PRO PUBLICO BONO – Public Administration, 2024/1, 127–144. • DOI: 10.32575/ppb.2024.1.6

Tuomo Alasoini

DIGITAL TOOLS USER GROUPS AS A DIGITAL DIVIDE AMONG FINNISH EMPLOYEES

Prof. Tuomo Alasoini, PhD, Research Professor, Finnish Institute of Occupational Health, tuomo.alasoini@ttl.fi

Based on Statistics Finland's Quality of Work Life Survey 2018, this paper seeks how Finnish employees' use of digital tools differs from each other, what sociodemographic and work context-related factors these differences are connected to, and how differences in usage are reflected in the effects of digitalisation on employees' work. The research identified five user groups. Nearly half of the employees are classified as Skilled Users, which are typically of a young age. Challenges for other groups include deficiencies in digital skills, problems in learning to use digital tools, routine-like usage, low learning demands at work, and a high workload and learning pressure arising from intensive use of digital tools. The results support the sequential and compound digital exclusion arguments derived from previous literature, but do not fully support the stratification argument. The paper shows that among employees there are digital divides of various types. Narrowing these gaps requires different policies and customised solutions.

Keywords:
digital divide, digital exclusion, digital skill, digital tool, digitalisation, inequality, user group

INTRODUCTION

New technologies have the potential to increase productivity and economic well-being, but their introduction and experimentation phases often bring about tensions and heighten inequality. This tendency seems to also apply to digital transformation.[1] The inequalities resulting from digitalisation are called digital divides. Digital divides have been theorised and studied from many perspectives, including social capital theories, disability theories,

[1] Baldwin 2019; Brynjolfsson–McAfee 2014; Frey 2019.

spatial theories, theories of technological acceptance and diffusion as well as theories of the social construction and shaping of technologies. The research on digital divides started in the 1990s with the spread of the use of the internet. At first, the focus was on the differences between internet users and non-users (first-level divide). Next, the focus shifted to the differences in the ways digital tools are used (second-level divide). In the latest phase, the research has expanded to the differences in how people are able to benefit from digitalisation (third-level divide).[2]

Although Finland appears in international comparisons as a well-developed information society where citizens have high digital skills, digital divides also exist there. Digital divides are manifested, for example, in how well citizens know how to use various publicly available online services.[3] Tens of thousands of adult citizens in the country have insufficient access to digital tools or who have only a poor ability to use them due to insufficient equipment, lack of skills or physical or language limitations. These difficulties apply especially to elderly people and people with a low level of education.[4] Digital divides also plague Finnish working life. According to the Working Conditions Survey 2020 of the Central Organisation of Finnish Trade Unions (SAK), 28% of its union members felt that they were sometimes "at the mercy of technology" at work.[5] Most of the members of SAK unions are blue-collar workers whose digital skills are on average inferior to those of higher-educated white-collar employees. Another recent Finnish study supports this view, revealing clear differences between the digital information skills of production workers and clerical staff among employees of the metal industry.[6]

Digital divides are a socio-politically significant issue both at the global and national levels.[7] In industrialised societies, they can exacerbate social inequality, increase the risk of exclusion from working life and society, hamper opportunities to prolong an individual's career and raise the employment rate, impair well-being at work, slow down the realisation of the productivity gains made possible by digital technologies, and increase criticisms of technology and anti-technology attitudes in society. Despite many studies on the effects of digitalisation on work, there has been little research on the digital divide in the world of work in Finland.

This paper explores three research questions. The first of these concerns how employees' ways of using digital tools differ from each other in Finland. Secondly, the paper asks what sociodemographic and work context-related factors these differences are connected to. The third research question examines how the differences in usage are reflected in the effect of digitalisation on employees' work. The study focuses on the second-level divide, which is referred to here as the usage gap.

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2 Ragnedda–Muschert 2018.
3 Heponiemi et al. 2023.
4 Korjonen-Kuusipuro et al. 2022.
5 SAK 2020.
6 Saikkonen 2022.
7 Mazzucato 2021.

The study draws on van Dijk's Resources and Appropriation Theory.[8] Specifically, the paper examines the findings in the light of arguments concerning the stratification of inequalities already existing in the offline world of work in the digital world, and the compound and sequential digital deprivation arising from the application of digital technologies at work. As its main source of empirical data, the study uses Statistics Finland's Quality of Work Life Survey 2018. The novelty of the paper lies in its application of research conducted on digital divides among citizens to the context of working life and the creation of the concept of "digital tools user group" as the basis of the analysis. The research was conducted as part of the "Digitalisation for All" research project (2020–22), funded by the Finnish Work Environment Fund and the Finnish Institute of Occupational Health.

The paper first briefly reviews the research on the digital divides and sheds light on the novelty of the study. This is followed by a presentation of the research data, the target group, and the research methods and variables. The paper concludes with the results and discussion.

Digital divides as objects of research

At the beginning of the 2000s, the focus of research on digital divides shifted from differences in access to the internet to differences in the usage patterns of different people, as the use of the internet became more common in industrialised countries. The main objects of research since then have been the determinants of digital skills and the use of digital tools. A third emerging theme has been the determinants of outcomes of use.

In their systematic literature review, Scheerder and her associates identify four types of digital skills.[9] Medium-related skills describe a person's technical ability to use digital tools. Content-related skills describe the ability to use digital tools for strategic, creative, and social purposes. Safety- and security-related skills consist of abilities that help individuals to use digital tools in a safe, socially acceptable and ethically sustainable way. General skills, according to Scheerder and her associates, are both general internet skills and digital competence and digital literacy. Content-related and general skills have been the focus of most studies. The most common variables used to explain skill differences have been gender, education, age, socioeconomic status of the family, and duration of internet use.

Another way of categorising digital divides is to separate operational, information navigation-related, social, and content creation skills.[10] Operational skills refers to the basic technical skills required to use the internet. Information navigation skills involves skills that help to find, select, and evaluate information on the internet. Social skills include the abilities that enable people to communicate successfully with others and function online

[8] Van Dijk 2005.
[9] Scheerder et al. 2017.
[10] Van Deursen – Helsper 2018.

through shared understanding, and the acquisition of social capital. Content creation skills refer to the ability to create content online that others appreciate.

Operational and information navigation skills have been called Web 1.0 skills. Web 1.0 refers to a version of the internet, whose pages are static and based on the server's file system. Social and content creation skills have been called Web 2.0 skills, referring to an internet whose pages are dynamic and enable users to filter or create content themselves.[11] Web 1.0 and Web 2.0 skills thus provide individuals with opportunities to pursue very different types of activities in digital environments, both at work and in life in general.[12]

Another main focus of this research has been the purpose of using digital tools. The divisions connected to the purpose of use have also been the basis for research on the benefits of use of digital technology.

Scheerder and her associates identify four main categories of the purpose of use.[13] Financial purpose refers to use where people aim to influence their employment, education, income, property and wealth. The motivations for cultural use are the strengthening of identity and cultural commitment. The third purpose of use concerns social goals. Guided by these aims, people join various networks and/or strive to participate in and influence administrative, political or other processes. The fourth purpose is personal goals. These are related to, for example, health, well-being, self-realisation, or entertainment. Social and personal uses have been the most frequent subjects of research. The most common variables to explain differences in intended use have been gender, age, education level, family income, labour market status, place of residence, and ethnic background.

The following three arguments that stem from previous research on digital divides form a framework to which the results of this study will be compared below.

According to the first argument, called the stratification hypothesis, a positive link exists between a person's corresponding fields of resources (economic, cultural, social and personal) in offline and digital contexts. In other words, specific areas of social and digital inclusion/exclusion influence each other. Digital divides among people are not randomly distributed, and they are not independent of social divides existing in society.[14]

The second argument, known as the compound digital exclusion hypothesis, assumes that there is a connection between different digital resources. For example, a person who has deficiencies in one type of digital skill, probably also has deficiencies in another. Correspondingly, if a person is unable to benefit from digitalisation in one area, (s)he will not be able to benefit from it in another. The underlying idea is that deficiencies in different types of digital skills accumulate, as does the inability to use digitalisation for various purposes and to benefit from the use of digital technologies.[15]

[11] Van Deursen et al. 2017.
[12] Neff–Nagy 2019.
[13] Scheerder et al. 2017.
[14] Helsper 2012.
[15] Van Deursen et al. 2017.

The third argument, called the sequential digital exclusion hypothesis, assumes a connection between the first-level, second-level and third-level digital divides. A person who is in danger of falling into one of these divides is also in danger of falling into another. In more concrete terms, those who have poor access to digital tools will probably also lag behind in the development of digital skills, will use digital tools in a more routine-like manner, and will not be able to benefit from their use in the same way as those with better access or higher skills.[16]

RESEARCH DESIGN AND ITS NOVELTY VALUE

The study makes use of previous research on digital divides, which focused on citizens in general in order to examine the divides between employees. The surveys aimed at citizens contain many findings that probably also apply to digital divides in the context of work. For example, the claim that even if one possesses good Web 1.0 skills without good Web 2.0 skills, this is not sufficient to create particularly favourable conditions for people to benefit from digitalisation is also true in working life. An increasing number of people are doing knowledge work, which requires critical and analytical thinking, creativity, continuous learning, social intelligence, self-direction, and ethical and cultural awareness.[17] It is hardly possible to acquire or maintain such skills without versatile (Web 2.0) digital skills.

The clearest difference when talking about digital divides between citizens and more specifically between employees is that the use of digital tools by employees is guided by the work context. The term "work context" refers to how the work that employees do is managed, organised and designed. The most important difference resulting from this is that while the use of digital tools as a citizen is affected by an individual's skills and motivation as such (including possible physical, linguistic or financial limitations), the use of digital technologies as an employee is also affected by the fact that the work is done with the employer's tools and under the direction of the employer. In a work context, an employee's use of digital tools is less autonomous than her/his use of them as a citizen. The work context-relatedness of employees' use of digital tools means that the same person, as a citizen and as an employee, may be in different positions in terms of how they use and benefit from digital tools. For example, a person who is an active and skilled user of digital tools in her/his free time may only have a limited access to digital tools at work, or her/his way of use of such tools may be significantly restricted due to the nature of the job. A person who is in the usage gap as an employee does not have to be in the gap as a citizen.

[16] Van Deursen et al. 2017.
[17] Van Laar et al. 2017.

In research aimed at citizens, the focus has typically been on the use of the internet.[18] There are also theoretical grounds for this limitation when studying digital divides in working life, because the use of the internet means a more radical change at work compared to the use of any single digital tool. The use of a digital tool, such as a computer and computer software, is about the reconstruction of the interaction between human and machine. The use of the internet represents a more radical change because it also involves a significant restructuring of the interaction between human beings. Information becomes easier and faster to acquire, share and update. The internet can be characterised as a new, globally available and collective information space for human activity.[19]

However, this study will not be limited to the use of the internet. The research-related justification for this is that in different jobs, the work tasks can differ significantly, for example due to the need and nature of the interaction or information processing required by the tasks. Limiting the investigation to the internet would leave out many of those of the analysis who might still make versatile use of some other digital tools in their work. In Statistics Finland's Quality of Work Life Survey, it is also not possible to distinguish unequivocally between those who use the internet at work and non-users, nor to determine the specific ways in which the internet has affected their work.

Popular literature contains many ways of characterising people based on their relationship to digitalisation. Some of the most well-known characterisations include digital native, digital immigrant, digital nomad, digital addict, digital winner, and digital loser. Many of these concepts are vague in content, and do not have a clear theoretical or research basis. Instead of relying on these categories, this paper aims to form groups based on statistically representative material that describes the way employees use digital tools. The user group consists of employees who have the same competence, motivation and learning challenge regarding digital tools in their work context. By grouping employees, the aim is also to create a more structured picture of the various positions that employees can have in relation to the digital divides, compared to a mere analysis of individual differences.

RESEARCH DATA AND TARGET GROUP

The data used in this research are based on Statistics Finland's Quality of Work Life Survey 2018, the target group of which are employees who regularly work at least 10 hours a week. The survey is well suited as a material for exploring this topic, as its special theme was digitalisation. The research material was collected through face-to-face interviews between September 2018 and January 2019. The sample was selected from those who participated in the labour force survey of Statistics Finland. Of the 6,153 people meeting the sample criteria, 4,110 were interviewed with a response rate of 66.8%. The bias of the

[18] Ragnedda–Muschert 2018.
[19] Boes et al. 2017.

data has been corrected with weighting coefficients to correspond to the target group of employees who work at least 10 hours a week, taking into consideration gender, age, province of residence, educational level and socioeconomic group. The age range of the target group is from 15 to 67 years.[20]

Two questions are in the survey that can be used to distinguish those who use digital tools at work from non-users. To the question "Do you use IT equipment at work?" 8.5% answered negatively. To the second question, which inquired separately whether the respondent uses the eight mentioned digital tools, 10.3% answered negatively to each point. 5.3% answered negatively to both questions, which were eliminated from the study's target group. Of the eight options given in the latter question, the most frequently used tools were real-time instant messaging tools (e.g. WhatsApp and Skype for Business). Such tools also represent the least demanding use of the eight options, which is why those for whom real-time instant messaging tools were the only digital tools applied at work were also excluded. With these limitations, the total proportion of excluded employees raised to 6.7%. Nearly all (94%) of the excluded employees were blue-collar workers, the largest occupational group among them being construction workers.

The size of the target group was thus reduced to 3,835, of which 24% were blue-collar workers, 43% were lower-level white-collar employees and 33% were higher-level white-collar employees (mainly professionals, associate professionals and managers). The group was almost equally divided between men (49%) and women (51%). The median age of the target group was 42 years.

RESEARCH METHODS AND VARIABLES

To form user groups, the questionnaire used in the survey was reviewed with the aim of finding the questions that would best describe the employees' perception of their skills, learning ability and motivation as users of digital tools in their work. The three questions chosen were the following: "Does the inadequacy of your own IT or digital skills slow down the performance of your work tasks?" (yes/no), "Does your work involve the following insecurity: fear of not learning how to use new technology well enough?" (yes/no) and "Which description of these do you think best describes you and your digital skills at work?" In the last question, the respondents were offered four options: 1. you master excellently the digital tools related to your work, you are enthusiastic about them and you also learn more of them in your own time; 2. you master well the digital tools you use at work and you may have the ability to advise others on their use as well; 3. you master exactly those digital tools that you need in your work; and 4. your digital skills do not seem to be sufficient for your work. Those who chose the first or second option were considered to have high digital skills and motivation. The other end of the dichotomised variable was formed from options three

[20] Sutela 2019.

and four (low digital skills and motivation). User groups were formed by cross-tabulation based on dichotomised variables. More complex statistical grouping methods such as cluster analysis were not used, because there were only few grouping variables and cross-tabulation produced theoretically meaningful results for further analyses.

The groups' use of digital tools was examined in relation to five questions. These concerned the use of digital tools as a proportion of total working time, the number of digital tools used at work, the need to learn how to use new digital tools at work, the effect of the slowness or malfunctions of digital tools on the work, and support received for the use of digital tools at work. Here, as in subsequent analyses, cross-tabulation was used, where variables describing differences between groups were tested with the Chi-square test. Differences between user groups were identified by testing statistically significant differences between cells with a post hoc column proportion z-test (IBM SPSS Survey Reporter 6.0.1./Column Proportion Test). The data were analysed using the SPSS statistical program version 25.

The differences between the groups were examined in terms of three sociodemographic background factors (gender, age, and three-level basic education level) and three work context factors. The latter were three-level socioeconomic status, occupation, and industry. To define the occupations, the national Classification of Occupations 2010 by Statistics Finland was used, which is based on the ISCO-08 occupational classification of the International Labour Organization. The classification was done on a 1-digit level, which divides occupations into ten groups. In the industry classification, Statistics Finland's TOL-2008 classification was used, which is based on the European Union's NACE industry classification. The classification was carried out at the main category level of industries.

Finally, we investigated how the groups differ in terms of the effects of digitalisation on work. The Quality of Work Life Survey asks "How do you think the digitalisation of work has affected your own work?" Respondents can choose between nine different effects. In addition, the survey inquires "Has your opportunity to use creativity at work improved with digital tools?" From among the questions, we chose the four that would most clearly describe the benefits vs. disadvantages of using digital tools for the employee. The selected benefits were creativity and, from the first question, work efficiency, and the disadvantages were workload and supervision of work, which we considered to constitute a limitation of work autonomy.

RESULTS

At first, user groups were formed, and their different experiences with the use of digital tools were analysed. Next, the composition of the groups was examined. Finally, the effects of digitalisation on the work of the group members were studied.

Identifying user groups

By cross-tabulating the answers to the questions about the three selected variables, eight groups were obtained. The employees who used digital tools at work were distributed among the groups very unevenly, and the combined share of the three smallest groups was only 5.3%. Those belonging to these three smallest groups were left out of further analysis, because it was not possible to perform a statistical analysis and characterisation based on their data. The remaining five groups were assigned names based on their answers to the three questions (Table 1).

Table 1: Digital tools user groups

Group	Features	n	%
Skilled Users	High digital skills and motivation Not concerned about learning to use digital tools No inadequacies in digitals skills that slow down working	1,754	49.5
Intensive Users	High digital skills and motivation Not concerned about learning to use digital tools Inadequacies in digital skills that slow down working	578	16.3
Routine Users	Low digital skills and motivation Not concerned about learning to use digital tools No inadequacies in digitals skills that slow down working	347	9.8
Coping Strugglers	Low digital skills and motivation Not concerned about learning to use digital tools Inadequacies in digitals skills that slow down working	420	11.9
Concerned Strugglers	Low digital skills and motivation Concerned about learning to use digital tools Inadequacies in digital skills that slow down working	254	7.2
Others		188	5.3
Total		3,541	100.0

Source: based on data of Statistics Finland's Quality of Work Life Survey 2018.

Two of the five groups have high digital skills and motivation. The largest group by far are Skilled Users, who account for nearly half of all employees using digital tools at work. They do not experience problems with having insufficient skills or learning to use digital tools. Intensive Users also have high levels of digital skills, but they still feel that inadequacies in their skills slow down their work. This group is named after the fact that its members use digital tools for a greater part of their working time than all the other groups. They also have more digital tools at their disposal. 65% of the group members use digital tools for at least three quarters of their working time, and 46% use five or more different tools.

Of the three groups with lower skill levels, Routine Users are clearly distinguished from other groups. They use digital tools at work less than all the other groups. This explains why they do not experience problems connected with insufficient skills, or have trouble learning to use digital technologies despite their limited competence and motivation. Concerned Strugglers form the clearest contrast to Skilled Users. They have low-level digital skills, in

addition to which they are concerned about their learning and feel that inadequacies in their skills slow down their work. The group of Coping Strugglers is distinguished from them by their confidence in learning digital skills.

The groups clearly differ from each other in their everyday experience of using digital tools. The answer distributions of the groups in each of the three questions in Table 2 differ from each other in a statistically significant way at a level of $p < .001$. However, for the sake of simplicity, the entire answer distributions are not shown in the table.

Intensive Users are under greater pressure than others to learn how to use new IT systems, applications or devices at work. In their work, they also often encounter usability problems caused by IT systems. Only a third consider the digital support they receive from their organisation to be completely sufficient. Routine Users are their clearest opposite. They are under less pressure to learn than the other groups, and they encounter problems caused by IT systems less often. They are also the most satisfied group with the digital support they receive. The third group that differs most from the other groups are Concerned Strugglers. Like Intensive Users, nearly two thirds of Concerned Strugglers have to wait or interrupt their work weekly or even more frequently, due to problems related to IT systems. They also less frequently consider the digital support they receive from their organisation to be completely sufficient than any other group.

Table 2: Differences between user groups in learning new digital tools, experiencing usability and adequacy of digital support

	Skilled Users	Intensive Users	Routine Users	Coping Strugglers	Concerned Strugglers	Total
Learns new or updated IT systems at work at least once a month	45% (n = 1752)	59% (n = 578)	22% (n = 347)	37% (n = 420)	40% (n = 253)	44% (n = 3350)
Has to wait or interrupt work due to problems of IT systems at least once a week	48% (n = 1754)	62% (n = 578)	30% (n = 348)	50% (n = 421)	64% (n = 254)	49% (n = 3355)
Receives completely sufficient support in the use of IT systems	61% (n = 1746)	34% (n = 576)	65% (n = 346)	33% (n = 421)	20% (n = 254)	50% (n = 3343)

Source: based on data of Statistics Finland's Quality of Work Life Survey 2018.

User groups according to background variables

All the sociodemographic background variables also differ between user groups at the level of $p < 0.001$ (Table 3). Skilled Users are younger on average than the others, but do not greatly differ from the rest in terms of gender or educational level. Intensive Users are more

often women than men, and are the most educated of all. Routine Users are the only clearly male-dominated group. They also differ from others in terms of possessing a lower basic level of education. Concerned Strugglers are the most female-dominated and the oldest group. Coping Strugglers are also more often women than men, and the share of elderly employees among Coping Strugglers is the greatest, after Concerned Strugglers.

Table 3: Differences between user groups by sociodemographic factors

Factor	Class	Skilled Users (%)	Intensive Users (%)	Routine Users (%)	Coping Strugglers (%)	Concerned Strugglers (%)	Total (%)
Gender	Men	52	44	59	44	39	49
	Women	48	56	41	56	61	51
	Total (%)	100	100	100	100	100	100
	Total (n)	1,754	578	347	420	254	3,353
Age	15–24y	12	7	12	4	3	9
	25–34y	33	22	14	13	6	25
	35–44y	28	27	24	22	16	26
	45–54y	18	28	25	31	33	23
	55y–	9	16	24	31	42	17
	Total (%)	100	100	100	100	100	100
	Total (n)	1,753	579	347	420	254	3,353
Education level	Basic	8	5	18	9	8	8
	Second level	40	34	50	43	41	41
	Third level	52	61	32	48	52	51
	Total (%)	100	100	100	100	100	100
	Total (n)	1,755	578	347	421	254	3,355

Source: based on data of Statistics Finland's Quality of Work Life Survey 2018.

The high level of education among Intensive Users is reflected also in their socioeconomic status. A clearly larger proportion of them (46%) work in senior white-collar roles than in other groups. Intensive Users are overrepresented among professionals and managers, typically working in knowledge-intensive service industries. Their clearest contrast, once again, are Routine Users, of whom more than half (51%) are blue-collar workers, many of them employed in manufacturing, construction, transport, and storage. Coping Strugglers and Concerned Strugglers are both slightly overrepresented among lower-level white-collar employees. Their most distinguishing feature is that in both groups, and especially among Concerned Strugglers, a larger proportion than in the other groups work in public health and social welfare services or education. As many as 44% of Concerned Strugglers work in these two fields (29% in the entire material). Skilled Users are the only group which does not have any special distinguishing feature either in terms of socioeconomic status, occupation or industry. Age remains the only factor profiling them.

User groups and the effects of digitalisation on work

Finally, we will investigate how the groups' different usage profiles are reflected in the effects of digitalisation on their work. An increase in work efficiency is the most frequently experienced change (59%). The proportion of those who experience an increase in creativity, workload and supervision of work varies from 35% in the case of workload to 44% for supervision. Several employees are of the opinion that digitalisation has reduced their work efficiency, workload or the level of supervision of their work (Table 4).

Regarding each effect, the answer distributions of the groups differ from each other in a statistically significant way at the level of $p < .001$. In the two user groups with high skills and motivation, positive effects are more apparent than in others and are reflected, for example, in an increase in creativity and work efficiency. However, Intensive Users also experience an increase in their workload and the degree of supervision of their work more often than Skilled Users. Routine Users differ from others by the smallness of the effects, both positive and negative. Concerned Strugglers report fewer positive effects and emphasise the negative aspects, such as an increase in workload. The same is true, but to a somewhat lesser extent, for Coping Strugglers.

Table 4: Differences between user groups in the effects of digitalisation on work

Aspect of work	Class	Skilled Users (%)	Intensive Users (%)	Routine Users (%)	Coping Strugglers (%)	Concerned Strugglers (%)	Total (%)
Creativity at work	Yes	40	45	19	34	28	37
	No	39	32	59	43	52	41
	Can't say	21	24	22	23	20	22
	Total (%)	100	100	100	100	100	100
	Total (n)	1,752	579	347	421	253	3,352
Work efficiency	Increase	64	63	47	50	46	59
	No effect	16	15	37	20	19	19
	Decrease	10	11	8	16	17	11
	Can't say	10	11	8	14	18	11
	Total (%)	100	100	100	100	100	100
	Total (n)	1,753	579	346	419	253	3,349
Workload	Increase	29	41	25	46	62	35
	No effect	40	30	55	32	16	37
	Decrease	20	16	13	14	13	17
	Can't say	11	13	8	8	9	11
	Total (%)	100	100	100	100	100	100
	Total (n)	1,753	578	346	420	253	3,350
Supervision of work	Increase	42	48	33	53	51	44
	No effect	45	37	56	36	37	43
	Decrease	2	1	1	1	3	2
	Can't say	11	14	10	10	9	11
	Total (%)	100	100	100	100	100	100
	Total (n)	1,749	579	345	418	253	3,344

Source: based on data of Statistics Finland's Quality of Work Life Survey 2018.

DISCUSSION

This section will first of all reflect on the findings. Thereafter, the key theoretical and practical contributions of the paper are presented. Finally, the limitations of the study will be highlighted.

Reflection on the findings

Nearly half of those who use digital tools at work did not experience specific challenges in their usage in terms of the three variables considered. It is interesting to note that Skilled Users are only profiled by a younger age compared to the other groups, but not, for example, in terms of gender, education or socioeconomic status, which have also been key variables related to differences in digital skills in many previous studies.[21] Skilled Users also relatively rarely experienced problems with the usability of the tools or felt that insufficient support was available, even though their use of the tools was comparatively intensive. Age seems to be an important factor that divides employees in relation to the usage gap, largely independent of the work context. The results support the view of young people as a "new media generation", at least from the point of view that the internet and digital tools in general seem to be more natural means of communication for them, including in working life, than for older age groups.[22]

The grouping showed that employees have very different challenges of usage. Intensive Users include a lot of highly educated, mostly middle-aged knowledge workers compared to the other categories. Their labour market position is strong, and their work is creative in nature, but, at the same time, many have experienced an increase in workload, constant learning pressure, problems with the usability of digital tools, and the inadequacy of their skills and digital support. The group's usage challenge can be viewed as a more general phenomenon characterising expert work that intensively utilises digital tools, which has been called the growing limitlessness of work, i.e. the blurring of the boundaries between work and the rest of life.[23] This kind of usage, without well-functioning IT systems and the support of one's own organisation, such as peer support or advanced help desk, can erode the work and threaten well-being at work.

The challenge facing Routine Users is not so much the current use of digital tools in itself but the routine-like manner of their actual use at work. This does not promote the development of their digital skills or of their work. Although Routine Users can cope with their current tasks using their current skills, they are on the periphery of digitalisation when its benefits are shared and are at the greatest risk of falling out of the labour market in the long term. Although many industrial blue-collar tasks are still less susceptible to

[21] Scheerder et al. 2017.
[22] Westlund–Bjur 2014.
[23] Field–Chan 2018.

automation at the current level of technological development than many tasks in the most data-intensive sectors of the economy, it has been predicted that the greatest opportunities for automation in the next few years with the development of artificial intelligence and robots will be in sectors that have traditionally involved a lot of industrial work, such as transport, logistics, manufacturing and construction.[24] Almost 40% of Routine Users in the data of this study worked in these industries compared to fewer than 30% in all the other user groups.

The usage challenges for Concerned Strugglers are their generally weak digital literacy and learning difficulties in using digital tools. Women, the elderly, and the health and social welfare and educational sectors were clearly overrepresented in this group. The challenge they face is exacerbated by the fact that they experienced usability problems more often than others, and that their organisation's digital support was considered insufficient. The results support the observation presented above that age seems to be a significant factor structuring digital skills, which should be better taken into account when planning the need for digital support in working life as well. An interesting question is why there is a clear overrepresentation of people working in the health and social welfare sectors and in education in this group. Unfortunately, the Quality of Work Life Survey does not offer an answer to this. Especially, the health and social welfare sector in Finland has massive IT systems, many of which have usability problems identified by previous studies, and many new technologies are in the experimental phase.[25]

Theoretical and practical contributions

The study adds to knowledge on research on digital divides by extending the application of research approaches applied to citizens in general to employees specifically. In this way, the results can be linked to three hypotheses concerning digital inequality proposed in previous literatures. The purpose was not to test these hypotheses in the true sense of the word, but to use them as an aid in the interpretation of the research results.

According to the stratification argument, the digital world reproduces offline inequalities. This argument does not receive unconditional support in the Finnish work context. The distribution of Skilled Users does not differ from the rest, according to, for example, education level or socioeconomic status, but only by age. Blue-collar workers and lower-level white-collar workers with a relatively low level of education include employees, mainly young, who belong to the group of Skilled Users in terms of their digital skills. However, the educational background among employees is connected to their patterns of usage in that those who have completed only basic education are clearly overrepresented among Routine Users, as well as among those who do not use digital tools at all in their

[24] PwC 2018.

[25] Hyppönen–Ilmarinen 2016.

work. Those who have completed secondary education are also somewhat overrepresented among both Routine Users and non-users. In the data, one can therefore find some support for the stratification argument, but not in a straightforward way.

According to the sequential digital exclusion argument, digital skills, the manner of using digital tools and the benefits of using them are strongly linked to each other. This seems to be reflected in the results of our study. The views of the groups with high skills and motivation, i.e. Skilled Users and Intensive Users, on the effects on work efficiency and creativity are more positive than those of others. Routine Users are the least likely to experience an increase in workload and the supervision of work performance. These results are explained by the fact that Routine Users have generally experienced the effects of using digital tools in their work to a lesser extent than the other groups.

The compound digital exclusion hypothesis argues that deficiencies in the types of digital skills, usage and in the various benefits of using digital tools are cumulative in nature. Unfortunately, it was not possible to directly investigate this claim with the data. In the Quality of Work Life Survey, there are no questions about the different types of digital skills, nor about the ways of using digital tools at work for different purposes. However, regarding the accumulation of different types of benefits, it is possible to find a positive association between changes in the level of creativity of employees' work and her/his labour market position. Based on previous research, a job's requirements for creative and social intelligence form the biggest obstacle to the automation of the job.[26] Seen from this perspective, it is possible to consider that the more positive views voiced by Skilled Users and Intensive Users about the effects of digital tools on the use of creativity at work can represent advantages for them as compared to other groups, not only in terms of better quality of work but also of a stronger labour market position.

The two most important practical contributions of the study are to indicate the extent of the usage gap in statistically representative national data, and to demonstrate the diverse nature of the gaps between different groups of employees. The study shows that approximately every second employee in Finland suffers from at least some type of use-related handicap. This can reflect to the magnitude of the social challenge arising from the use of digital tools in Finnish working life. The handicaps manifest as work performance problems, in particular, caused by insufficient digital skills, increased strain at work caused by highly intensive use of digital tools and their rapid development, and a growing risk of exclusion from the labour market (in the long run), which is caused by little or routine work-related use of digital tools or outright non-use of digital technologies. To bridge the usage gap, there is no one-size-fits-all solution; different types of these call for tailored policies and solutions. Highest priority should be given to measures that make the development of digital skills accessible to all employees both at work and outside work, create new procedures and solutions to overcome stress caused by the use of digital technologies, ensure sufficiently easy-access and customised support for employees in the

[26] Frey–Osborne 2017.

event of technology-related problems at work, improve change management skills in work organisations, encourage experimentation with the innovative reorganisation of work, and – last but not least – support employees' own initiative to better master digital tools.

Limitations

An obvious limitation of the study is that the grouping was carried out solely based on the self-assessments of employees. Previous research has shown that people's self-assessments of their competences may be biased; for example, men have a tendency to evaluate their digital skills more positively than women, even at the same level of competence.[27] Unfortunately, it was not possible to measure digital skills in the study with more varied and, above all, validated measures.[28]

The grouping was done simply by cross-tabulation based on the three questions of the Quality of Work Life Survey with the aim of differentiating between the employees on the basis of their knowledge of digital tools, motivation, and learning ability. Although the questions were not originally designed specifically for the purposes of this kind of analysis, they covered what the study was trying to achieve reasonably well, i.e. the aspects of skill, motivation and the ability to learn to use digital tools. The user groups formed based on the three questions also seemed theoretically plausible, and the grouping was clearly connected to many other characteristics that can describe an employee as a user of digital tools. In this way, the grouping – albeit formed in a simple manner – helped to shed light on fundamental differences in the attitudes of employees towards the digitalisation of work.

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[27] Saikkonen–Kaarakainen 2021.

[28] van Deursen et al. 2016; Vuorikari et al. 2022.

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Tuomo Alasoini is a Research Professor at the Finnish Institute of Occupational Health and has had a long career as a civil servant at the Ministry of Social Affairs and Health, the Ministry of Labour, and the Finnish Funding Agency for Innovation Tekes (now Business Finland). Alasoini has a PhD in Sociology (1990) and Industrial Engineering and Management (2016). He is also an Associate Professor of Sociology at the University of Helsinki. His current research projects revolve around the future of work, digital divides, hybrid work, platform work, and the twin (digital and green) transitions of working life.