use of OER.	58.4	8.0	20.8	12	0,8
OER can easily promoted within IT supported remote work	52.0	8.0	23.2	15,2	1,6
OER can be used within IT supported remote work	57.6	11.2	18.4	9.6	3,2
OER competences should be developed at employees who work remotely	74.4	12.0	10.4	2.4	0,8

Concerning the benefits mentioned in the interviews the participants of the questionnaire provided feedback if they agree or disagree with these benefits of working remotely with IT support. Here it became obvious that most agreed (agree + totally agree with more than 85%) benefits are (a) Work from virtually anywhere (95.2%) (b) Save time for commuting (94.4%), (c) Flexible work schedule (92.0%), (d) Individual workspace (90.4%), (e) Save money (88.0%), (f) Increasing concentration (87.2%) and (g) Increasing job satisfaction (86.4%).

The three mentioned benefits which got the lowest agreements were (1) Improving inclusivity of the company (44.8%), (2) Freedom of Employees (58.4%) and (3) Gain distance from office politics (60.0%)

Table 6. Benefits of remote work fostered by IT? In percent.

	4 Totally agree	3 agree	2 disagree	1 Totally disagree	0 No comment
Enhance productivity	19.2	51.2	20.0	6.4	3.2
Save time for commuting	76.8	17.6	4.8	0.0	008
Save money	62.4	25.6	8.8	3.2	0.0
Flexible work schedule	73.6	18.4	8.0	0.0	0.0
Work from virtually anywhere. ...	88.0	7.2	4.8	0.0	0.0
Increase motivation	64.8	15.2	7.2	12.8	0.0
Better work-life balance	65.6	13.6	8.0	12.8	0.0

Have your own working times	63.2	28.8	5.6	2.4	0.0
Gain distance from office politics	34.4	25.6	21.6	16.8	1.6
Individual workspace	73.6	16.8	7.2	2.4	0.0
Local independence	65.6	16.8	8.8	7.2	1.6
Positive environmental impact	50.4	16.0	29.6	3.2	0.8
Less stress	39.2	26.4	25.6	8.8	0.0
Improving inclusivity of the company	25.6	19.2	43.2	9.6	2.4
Freedom for employees	32.8	25.6	21.6	19.2	0.8
Increasing job satisfaction	64.0	22.4	7.2	5.6	0.8
Increasing concentration	69.6	17.6	6.4	4.8	1.6

With regard to the challenges and risks mentioned in the interviews the respondents of the questionnaire offered information if they agree or disagree. All challenges and risks mentioned in the questionnaire are also always focussing on working remotely with IT support. The participant mostly agreed (agree + totally agree with more than 85%) to the following four challenges and risks: (a) Teamwork is challenging (90.4%) (b) Disturbance from family and children (88.0%), (c) Risk of losing work-life balance (87.2%) and (d) Risk of isolation (85.6%).

The three mentioned challenges and risks which got the lowest agreements were (1) Lack of a designated workspace (27.2%), (2) Leading a group is more difficult (28.8%) and (3) Energy cost at home increases (31.2%).

Table 7. Challenges of remote work fostered by IT? In percent.

	4 Totally agree	3 agree	2 disagree	1 Totally disagree	0 No comment
Leading a group is more difficult	14.4	14.4	43.2	7.2	20.8
Teamwork is challenging	74.4	16.0	8.8	0.0	0.8
Disturbance from family and children	68.8	19.2	7.2	4.0	0.8
General distractions at home	43.2	16.8	8.0	19.2	12.8
Risk of losing work-life balance	81.6	5.6	7.2	4.8	0.8
Risk of isolation	76.8	8.8	4.8	9.6	0.0
Feeling of being disconnected	65.6	15.2	6.4	12.0	0.8
IT and Internet challenges	55.2	18.4	14.4	12.0	0.0
Energy cost at home increases	15.2	16.0	52.0	15.2	1.6
No or less face-to-face contacts	64.0	9.6	20.8	4.8	0.8
Decreased collaboration	60.0	17.6	10.4	11.2	0.8
High technological dependency	72.0	9.6	10.4	7.2	0.8
Missing promotion opportunities	33.6	28.0	28.8	8.8	0.8
Lack of a designated workspace	12.0	15.2	51.2	20.8	0.8
Lack of insight into employee activities	41.6	32.8	13.6	11.2	0.8
More management responsibilities	57.6	16.0	12.8	11.2	2.4
Signs of fatigue	27.2	12.8	43.2	16.8	0.0

4. Conclusions

With this research we can underpin the importance of sustainability and the use of OER in remote work to foster further education. We could find that benefits and challenges of remote work with support of IT are often discussed but not seen by the remote workers at the same level of agreement. Therefore, we were able to identify benefits and

risks which are more in focus of the remote workers and which may be more in focus when it comes to the design of educational solutions with IT support to be more recognized by the remote worker. For future research this means that there has to be a focus on didactic and pedagogical concepts to address these benefits and challenges via OER support in an adequate way. Here also a fitting IT environment has to be taken into account.

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