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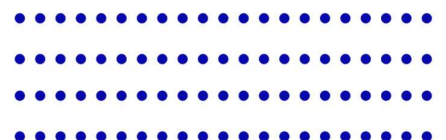
Synthesis of evaluation studies of media literacy and digital skills interventions

Work package 3 – Deliverable 3.2

CHANSE.

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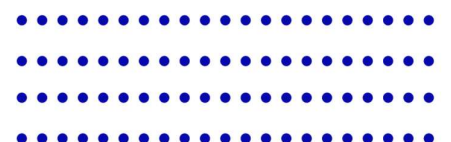**Table of contents**

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Executive summary

This report details the REMEDIS findings for Media Literacy and Digital Skills (ML&DS) interventions, where before and after measures were available. In general, the interventions increased participants' digital literacy and internet use. However, the impact of interventions on increased benefits of use (i.e. outcomes) was not as clear.[1]

Most interventions reported significant changes in **digital literacy** levels. Improvements were greater when participants reported higher digital literacy levels before the intervention. However, digital literacy improvements were not consistently related to breadth of or the outcomes achieved from ICT use before the intervention.

All interventions showed significant changes in **ICT use** post-intervention, mostly these were increases. Larger increases in ICT use post-intervention were related to higher digital literacy levels. Increases tended to be smaller for interventions where participants used ICTs more broadly before the intervention, suggesting ceiling effects.

There was substantially less evidence that ML&DS interventions increased **beneficial outcomes of ICT use**. In most evaluations, interventions had no (short-term) impact on the benefits participants achieved from ICT use. Also, digital literacy levels and ICT use pre-intervention did not appear to be related to whether a person received more satisfactory outcomes post-intervention.

In comparison to those with better **ICT access**, those with lower quality access to ICT were more likely to improve their digital literacy skills and broaden their ICT use, but were not more likely to improve the outcomes achieved from ICT use.

Two main conclusions can be drawn about **who benefits most** from interventions: 1) Improvements in digital literacy, uses and outcomes were more consistent for interventions aimed at participants with more socio-economic resources. 2) Interventions aimed at educators or carers were the ones that reported improvements in outcomes, interventions with vulnerable groups as beneficiaries showed fewer improvements in outcomes.

Recommendations

The **interventions** for groups who had more disadvantaged starting position seem to have been less effective, which suggests their design and delivery should be better aligned with the needs and experiences of these groups.

There were considerable difficulties in conducting analyses, **evaluations** in the future would benefit from a more robust design with matching questions in pre- and post-tests and less reliance on post intervention reporting of pre-intervention levels of skills, uses and outcomes.

However, we have noted in other reports on the REMEDIS project how difficult this is to achieve with these **beneficiary target groups** and, therefore, collecting any data at all in ways that are appropriate to the reality of the beneficiaries of and the professionals and volunteers working for the interventions should take priority.

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[1] Study sample sizes were small, and future research is needed to validate the results presented.

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1 Introduction

1.1 The REMEDIS project

The REMEDIS (Rethinking Media Literacy and Digital Skills) project is funded by the European Union's CHANSE (Collaboration of Humanities and Social Sciences in Europe) programme. The consortium involves 7 academic partners from 6 countries and 14 non-academic cooperation partners. Within these countries, REMEDIS pays special attention to target groups, including youths Not in Education, Employment, or Training (NEETS), the unemployed, refugees, lower SES people, NEET carers and (future) teachers.

REMEDIS aims to understand the positive impacts of Media Literacy and Digital Skills (ML&DS) interventions across different life domains. To achieve this, REMEDIS adopts innovative, evidence-based research strategies that first aims to identify and quantify the most salient driving factors for ML&DS from a lifelong perspective. The project then develops and evaluates initiatives that foster ML&DS.

The REMEDIS project has four core research objectives:

1. To improve existing theoretical knowledge about the actual outcomes of interventions.

2. To improve and enhance existing ML&DS intervention strategies based on existing and emerging evidence.

3. Adopt advanced methods and develop and validate instruments for evaluating intervention strategies.

4. To produce evidence-based policy recommendations and develop a user-friendly, customisable evaluation toolkit.

By synthesising the existing evidence that details the impact of current ML&DS interventions, this report advances objectives 2 and 3 of REMEDIS: enhancing current ML&DS intervention strategies and developing instruments for evaluating these strategies.

1.2 This report

This report addresses objective 2 by evaluating the impact of Media Literacy and Digital Skills (ML&DS) interventions of REMEDIS partner projects, which collected data on access, digital literacy, uses and outcomes before and after the intervention. The evaluation questionnaires used in this report were developed in collaboration between the REMEDIS project team, local partner NGOs and stakeholders. The report details where funding and resources would be most effective and therefore paves the way for evidence-based policy recommendations (objective 4).

Detailed findings based on the application of the evaluation instruments and observational methods for all interventions can be found in the report 'Evaluating Twelve Media Literacy and Digital Skills Interventions' (Martinez et al., 2025). Section 2 below describes the intervention selection, the study design and the methodology used for analyses in this report.
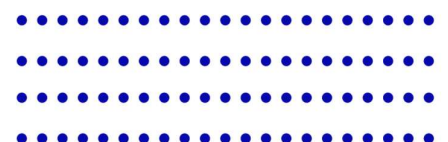
2 Methodology

This report examines the impact of Media Literacy and Digital Skills (ML&DS) interventions, asking whether the interventions were effective in improving and in improving digital inclusion beyond the media literacy and digital skills of their beneficiaries, including the outcomes they get from ICT use [2]. The selected interventions that met the inclusion criteria were analysed for:

- Improvements in media literacy and digital skills;
- Increases in the breadth of Information and Communication Technology (ICT) use;
- Improvements in the outcomes of ICT use;
- How these related to sociodemographic characteristics and internet access.

2.1 Intervention selection

REMEDIS partner interventions evaluations had to have a minimum sample and available pre- and post-test data to be included in this report's analysis. This resulted in seven interventions being analysed for digital literacy, and six interventions being analysed for ICT uses and their outcomes.

This study measured the impact of ML&DS interventions by calculating the difference between the results of the pre-intervention and post-intervention tests. To accurately measure the differences between responses before and after the interventions, the analysis only drew from 'matched pairs' responses. In other words, the analysis excluded individuals who only responded to either the questions before the intervention (pre-test) or the questions after the intervention (post-test) [3]. Six interventions had matched paired responses and met the minimum requirement of 10 observations and therefore were included in the report's analysis.

The Spanish PA intervention only had post-test data and therefore it was excluded from the 'uses and outcomes' analysis. However, as the researchers used an alternative approach to measuring media and digital literacy, asking for participants' ability to do certain tasks before and after the intervention, the intervention was included for analysis of digital literacy.

As the interventions had a variety of target groups and goals (See Table 1), synthesising the results was challenging. The analyses are descriptive and for both within and between-intervention comparisons we, therefore, use the language of patterns or trends alongside paying explicit attention to significant results. Notwithstanding these limitations, this comparative work is unique and valuable in examining such a wide range of target groups and goals.

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[2] See the REMEDIS D3.1 Report (Martinez et al., 2025) for the methodology with which access, skills, uses and outcomes levels were calculated.

[3] A total of 301 observations collected in the pre-test were excluded in the analyses across all twelve REMEDIS interventions because pre-test respondents did not complete the post-test, or their responses could not be matched.

Table 1. Interventions included in REMEDIS		
Intervention	**Target group**	**Intervention goals**
Veilig Online – Belgium (BE_VO)	Socially vulnerable parents	Improve parents' management of their children's media use
ÕPIRAAM course – Estonia (ES_HARNO)	In-service teachers	Creating secure, efficient and innovative learning experiences
Strengthening multiliteracy – Finland (FIN_FSME)	16 to 19 years old students	Enhance students' media literacy
Strengthening DL&ML and teaching skills for digital inclusion among carers and trainers of older people – Poland (POL_TSOP)	Trainers and caregivers of older people	Improve participants' didactic and digital competencies
The open-minded and creative teacher of the future - Poland (POL_OTF)	Future and current teachers	Increase digital and media competencies and their ability to use them in teaching
Cibermanagers por la Igualdad – Spain (SP_PA)	Secondary school students (aged 13–16)	Address and prevent gender-based cyberviolence among minors
Code Your Future – United Kingdom (UK_CYF)	Adults from low-income backgrounds, refugees and asylum seekers	Develop essential digital skills needed for day-to-day activities

Previous research demonstrates that sociodemographic characteristics are strongly related to digital literacy and ICT uses and outcomes (Dodel et al., 2020; Pearce & Rice, 2013; Robinson et al., 2015; Scheerder et al., 2017; van Deursen & Helsper, 2015). To explore whether participant characteristics influenced the impact of the interventions on digital inclusion, the analysis compared pre- and post-intervention digital literacy, uses, and outcomes across participant groups by different age, gender, and education levels.

The participants in the seven included interventions also varied in sample size, age, gender balance and educational attainment (See Table 2). In some interventions all participants had graduate education (POL-TSOP) to those where only half of them did (UK_CYF), some interventions had only a third of participants who were women (FIN_SME) while others were almost exclusively attended by women (ES_HARNO, POL_OTF).
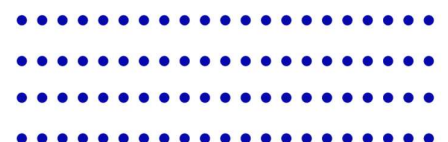
Table 1. Characteristics of intervention studies in terms of size and sociodemographic data (respondent numbers, age, gender[4] and education level)					
Intervention	**N**	**Age M (SD)**	**Age (range)**	**Women (%)**	**Graduates (%)**
Veilig Online – Belgium (BE_VO)	35	41 (6.2)	25 - 52	71%	NA
ÕPIRAAM course – Estonia (ES_HARNO)	11	53 (8.4)	40 - 67	100%	91%
Strengthening multiliteracy – Finland (FIN_FSME)	48	21 (8.4)	17 - 55	35%	NA
Strengthening DL&ML and teaching skills for digital inclusion among carers and trainers of older people – Poland (POL_TSOP)	69	27 (9.6)	19 - 55	90%	100%
The open-minded and creative teacher of the future - Poland (POL_OTF)	73	29 (10.4)	19 - 58	99%	NA
Cibermanagers por la Igualdad – Spain (SP_PA)	40	16 (1.0)	13 - 17	48%	NA
Code Your Future – United Kingdom (UK_CYF)	14	44 (15.7)	20 - 73	57%	50%

The report wanted to compare age, gender and education with digital literacy, uses and outcomes. However, due to limited data collection, not all tests were possible with the available sociodemographic data. Therefore, comparisons were excluded from the analysis and discussion when data was not collected or when all participants fell into one category and there was no variation in this aspect (see Table 3).

Table 2. Reasons for excluding analyses with sociodemographic data in some interventions	
Intervention	**Rationale**
BE-VO	**Education:** Data on education was not collected
ES-HARNO	**Gender:** All participants were female **Education:** 91% of participants had a university degree
FIN-FSME	**Age:** 81% of participants were 21 years old or younger **Education:** All participants were at the same education level (below a university degree)
POL-TSOP	**Gender:** 89% of participants were female **Education:** All participants held at least a university degree.
POL-OTF	**Gender:** 99% of participants were female **Education:** All participants are pre-service teachers and, therefore, in graduate education but without having completed a university degree.
SP-PA	**Age:** All participants were adolescents (13-17 years old) **Education:** All participants were in secondary school

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[4] The sum of the proportions of male and female participants did not always result in 100% as some individuals chose other options such as 'prefer not to say'.

2.2 Design

The overall design of the seven interventions consisted of a pre-test and either an immediate or delayed post-test (see Figure 1). The analysis matched responses collected from the same individual in the pre-test and post-test.

Interventions that applied a post-test immediately after the intervention finished asked about future uses and outcomes (in the coming months) rather than current uses and outcomes (in the past month). Although these estimates likely overestimate actual use, many interventions used this option for fear of attrition if a delayed post-test was applied. Predicted future use estimates were preferred over not collecting data at all.
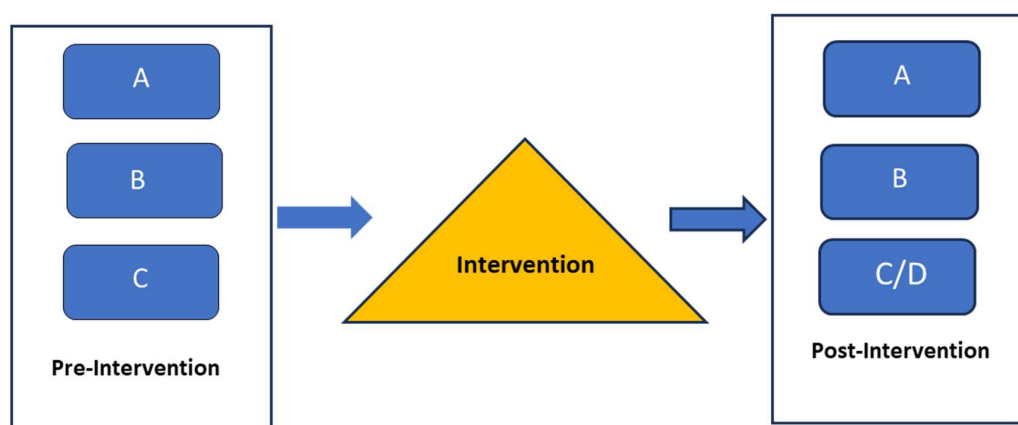
Figure 1. Content of evaluation questionnaires pre- and post- intervention[5]

Note: Some measured both pre- and post-intervention, some only measured post.
A. Socio-demographics, B. Access and skills, C./D. Uses and Outcomes

The evaluation questionnaire consisted of questions grouped in three sections (see Figure 1):

- Sociodemographic data (Part A): age, gender, education attainment (according to national classifications), occupation and wellbeing. Some interventions collected A in post-intervention data to ensure matched pair results.
- Digital literacy (Part B): digital skills, digital knowledge and media literacy. Digital literacy was calculated using the proportions of specific skills at a high level and the proportion of correct answers in digital knowledge and media literacy questions. This section also measured access to ICTs and the internet in the pre-test.
- Uses and Outcomes (Part C/D): uses and outcomes were categorised as: Informal learning, Wellbeing, Social Interactions, Finances and Work. Uses were measured by calculating the proportion of activities that individuals were doing out of all activities mentioned in the questionnaire for that intervention. The report used what individuals were already doing

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[5] During the evaluation design, delayed post-tests (a month after the intervention) were recommended and some interventions were able to collect a few observations doing these. However, none of the interventions were able to collect the minimum number required to do comparative pre- and post-testing, thus the delayed post-tests were omitted from the analyses in this report. For more information, see the Martinez et al., 2025.

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(Part C) in the pre-test and either what individuals were currently doing in the delayed post-test (Part C) or what participants were likely to undertake in the next few months (Part D). Outcomes were calculated using a similar method (see Martinez et al., 2025). Outcomes were measured by calculating the proportion of activities that participants were satisfied with out of the activities they had done. Hence, scores reflect the extent to which participants are satisfied with their use of ICT regardless of how many activities they undertake[6].

The majority of interventions used all Parts (A, B and C) for the pre-test and Parts B and D (Digital literacy and use in the immediate post-test) for the post-test, with some interventions applying Part C (delayed testing) in the post-test.

'Part B' was not always applied after the intervention, as some studies adapted or deleted questions between the two stages through co-development processes. In these cases, Part D of the post-test questionnaires was used to calculate improvements in digital literacy.

The impact of the intervention on digital literacy was calculated by the difference between the pre- and post-intervention literacy levels. Post-intervention digital literacy levels indicate the proportion of activities participants knew how to do before and after the intervention from all those measured. Participants were also asked which activities they knew how to do because of the intervention ("Yes, I now know how to do this").

In interventions where only a post-test was applied, the pre-intervention digital literacy level was calculated based on the proportion of activities participants reported they already knew how to do before the intervention ("Yes, I already knew how to do this"). When the evaluation used this measure, a decrease in digital literacy after the intervention is not possible, and the minimum change between pre- and post-intervention is zero.

Access to ICT can also be a determinant of a participant's breadth of ICT use and digital literacy level. To assess the impact of access on the ML&DS interventions, access was measured by the number of devices participants used to access the internet, as well as whether their access was limited to a smartphone or included other types of devices.

In summary, as well as examining notable changes in digital literacy, and ICT uses and outcomes, the analysis also examined whether these effects were different for various sociodemographic groups (age, gender, and education level) and whether access to ICT pre-intervention affected digital literacy improvements.

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[6] The proportion is calculated only for the activities that users reported doing online. Hence, if one person only does one activity online and is satisfied with the results, they will report a higher overall proportion than a participant satisfied with 9 out of 10 activities undertaken online.

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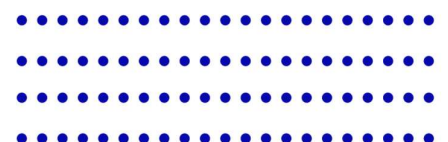
3 Results

3.1 Digital literacy pre- and post-intervention

Improvements in *Media Literacy and Digital Skills (ML&DS)* were calculated based on the difference between the pre-intervention and post-intervention results from digital literacy, ICT use and outcomes.[7] Two interventions applied Part B (access, skills and knowledge) equally in both pre-test and post-test and thus straight pre- post- intervention comparisons could be made. Answers in Part D were used for the other five interventions, either due to a lack of Part B data or a change in measurement tools.

Improvements in digital literacy

The three interventions with the largest increase in literacy levels after the intervention were also the interventions with the highest levels of literacy pre-intervention, suggesting that interventions with more skilled participants were more effective (see Table 4). The five interventions using Part D questions for calculating literacy differences based on post measurement only were those that reported statistically significant and large effects.

Table 3. Proportions and changes in digital literacy levels before and after the interventions					
Intervention	**Proportion of digital skills and knowledge at a high level**			**Significance testing for % change**	
	Pre-test	Post-test	% change	t	Cohen's d
BE-VO[b]	52%	55%	3%	2.10*	0.35
FIN-FSME[a]	34%	38%	4%	0.82	0.12
ES-HARNO[b]	31%	43%	12%	4.45**	1.34
UK-CYF[a]	25%	39%	13%	2.15	0.58
POL-TSOP[b]	75%	97%	22%	7.80***	0.94
SP-PA[b]	58%	86%	28%	6.24***	0.99
POL-OTF[b]	64%	92%	28%	8.74***	1.02

*p<0.05, **p<0.01, ***p<0.001*

Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, SP-PA N=40, UK-CYF N=14.
[a] interventions used part B to measure digital literacy [b] interventions used part D to measure digital literacy
Note: Interventions are ordered from smaller to larger % change

Five out of seven interventions showed a high-level increase of digital literacy (*Cohen's d* 0.5 or higher) after the intervention (see Table 4). Two intervention evaluations had very small effect sizes for the impact on improvements in digital literacy, one of these was significant (BE_VO) and the other was not (FIN_FSME). Nevertheless, the trend was consistent for

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[7] The proportion of answers 'Very true of me' – 5 on a scale from 0 to 5. See appendix for questionnaire.

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improvements in digital literacy, which is what they set out to do, and no interventions reported a negative effect of the intervention on participants' digital literacy level.

Sociodemographic data and digital literacy improvements

To understand whether certain sociodemographic groups were more likely to benefit from the interventions and improve their ML&DS levels, relationships between the difference between pre-test and post-tests, and sociodemographic variables (age, gender and education level) were analysed. T-tests were carried out for gender and education level. Correlations (Spearman) were calculated for age (see Table 5).

Table 4. Relationships between sociodemographic data and changes in digital literacy levels					
Intervention	Proportion of digital skills and knowledge at a high level			Relationship between sociodemographic data and difference in digital literacy		
	Pre-test	Post-test	% change	Gender (t)	Age (ρ)	Education (t)
BE-VO[b]	52%	55%	3%	-2.14*	-0.07	NA
FIN-FSME[a]	34%	38%	4%	-1.17	NA	NA
ES-HARNO[b]	31%	43%	12%	NA	-0.53	NA
UK-CYF[a]	25%	39%	13%	-0.02	-0.53	0.87
POL-TSOP[b]	75%	97%	22%	NA	0.02	-1.97
SP-PA[b]	58%	86%	28%	0.13	NA	NA
POL-OTF[b]	64%	92%	28%	NA	0.31**	NA

*$p<0.05$, **$p<0.01$, ***$p<0.001$

Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, SP-PA N=40, UK-CYF N=14.
[a] interventions used part B to measure digital literacy [b] interventions used part D to measure digital literacy
Note I. Interventions are ordered from smaller to larger % change in literacy levels
Note II. Comparator for gender is men. Comparator for education is graduate education

Most differences were not significant, which is not surprising considering the small sample sizes[8]. That said, the findings provide insights which can be further explored in future research.

For **gender**, the results were inconsistent, showing that men and boys benefited more in two interventions with teachers (FIN_FSME) and socially vulnerable parents and caregivers (BE_VO), whereas women and girls showed larger improvements in the Spanish PA intervention with secondary school students.

Similarly, the relationship between **age** and literacy increases varied between interventions. Older participants seemed to benefit more in one intervention, while younger adults reported larger increases in two interventions. The two remaining interventions showed virtually no

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[8] Throughout the report, non-significant differences are discussed. Because of the nature of the study, small samples may have prevented detection of significant relationships. More detail is provided when relationships were significant.

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difference between age groups. The improvements in digital literacy between pre-and post-tests were significantly different for older and younger individuals in the Polish OTF intervention which trained teachers; older participants benefitted more.

The relationship between **education** level and increases in digital literacy was inconsistent, the two interventions for which education level was measured showed opposite non-significant results. In the Polish TSOP intervention with caregivers and trainers, participants with lower levels of education increased their digital literacy more than those with university education. In contrast, the UK's CYF intervention with refugees and migrants concluded that those with higher education attainment had a higher increase of digital literacy post-intervention compared to those with lower education attainment.

Pre-intervention access and improvements in digital literacy

Although access was not a primary focus of the studies, this report includes an assessment of access due to its potential influence on the effectiveness of the ML&DS interventions. Access conditions can shape participants' baseline digital knowledge, prior experience and their capacity to apply newly acquired digital literacy skills outside the intervention setting.

Table 5. Relationship between access conditions and digital literacy level						
		Access	**Proportion of digital skills and knowledge at a high level**			**Correlation between access devices and skill**
	No. devices	Smartphone only	Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF[a]	1.6	50%	25%	39%	13%	-0.12
FIN-FSME[a]	2.1	15%	34%	38%	4%	-0.11
BE-VO[b]	2.7	3%	52%	55%	3%	0.19
POL-TSOP[b]	2.4	1%	75%	97%	22%	-0.28*
ES-HARNO[b]	2.4	0%	31%	43%	12%	-0.10
SP-PA[b]	3.4	0%	58%	86%	28%	NA
POL-OTF[b]	2.5	0%	64%	92%	28%	-0.01

*p<0.05, **p<0.01, ***p<0.001

[a] interventions used part B to measure digital literacy [b] interventions used part D to measure digital literacy
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, SP-PA N=40, UK-CYF N=14.
Note: Interventions are ordered from larger to smaller smartphone-only user proportions.

The UK's CYF intervention with immigrants and the Finnish FSME intervention with teenagers had the highest proportion of participants who accessed the internet solely through a smartphone (50% and 15%, respectively). As Table 6 shows, the results in the post-test for

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digital literacy were relatively similar (39% and 38%) despite a considerable difference between these interventions in the pre-tests (34% and 25%).

For the two interventions that measured digital literacy in both the pre- and post-tests (using part B), participants with worse access conditions did show improvements in digital literacy, though these were smaller than those for people with better access conditions. This means that a lack of access was not an impediment for participants to benefit from the interventions. In fact, the relative benefit might be highest for those with lower quality access.

No common trends were found among interventions that measured literacy improvements in the post-test only (using part D). For these interventions, participants with more than one device displayed larger increases in digital literacy levels compared to those who had smartphone-only access.

Pre-intervention use and improvements in digital literacy

Across interventions, a wider breadth of ICT use pre-intervention (out of those measured) related to greater increases in digital literacy levels from pre- to post-test (see   ).

	Use: Proportion of all activities undertaken	Proportion of digital skills and knowledge at a high level			Correlation between digital literacy and pre-test use
Intervention	pre-test	Pre-test	Post-test	% change	Spearman's (ρ)
BE-VO[b]	40%	52%	55%	3%	0.10
UK-CYF[a]	59%	25%	39%	13%	0.33
FIN-FSME[a]	77%	34%	38%	4%	0.14
POL-OTF[b]	77%	64%	92%	28%	0.06
ES-HARNO[b]	85%	31%	43%	12%	0.34
POL-TSOP[b]	90%	75%	97%	22%	0.05

Table 6. Relationship between variety of uses (pre-test) and digital literacy

*p<0.05, **p<0.01, ***p<0.001

[a] interventions used part B to measure digital literacy [b] interventions used part D to measure digital literacy
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, SP-PA N=40, UK-CYF N=14.
Note: Interventions are ordered from smaller to larger proportions of activities undertaken.[9]

Nevertheless, the relationship between improvements in digital literacy and pre-test uses was relatively weak; none of the correlations tested were significant, and effect sizes were small (see   ). In other words, the variety of activities carried out on the internet before the intervention was not a consistent predictor of digital literacy levels increasing post-intervention.

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[9] Data was only available for six interventions under 'uses and outcomes', and therefore the table includes six interventions.

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Pre-intervention outcomes and improvements in digital literacy

The study predicted that the benefits participants obtained from using ICTs pre-intervention may positively impact the improvements participants saw in their digital literacy levels post-intervention. Participants might, for example, be more motivated to acquire further knowledge about the digital world and acquire skills to navigate it, if they have experienced satisfactory outcomes before entering a programme.

Table 7. Relationship between outcomes (pre-test) and digital literacy					
Intervention	Pre-test proportions of satisfactory outcomes	Proportion of digital skills and knowledge at a high level			Correlation between digital literacy and pre-test outcomes
		Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF[a]	72%	25%	39%	13%	0.27
BE-VO[b]	75%	52%	55%	3%	-0.16
POL-OTF[b]	78%	64%	92%	28%	-0.31**
POL-TSOP[b]	81%	75%	97%	22%	-0.21
FIN-FSME[a]	83%	34%	38%	4%	-0.25
ES-HARNO[b]	85%	31%	43%	12%	0.40

*p<0.05, **p<0.01, ***p<0.001

[a] Interventions used part B to measure digital literacy [b] Interventions used part D to measure digital literacy
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, SP-PA N=40, UK-CYF N=14.
Note: Interventions are ordered from smaller to larger proportions of outcomes achieved. Data was only available for six interventions under 'uses and outcomes', and therefore the table includes six interventions.

In five out of six interventions, there was a surprising negative relationship between pre-intervention outcomes achieved and improvements in digital literacy levels (see Table 8), with statistically significant results for Poland's OTF programme, the intervention with the largest sample. In the Polish OTF intervention, teachers who had experienced more benefits from use before the intervention indicated lower increases in digital literacy after the intervention than those who had fewer satisfactory outcomes from use before the intervention. The counterintuitive relationship observed here may indicate ceiling effects, whereby individuals who gained benefits pre-intervention already had relatively high digital literacy levels.

3.2 Uses pre- and post- intervention

Questionnaire data measured 'uses' in six general domains: Informal Learning, Wellbeing, Social, Finance, Education and Work. The breadth of use was determined by calculating the proportion of activities participants reported undertaking in the month before (pre-test) or anticipated undertaking in the following months (post-test) relative to the total number of

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online activities listed for that intervention. Increases in use were measured by calculating the difference in these proportions before and after the intervention. This approach enabled a cross-intervention comparison across the six included interventions, regardless of the number or type of activities included in each intervention questionnaire.

Increases in uses pre- and post-intervention

Five out of six interventions showed statistically significant results regarding participants' changes in ICT uses, with most interventions' showing increases (see   ).

Table 8. Proportions and changes in variety of uses before and after the interventions					
	Uses: Proportions of activities undertaken			Significance of change in use before and after intervention	
Intervention	Pre-test	Post-test	% change	t	Cohen's d
ES-HARNO	85%	89%	4%	0.70	0.21
POL-TSOP	90%	95%	5%	4.04***	0.49
POL-OTF	77%	91%	14%	7.90***	0.93
BE-VO	40%	61%	21%	2.59*	0.44
UK-CYF	59%	87%	28%	5.21***	1.45
FIN-FSME	77%	33%	-44%	-6.99***	-1.08

*p<0.05, **p<0.01, ***p<0.001

Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14. Note: Interventions are ordered from smaller to larger % change in the proportions of activities undertaken.

The Polish OTF interventions for teachers and the UK's CYF programme for immigrants reported significant and large increases after the intervention. In the Belgian VO intervention for socially vulnerable parents, the increase in use was percentual large and the effect size (t) smaller though still significant (see   ). The interventions with the broadest pre-intervention levels of use showed the smallest increase in ICT use after the intervention, suggesting ceiling effects for use.

The Finnish FSME intervention for vocational school students was the only intervention which displayed a negative percentage change. In other words, students indicated that they expected to engage in fewer ICT activities post-intervention compared to their pre-intervention use. This outcome may be attributed to the intervention's content, which aimed to raise awareness of potential online risks and harms. This heightened awareness could have reduced their confidence in and willingness to engage in various internet-based activities that carry risks (see Martinez et al., 2025).

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Sociodemographic data and increases in use

The report tested for a relationship between increases (or decreases) in use and participant's age, gender or education level.

Intervention	Use proportions of activities undertaken			Relationship between sociodemographic and difference in use		
	Pre-test	Post-test	% change	Gender (t)	Age (ρ)	Education (t)
ES-HARNO	85%	89%	4%	NA	0.03	NA
POL-TSOP	90%	95%	5%	NA	-0.16	1.52
POL-OTF	77%	91%	14%	NA	-0.05	NA
BE-VO	40%	61%	21%	0.11	-0.37*	NA
UK-CYF	59%	87%	28%	-0.38	0.31	-0.35
FIN-FSME	77%	33%	-44%	1.12	NA	NA

Table 9. Relationship between sociodemographic data and changes in use

*$p<0.05$, **$p<0.01$, ***$p<0.001$
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note I: Interventions are ordered from smaller to larger % change in the proportions of activities undertaken.
Note II: Comparator for gender is men. Comparator for education is graduate education.

In the three interventions where **gender** comparisons were possible, there were contrasting, albeit insignificant, results. In the UK's CYF intervention with immigrants, women reported lower increases in use compared to men. Conversely, in the Finnish FSME intervention with secondary school students and the Belgian VO intervention with parents, women and girls reported slightly higher relative increases compared to their male counterparts.

For the most part, **age** had a negative relationship with increases in ICT use, with younger adults predicting a broader future use of ICT. The Belgian VO intervention was the only one with significant relationships between age and increases in use, where younger parents were more likely than older parents to predict a broader variety of uses following the intervention.

Similar to gender, the two interventions that considered **education** levels reported opposing and non-significant trends. In the case of Polish TSOP with trainers and caregivers, participants with a higher education level were likely to report increased ICT use after the intervention compared to those without a graduate education. On the contrary, in the case of the UK's CYF intervention, immigrants with lower levels of education were more likely to report an increase in ICT use.

Pre-intervention access and increases in use

The relationship between access and broader use of ICT was inconsistent (see Table 11), with no significant relationships observed. That said, there was evidence of a ceiling effect: participants with access to more devices, lower reliance on smartphones and a broader pre-test ICT use reported the smallest increases in use.

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Table 10. Relationship between access and changes in breadth of ICT use						
	Access pre-intervention		Use: Proportion of activities undertaken			Correlation between number of devices and changes in use
Intervention	No. devices	Smartphone only	Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF	1.6	50%	59%	87%	28%	-0.27
FIN-FSME[a]	2.1	15%	77%	33%	-44%	0.01
BE-VO	2.7	3%	40%	61%	21%	0.00
POL-TSOP	2.4	1%	90%	95%	5%	0.03
ES-HARNO	2.4	0%	85%	89%	4%	-0.45
POL-OTF	2.5	0%	77%	91%	14%	-0.02

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note: Interventions are ordered from larger to smaller smartphone-only user proportion.
[a]Domains measured were different between pre- and post-test. In the pre-test, all domains but Work use were applied, whereas only Informal Learning was applied in the post-test.

Some findings indicated that participants with less broad ICT access saw a broader increase in ICT use post-intervention. For example, the UK CYF intervention displayed the largest increase in ICT use, despite participants reporting the lowest number of devices used to access the internet and the highest rate of smartphone-only access.

Similarly, the Belgian VO intervention with socially vulnerable parents supported this trend. Despite participants having access to a relatively broad set of devices (with only 3% reporting smartphone-only access), their pre-test ICT use results reported a narrow range of activities. Additionally, in both the UK CYF and the Estonian HARNO interventions, participants with access to more devices were less likely to increase their internet use post-intervention.

However, the opposite was true for the Finnish FSME intervention with vocational school students, where limited access to ICT saw a decrease in use post-intervention (see Martinez et al, 2025).

These findings likely point to a ceiling effect while also suggesting that populations with limited access to ICT may still benefit from increased use following interventions.

Pre-intervention digital literacy and increases in use

This report anticipated that participants with lower levels of digital literacy pre-intervention could report larger increases in ICT use post-intervention because they had more ground to gain and would start at a lower level of engagement before the intervention. However, the opposite could also be true, those starting out with higher skill levels might be more confident to try things out and ML&DS training might boost their already existing advantage. Pre-intervention literacy levels of the participants and the overall change in ICT use were not consistently related within different interventions, though there was more evidence for a boost in existing advantage (see Table 12).

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| Intervention | Pre-test proportion of digital skills and knowledge at a high level | Uses: Proportion of activities undertaken | | | Correlation between digital literacy pre-intervention and change in use |
		Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF	25%	59%	87%	28%	-0.20
ES-HARNO	31%	85%	89%	4%	0.80**
FIN-FSMEª	34%	77%	33%	-44%	0.25
BE-VO	52%	40%	61%	21%	0.75***
POL-OTF	64%	77%	91%	14%	0.02
POL-TSOP	75%	90%	95%	5%	-0.03

Table 11. Relationship between digital literacy levels (pre-intervention) and changes in ICT use

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
ªDomains measured were different between pre- and post-test. In the pre-test, all domains but Work use were applied, whereas only Informal Learning was applied in the post-test.
Note: Interventions are ordered from lower to higher levels of digital literacy.

The Estonian HARNO intervention with service teachers reported relatively low digital literacy levels to start with, and one of the highest proportions of use pre-test. In contrast, parents in the Belgian VO intervention reported relatively good pre-test digital literacy levels and the lowest proportion of pre-test uses.

In four interventions, participants with high levels of digital literacy in the pre-test showed greater increases in use compared to those with lower literacy levels. Conversely, in the other two interventions, the opposite trend was observed (see Table 12). There were two interventions where relationships between pre-test digital literacy levels and increases in use were significant, in both the Estonian HARNO and the Belgian VO intervention participants with a higher pre-test skill level was related to broader ICT uses.

Pre-intervention outcomes and increases in use

Similar to the relationship between uses and pre-test literacy levels, the interventions showed inconsistent results in terms of whether better outcomes of internet use in the pre-test was related to positive or negative change in uses (see
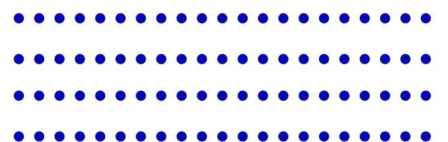
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	Pre-test proportions of outcomes that were	Uses: proportions of activities undertaken			Correlation between outcomes pre-intervention and change in use
Intervention	satisfactory	Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF	72%	59%	87%	28%	-0.24
BE-VO	75%	40%	61%	21%	0.41*
POL-OTF	78%	77%	91%	14%	-0.09
POL-TSOP	81%	90%	95%	5%	-0.10
FIN-FSME	83%	77%	33%	-44%	-0.15
ES-HARNO[a]	85%	85%	89%	4%	0.53

Table 12. Relationship between outcomes proportions (pre-test) and changes in uses

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
[a]Domains measured were different between pre- and post-test. In the pre-test, all domains but Work use were applied, whereas only Informal Learning was applied in the post-test.
Note: Interventions are ordered from lower to higher levels of beneficial outcomes.

Notably, participants in the Belgian VO intervention reported the lowest levels of ICT use in the pre-test, although their pre-test outcomes were relatively similar (though still on the lower end) to those of other interventions. The conditions of vulnerability among participants in the Belgian VO intervention may explain their lower pre-intervention use. This is supported by the UK's CYF intervention with immigrants (including refugees), where participants were also in vulnerable situations. The results were mirrored: immigrants in the UK's CYF intervention exhibited very low pre-intervention use levels alongside average (though still lower end) outcomes compared to other interventions. Both groups demonstrated considerable broadening of ICT use following the intervention.

The only significant relationship between pre-intervention outcomes and increases in use was found in the Belgian VO intervention, where vulnerable parents with broader outcomes pre-intervention were likely to report higher increases in use. None of the other relationships between participants' outcomes pre-intervention and increases in use were significant and some were opposite with those with less satisfactory outcomes before the intervention were more likely to see increases in use.

3.3 Outcomes pre- and post-intervention

Outcomes, or the benefits achieved from ICT use, refer to the participants' satisfaction with the real-life results achieved through their online activities. The expected result was that more satisfactory outcomes pre-intervention would lead to more satisfactory outcomes post-intervention, as participants reported previous ICT-related achievements which may inspire confidence in what they might achieve through the intervention. Outcomes were calculated using a similar method for identifying ICT use (see Martinez et al., 2025), using a pre-post difference. The pre-post difference is the change in the proportion of beneficial outcomes of ICT uses before the intervention and the outcomes the participant expected to achieve in the

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months after the intervention. That is, the percentage of times they were or would be satisfied with the results of the activities they undertook online.

Improvements in outcomes pre- and post-intervention

Only three studies reported significant changes in outcomes post-intervention, with inconsistent results between them (see Table 14).

Table 13. Proportions and changes in positive outcomes achieved before and after the interventions					
	Outcomes: proportions of activities with satisfactory results			Significance of change in outcomes before and after intervention	
Intervention	Pre-test	Post-test	% change	t	Cohen's d
UK-CYF	72%	77%	5%	0.55	0.16
FIN-FSME	83%	92%	9%	1.26	0.27
POL-OTF	78%	92%	14%	4.75***	0.56
POL-TSOP	81%	97%	16%	7.33***	0.88
BE-VO	75%	55%	-20%	-1.63	-0.30
ES-HARNO	85%	44%	-41%	-6.32***	-1.91

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note: Interventions are ordered from smaller to larger changes in outcomes achieved.

The percentage change was largest for the Estonian HARNO intervention with in-service teachers, but it was not in the expected direction; the proportion of satisfactory outcomes from internet use decreased after the intervention. The Belgian VO intervention was the intervention with the second largest change in beneficial outcomes of ICT use and also showed a decrease in satisfactory outcomes achieved after the intervention in comparison to the outcomes achieved before the intervention, though for this intervention the change was not significant. This might be due to greater parental and caregiver awareness of the potential for negative outcomes of internet use after the programme which focussed on digital literacy and their children's safety online (see Martinez et al., 2025).

These two negative relationships contrast with the only to other significant relationships found for the two Polish interventions. In both the Polish OTF, with teachers, and the Polish TSOP interventions, with trainers and caregivers, participants expected increases in positive outcomes participants expected post-intervention.

Sociodemographic data and improvements in outcomes

When exploring the relationships between sociodemographic characteristics and intervention outcomes, the results were inconsistent like they were for digital literacy and ICT use (see
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Table 14. Relationships between sociodemographic data and changes in outcomes						
	Outcomes: Proportions of activities with satisfactory results			Relationship between sociodemographic data and differences in outcomes		
Intervention	Pre-test	Post-test	% change	Gender (t)	Age (ρ)	Education (t)
UK-CYF	72%	77%	5%	1.03	0.03	-1.44
FIN-FSME	83%	92%	9%	-1.62	NA	NA
POL-OTF	78%	92%	14%	NA	0.17	NA
POL-TSOP	81%	97%	16%	NA	-0.29*	0.87
BE-VO	75%	55%	-20%	-0.13	-0.11	NA
ES-HARNO	85%	44%	-41%	NA	0.08	NA

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note I: Interventions are ordered from smaller to larger changes in outcomes achieved.
Note II: Comparator for gender is men. Comparator for education is graduate education

The analysis explored the relationship between **gender** and outcomes in three interventions, and no significant relationships were found. The pattern varied between interventions; male participants in the Belgian VO and Finnish FSME interventions reported smaller increases in outcomes achieved, while the UK's CYF intervention saw that men were more likely to see increases in outcomes than women.

The Polish TSOP intervention, aimed at caregivers and trainers of older people, was the only intervention with a statistically significant relationship between **age** and outcomes achieved. There older participants were significantly less likely to see increases in outcomes post-intervention. The Belgian VO intervention working with vulnerable parents brought up the same results, although the relationship was not statistically significant. None of the age-outcome relationships in the other interventions were significant, the trend was for older participants to see greater increases in outcomes achieved than younger participants.

The relationships were not significant in the two interventions for which **education** level comparisons were possible. In the Polish TSOP intervention, trainers with higher levels of education were more likely to see an increase in positive outcomes after the intervention. In the UK's CYF intervention, the relationship was reversed: low-income adults and vulnerable immigrants with lower levels of education were more likely to see an increase in positive outcomes from internet use after the intervention.

Pre-intervention access and improvements in outcomes

The REMEDIS study's expectations would have been that those with broader access would expect to benefit more from the intervention since they would be able to continue with more ubiquitous and higher quality connectivity after they had completed the programme. There was no clear relationship between access and an increase in outcomes (see Table 16).

Table 15. Relationship between access conditions and changes in outcomes						
		Access	**Outcomes: proportion of activities with satisfactory results**			**Correlation**
Interventions	No. devices	Smartphone only	Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF	1.6	50%	72%	77%	5%	0.17
FIN-FSME	2.1	15%	83%	92%	9%	0.11
BE-VO	2.7	3%	75%	55%	-20%	0.11
POL-TSOP	2.4	1%	81%	97%	16%	-0.10
ES-HARNO	2.4	0%	85%	44%	-41%	-0.18
POL-OTF	2.5	0%	78%	92%	14%	-0.22

*p<0.05, **p<0.01, ***p<0.001*

Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note. Interventions are ordered from larger to smaller smartphone-only user proportion.

Participants in the UK's CYF intervention with immigrants, had the highest proportion of smartphone-only users, reported both the lowest level of pre-test outcomes, and the smallest increase in post-intervention outcomes. This could mean that restricted access limits the ability to convert the benefits participants learned about during the interventions into actual improvements in everyday life after the programme ends. Their lower 'outcomes' starting point may have also contributed to the small percentage change with less confidence in the benefits of ICT use.

However, results from the other interventions did not support this conclusion. Vulnerable parents in the Belgian VO intervention and in-service teachers in the Estonian HARNO intervention reported relatively favourable access conditions but a decrease in positive outcomes post-intervention in comparison to their previous achievements. This suggests that high levels of access might not be an automatic conduit to being able to take advantage of the intervention. It should be noted that these interventions also focussed on the risks associated with ICT use and that this might have damped expectations about positive outcomes from ICT use.

Pre-intervention digital literacy and improvements in outcomes

There was no clear pattern between participants' pre-intervention digital literacy levels and the increases or decreases in positive outcomes post-intervention (see   ).

In the Belgian VO intervention, vulnerable parents with higher literacy levels were significantly more likely to see an increase in positive outcomes post-intervention. While the relationship between literacy and increases in positive outcomes was not significant in any of the other interventions, the UK CYF with refugees and migrants and Estonian HARNO intervention with in-service teachers seemed to benefit highly literate individuals more.

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Table 16. Relationship between digital literacy levels and positive outcomes achieved					
Intervention	Proportion of digital skills and knowledge at a high level	Outcomes: Proportion of activities with satisfactory results			Correlation between pre-intervention digital literacy and outcomes achieved
		Pre-test	Post-test	% change	Spearman's (ρ)
UK-CYF	25%	72%	77%	5%	0.38
ES-HARNO	31%	85%	44%	-41%	0.33
FIN-FSME	34%	83%	92%	9%	-0.26
BE-VO	52%	75%	55%	-20%	0.72***
POL-OTF	64%	78%	92%	14%	-0.18
POL-TSOP	75%	81%	97%	16%	-0.04

*p<0.05, **p<0.01, ***p<0.001

Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.

Note: Interventions are ordered from smaller to larger pre-intervention digital literacy levels.

In contrast, the Polish OTF intervention with teachers, the Polish TSOP intervention with caregivers and trainers of older people, and the Finnish FSME intervention with teenagers showed greater increases in positive outcomes for individuals with lower literacy levels. The two Polish interventions with teachers, trainers and carers were those with the weakest relationships between digital literacy and outcomes achieved. This outcome may be caused by a ceiling effect, as participants began with relatively high literacy and outcome levels. Therefore, participants had a limit to how many additional positive outcomes they could achieve.

Pre-intervention uses and improvements in outcomes

The relationship between ICT use pre-intervention and increased achievement of positive outcomes post-intervention was more consistent (see   ).

In general, the interventions in which participants made broader use of ICT were also those that showed greater changes in satisfactory outcomes achieved after the intervention.

When looking at improvements for participants within each intervention, a different pattern emerges. For five out of six of the interventions, individuals with a broader use pre-intervention had lower increases in satisfactory outcomes after the intervention than individuals with more limited use. In two interventions broader users of the internet benefited very slightly more from the intervention. This was the case for the Belgian VO intervention, which had the lowest uses before the intervention overall and a considerable overall decrease in outcomes achieved after the intervention. It was also the case for the Estonian HARNO intervention with in-service teachers which, in contrast to the Belgian VO intervention, had one of the highest levels of use pre-intervention.

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Table 17. Relationship between uses (pre-test) and changes in outcomes					
	Use: Proportion of activities undertaken	**Outcomes: Proportion of activities with satisfactory results**			**Correlation between pre-intervention uses and outcomes achieved**
Intervention		Pre-test	Post-test	% change	Spearman's (ρ)
BE-VO	40%	75%	55%	-20%	0.09
UK-CYF	59%	72%	77%	5%	-0.29
FIN-FSME	77%	83%	92%	9%	-0.01
POL-OTF	77%	78%	92%	14%	-0.12
ES-HARNO	85%	85%	44%	-41%	-0.30
POL-TSOP	90%	81%	97%	16%	-0.26*

*p<0.05, **p<0.01, ***p<0.001
Base: BE-VO N=35, ES-HARNO N=11, FIN-FSME N=48, POL-TSOP N=69, POL-OTF N=73, UK-CYF N=14.
Note: Interventions are ordered from fewer to more diverse uses pre intervention.

The only significant relationship found was for the Polish TSOP intervention. In this intervention, trainers and carers of older people who reported the most diverse uses before the intervention were less likely to think they would increase the positive outcomes they achieved from internet use in the months after the intervention. This means low use participants benefitted more but also that there might be a potential ceiling effect of high use and outcomes for these highly educated participants.

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4. Conclusions and recommendations

This report synthesises the results of seven quantitative evaluations of ML&DS interventions as part of the REMEDIS project. The seven interventions were selected due to their sample size and pre- and post-intervention data availability.

The quantitative survey instrument used, designed by the REMEDIS project team in collaboration with local partner NGOs and stakeholders, consists of three key components: **digital literacy**, **uses** and **outcomes.** This section is split into the three components, who benefits the most from interventions and recommendations for future evaluations.

Digital literacy

All interventions reported improvements in participants' digital literacy levels post-intervention. Interventions where participants had relatively high digital literacy levels before the intervention presented comparatively higher increases in digital literacy levels post-intervention. Therefore, the results do not indicate ceiling effects for people who reported high literacy levels pre-intervention, on the contrary, it seemed that more skilled participants benefited more.

Breadth of ICT **use** before the intervention was inconsistent in its relationship to digital literacy increases post-intervention. There was a significant relationship in one intervention between higher **outcomes** from internet use achieved pre-intervention and a lower likelihood of increasing digital literacy post-intervention, suggesting a platform effect of outcomes achieved. However, the results from the rest of the interventions were inconclusive.

The relationships between sociodemographic characteristics (**age, gender** and **education**) and changes in digital literacy levels were inconsistent across studies, where the same characteristic sometimes related to an increase and in others to a decrease in digital literacy.

Uses

Most interventions showed an increase in breadth of ICT use post-intervention. Five out of six studies reported significant effects, four of which indicated increased use. Improvements were particularly high in interventions where participants reported low use levels before the intervention, which might indicate potential ceiling effects in interventions where participants already had broad ICT usage. A decrease in use in one intervention might have been due to greater caution after becoming more aware of the risks associated with use (Martinez et al., 2025).

The relationship between **digital literacy** before the intervention and the breadth of ICT use after the intervention depended on the intervention, and no general trend was found. However, the two significant correlations were positive, which suggests that higher digital literacy levels may boost the intervention's impact on increasing individual's usage of ICTs for a broader variety of purposes.

Similar to digital literacy, **sociodemographic variables** had inconsistent relationships to broadening ICT use. Except for age in two interventions, there were no significant relationships. Level of participation in the evaluations is one likely factor behind this result, as sample sizes were small. Another factor was the homogeneity of the target group for some interventions

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(i.e. made up of very similar people with little variation in sociodemographic background). One further explanation is that these studies included vulnerable social groups. Restrictions in access to or availability of useful, relevant content may mean it is more difficult for participants from disadvantaged or marginalised groups to increase their use outside of the intervention (Martinez et al., 2025).

Outcomes

The evidence from the intervention evaluations suggests that the evaluated **interventions were not as effective in having a positive impact on outcomes**. However, it should be noted that participants' satisfaction with outcomes before the intervention was already high in comparison to digital literacy and uses levels. This could mean that participants were very positive about the impact of the internet in their lives to start with, which makes positive changes in satisfaction harder to achieve (i.e. there may have been a ceiling effect).

Three interventions showed significant relationships between **satisfactory outcomes before** and after the intervention. In one of these, participants who achieved fewer satisfactory outcomes of ICT use pre-intervention were likely to have more satisfactory outcomes post-intervention than those who started out with more positive outcomes. In the others those with more satisfactory outcomes benefited more.

Digital literacy was not a significant predictor of improved outcomes, nor were there consistent relationships between outcomes and **breadth of ICT use** before the intervention or **sociodemographic** factors. This might be due to ceiling effects where there was little room for improvement in the satisfaction with outcomes measured.

Which interventions are the most effective?

In general, interventions aimed at groups with **higher levels of socio-economic status** and those with **higher levels of digital literacy** benefitted participants more. Though there was no relationship found between effectiveness of interventions and gender or education level of a participant. This means that particular interventions benefited all participants more independent of the participants' education level or gender, while other interventions were less effective independent of the education level or gender of the participant.

The Polish OTF and ESOP **interventions with teachers, trainers and caregivers** showed the most consistent increases in digital literacy, internet use and related outcomes. They were also the only interventions that demonstrated significant changes in outcomes before and after the intervention. Some characteristics of these interventions may explain the relatively positive results.

First, the intervention participants in the Polish OTF intervention were pre-qualified teachers with **higher levels of digital literacy** than those studied in the other interventions. A higher level of digital literacy may have given participants confidence to explore their breadth of ICT use and improve their digital literacy further. The Estonian HARNO intervention worked with a similar group of in-service teachers and while there were small increases in digital literacy and uses after the intervention they reported decreases in outcomes after the intervention. These

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participants also had high use and outcome levels before the intervention, even if their digital literacy levels were not as high.

Second, the Polish interventions were initiatives **embedded within broader programmes** focused on adult learning and teaching. This is important since this will have meant they were explicitly linked to improvements or goals beyond the solving of the particular 'problem' addressed in the intervention as well as future career opportunities. For other interventions, the goals of the participants and of the interventions might have been mismatched (See Martinez et al, 2025).

Third, **larger participation levels** in the Polish evaluation might have also contributed to finding significant relationships, in other interventions with smaller samples finding significant effects even if they were present was less likely. The latter were commonly also interventions with more vulnerable groups, where partner organisations struggled to collect data.

Recommendations for interventions

Interventions with more advantaged participants were more effective in increasing digital literacy and use. A clearer understanding and formulation of aims and expectations from the beneficiaries of the intervention might have contributed to making the most of these more effective interventions. This also suggests that interventions with more vulnerable participants were less aligned with the needs, experiences, and expectations of these participants (see also Martinez, 2025). **Better alignment and embedding of ML&DS interventions within broader programmes** with clear goals that are relevant to beneficiaries would likely improve the effectiveness of these interventions.

Martinez et al. (2025) argued that decreases in ICT use and outcomes after the intervention could be due to efforts to raise awareness about potential online risks and harms. This awareness might have led some participants to reconsider their internet use and choose to reduce it or for them to be more critical about the quality of these outcomes. This is likely to have been the case for the Belgian VO intervention. This does not mean that raising awareness is negative in and of itself. Instead, it highlights the need to **pair awareness initiatives with skill development and training** to help participants manage and respond to these risks more effectively while empowering them to also take advantage of the benefits that ICT use can bring.

That those with lower quality access were more likely to increase their ICT literacy and use suggests that ML&DS interventions should continue to specifically **target those who are less digitally included** at this basic level. Even if this does not lead to increased access for these individuals, they are poised to significantly benefit.

Recommendations for evaluations

Future evaluations must prioritise research with **larger sample sizes**. Despite filtering for sample size, the number of participants was small in most studies. Although this report highlights several important insights, a larger sample size would increase the robustness of these findings and might clarify the contradicting results.

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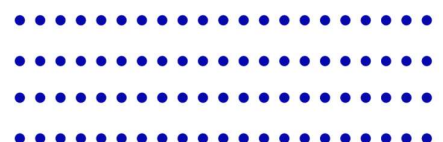
Ensuring **consistency in measurement** before and after the intervention in future evaluations would also increase reliability and robustness. For example, most interventions used only a post-test to measure improvements in digital literacy levels before and after the intervention. Interventions using this approach reported higher and more significant positive changes in ML&DS levels, partly due to an inability to capture negative changes in this way. A consistent approach to measuring the impacts of interventions would produce more solid results.

Both of these recommendations are easier said than done. Evaluating interventions working with groups experiencing different forms of disadvantage demands **more resources such as time, funds for incentives and data collection**, and other actors' involvement (e.g., interpreters). This is something these organisations are less likely to have than those who work with more advantaged populations see Martinez et al., 2025) - more funding and resources need to be made available.
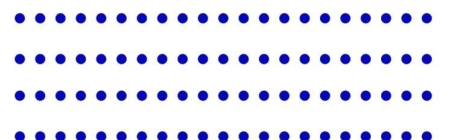
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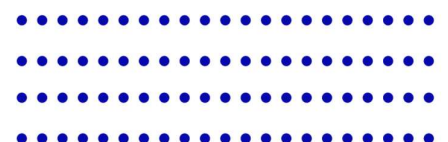
Part A. Sociodemographic data and personal wellbeing

Intro [Such as: First, we would like to ask you some questions about yourself to understand the background of the people who are participating in our course/workshop/event]

1.1 In what year were you born? _____

1.2 How would you describe yourself? I am...

Male (0)	
Female (1)	
Non-binary (2)	
I would describe myself differently (please tell us how) (66)	
Prefer not to say (99)[10]	

1.3 What is the **highest level of education** you have successfully completed? (If you finished your education abroad, please tick the option that is the most similar)[11]

Primary school level or lower (1)	
Secondary school level (O-Levels, CSE, GSCE, BTEC/SCOTVEC, RSA diploma, GNVQ, NVQ/SVQ up to Level 3, Apprenticeship, City and Guilds Craft, OND/ONC) (2)	
University entry level (AS-Level or equivalent, A-Level or equivalent, higher or equivalent, Scottish Sixth Year certificate, Access qualification) (3)	
Further education/vocational training (NVQ Levels 4 and 5, Foundation degree, Diploma in Higher Education, RSA higher diploma, HNC/HND, BTEC higher, Nursing qualification, other higher education below degree level) (4)	
Bachelor's degree (BA, BS, AB, etc.) (5)	
Graduate degree (Master's level, Doctorate) (6)	
Other (66)	
Prefer not to say (99)	

1.4 Which of the following best describes your current situation?

In full-time education (1)	
In part-time education (2)	
Working full-time (at least 30 hours a week) (3)	
Working part-time (8–29 hours a week) (4)	
Unemployed (5)	
Retired (6)	
Permanently sick or disabled (7)	
In community or military service (8)	

[10] Answer category coding should not be shown to participants. All 'Other's are to be marked 66, 'Don't know's 77, 'Not applicable's 88 and 'Prefer not to say' 99.

[11] Although this should be adopted for the particular country, at the very minimum it should classify the education level up to secondary school, undergraduate (BA), further (post-secondary) and graduate (MSc/PhD) education levels.

	Taking care of the home, looking after children or other people (9)	
	Other (66)	

1.5 Please indicate how true the following statements are of yourself.

	Not true of me (1)	Not very true of me (2)	Mostly true of me (3)	Very true of me (4)	Don't know (77)	Don't want to answer (99)
I am able to participate well at work (1)[12]						
I am able to participate well in class (2)[13]						
I feel I am behind on what is happening in the world (3)						
I am generally a confident person (4)						
I know how to manage my finances (e.g., banking, budgeting) (5)[14]						
If I need help, there is someone I can call for support (6)						
I would like to be in contact with family and friends more (7)						
I am able to make informed decisions about my health (8)						
I have a tendency to feel lonely (9)						
I know where to go to get things done (e.g., get a driver's license, find out about tax benefits) (10)						

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[12] For those who have indicated that they are employed.
[13] For those who have indicated that they are in education.
[14] Only for adults (>18 years old).

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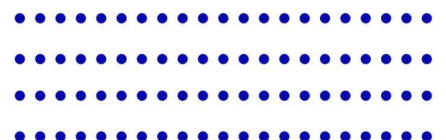
Part B. Digital lived environment

The questions in this section are related to the internet access conditions you have, what you know, and what you actually do online.

We would like to ask you a few questions about how you use the internet and technologies such as mobile phones and computers.

2.1 Which of these do you use to access the internet? (Select all that apply)

Computer (desktop or laptop) (1)	
Smartphone (a phone that you can access the internet with or download apps on) (2)	
Tablet or eReader (e.g., iPad, Kindle, etc.) (3)	
Game console (e.g., Xbox, PlayStation, etc.) (4)	
None of these (5)	
Other (please give a description) (66)	

2.2 Please indicate **how true the following statements are of you** when thinking about how you use the internet and technologies such as mobile phones.
If you have never done this, think about how true this would be of you **if you had to do it now, and by yourself**.
If you do not understand what the question is asking, tick the box 'I do not understand what you mean by this'.

	Not at all true of me (1)	Not very true of me (2)	Neither true nor untrue of me (3)	Mostly true of me (4)	Very true of me (5)	I do not understand what you mean by this (0)	I do not want to answer (99)
I know how to protect a device (e.g., with a PIN, a screen pattern, a fingerprint, facial recognition) (1)							
I know how to store photos, documents or other files on the cloud (e.g., Google Drive, iCloud) (2)							
I know how to use private browsing (e.g., incognito mode) (3)							

2.3 Please indicate how true the following statements are of you when thinking about how you use the internet and technologies such as mobile phones.
If you have never done this, think about how true this would be of you if you had to do it now, and by yourself.

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	Not at all true of me (1)	Not very true of me (2)	Neither true nor untrue of me (3)	Mostly true of me (4)	Very true of me (5)	I do not understand what you mean by this (0)	I do not want to answer (99)
I know how to use advanced search functions in search engines (1)							
I know how to check if the information I find online is true (2)							
I know how to figure out if a website can be trusted (3)							

2.4 Please indicate **how true the following statements are of you** when thinking about how you use the internet and technologies such as mobile phones.

If you have never done this, think about how true this would be of you **if you had to do it now, and by yourself**.

If you do not understand what the question is asking, tick the box 'I do not understand what you mean by this'.

	Not at all true of me (1)	Not very true of me (2)	Neither true nor untrue of me (3)	Mostly true of me (4)	Very true of me (5)	I do not understand what you mean by this (0)	I do not want to answer (99)
Depending on the situation, I know which medium or tool to use to communicate with someone (e.g., make a call, send a WhatsApp message, send an email) (1)							
I know which images and information about me is okay to share online (2)							
I know when it is and when it is not appropriate to use emoticons (e.g., smileys, emojis), text speak (e.g., LOL, OMG) and capital letters (3)							

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2.5 Please indicate **how true the following statements are of you** when thinking about how you use the internet and technologies such as mobile phones.

If you have never done this, then think about how true this would be of you **if you had to do it now, and by yourself**.

	Not at all true of me (1)	Not very true of me (2)	Neither true nor untrue of me (3)	Mostly true of me (4)	Very true of me (5)	I do not understand what you mean by this (0)	I do not want to answer (99)
I know how to create something that combines different digital media (e.g., photos, music, videos, GIFs) (1)							
I know how to edit existing digital images, music and videos (2)							
I know how to ensure that many people will see what I put online (3)							

2.6 To what extent are the following statements about media such as television, radio, newspapers and how people use them true or not true?

If you are not sure, please let us know.

	Definitely not true (1)	Definitely true (2)	I am not sure (3)	I do not want to answer (99)
Media companies choose content based on what will attract the biggest audience (1)				
Documentaries are made to represent what really happened in an unbiased way (2)				
People are more likely to be persuaded by media content that fits with their own views than by media content that doesn't (3)				
Media content and platforms are designed in such a way to keep people hooked/paying attention (4)				
A story about peace is more likely to be featured prominently than one about war (5)				

2.7 To what extent are the following statements about technologies such as the internet and mobile phones true or not true? If you are not sure, please let us know.

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	Definitely not true (1)	Definitely true (2)	I am not sure (3)	I do not want to answer (99)
The first search result presented by search engines (such as Google or Bing) is always the best information source (1)				
Everyone gets the same information when they search for things online (2)				
Whether someone likes or shares a post can have a negative impact on others (3)				
The first post a person sees on social media is the last thing that was posted by one of their contacts (4)				
Using hashtags (#) increases the visibility of a post (5)				
Companies pay ordinary people to use their products in videos and content they create (6)				

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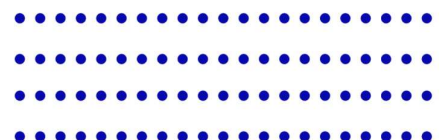
Part C. Uses and outcomes

Intro: The following questions are about the things you do or do not do with technologies such as the internet and mobile phones, and what the outcomes are of this use.

Informal learning

3.1 Thinking about your online activities (on the internet or mobile phone) **in the last month**, please indicate whether the following was something you did – something that happened and whether you were happy with the result (i.e., whether you learned something).

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most results (2)	Yes, I did this and was overall happy with what I found (3)	I don't want to answer (99)
I looked up information online to answer a question I had (1)				
I came across opinions that differed from my own (e.g., in newspapers, on discussion boards, social media) (2)				

Wellbeing

3.2 We would like to know whether you have tried to do any of the following activities **in the last month**, and whether you were happy with the result (i.e., whether you improved your life or knowledge).

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most results (2)	Yes, I did this and was overall happy with the results (3)	I don't want to answer (99)
Look up information to understand problems or issues that interest you (1)				
Use sport or fitness-related advice or programs/apps (2)				
Look up health-related information/advice online (3)				

3.3 Have you come across any of the following things on the internet or your mobile phone **in the last month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
I have come across content that offended me (1)			
On the internet, I found information that made me do things that were not so good for my health (2)			

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Social

3.4 We would like to know whether you did any of the following activities or whether they happened to you online **in the last month**, and if you were happy with how it went or felt (in comparison with your offline interactions).

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most interactions (2)	Yes, I did this and was happy with most interactions (3)	I don't want to answer (99)
Communicated with my close family and friends (1)				
Contacted people who are not close friends or family (2)				
Looked for information on a government or public service (e.g., taxes, benefits, driving licence) (3)				

3.5 Have any of the following happened to you on the internet or through a mobile phone **in the last month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
Other people on the internet have sent me annoying or embarrassing messages (1)			
The internet and mobile phone have made interacting with others more difficult for me (2)			

Finance (only for adults 18+)

3.6 We would like to know whether you have tried to do any of the following activities **in the last month**, and whether you were happy with the result (i.e., you managed to get the service or product you wanted).

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most results (2)	Yes, I did this and was happy with most services or products (3)	I don't want to answer (99)
Buy products or services online (1)				
Use financial services (e.g., benefits advice, banking, finding insurance) online (2)				

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3.7 Have any of the following things happened to you on the internet or on your mobile phone **in the last month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
I have bought products online that were of bad quality (1)			
I have lost money on the internet due to fraud or a scam (2)			

*Occupation – Education (for students only)[15]*

3.8 We would like to know whether you have tried to do any of the following things in relation to school/university **in the last month**, and if you were happy with how it went or felt (i.e., you managed to find what you were looking for/used the tools in a satisfactory way).

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most results (2)	Yes, I did this and was happy with most results (3)	I don't want to answer (99)
Searched for information online to do homework (1)				
Used online tools for school/university work (e.g., Moodle, Blackboard) (2)				

3.9 Has the following happened to you in relation to school/university work **in the last month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
I had trouble getting school materials or documents I needed for school/university that were available online or sent by email (1)			
The technology I have is of too poor quality to be able to do homework or assignments (2)			

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[15] The following questions are either/or – that is, in the Occupation questions, people get only one question set – either the Education, Work or Unemployed question, unless you have space for more.

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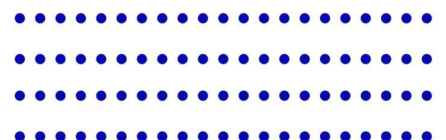
Occupation – Work (everybody else can be asked this, not just people working)

3.10 We would like to know whether you have had paid employment or done voluntary work of any kind **in the last month**.[16]

Yes, I have done paid, unpaid or volunteer work (1)	
No, I have not done any paid, unpaid or volunteer work (2)	

3.11 Please indicate whether you have tried to do the following things for your work **in the last month**, and what the result was of this use of technologies, such as the internet and mobile phone.

	No, I haven't tried to do this (1)	Yes, I did this but was not very happy with how this allowed me to do the work (2)	Yes, I did this and was mostly happy with how this allowed me to do the work (3)	I don't want to answer (99)
Used the internet or mobile phone for my work (1)				
Searched for information online related to my work (2)				

3.12 Has any of the following happened to you in relation to your work **in the last month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
I had trouble getting information or documents for work that were available online or sent by email (1)			
The internet and/or mobile phone force me to work in a certain way that I do not like (2)			

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[16] This should only be asked if those who are retired, disabled or doing care work at home are given the Work questions.

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Occupation – Unemployed (for those who are unemployed; if there is space, also ask those who are employed)

3.13   Please indicate whether you have tried to do the following things **in the last month**, what the result was of this use of technologies, such as the internet and mobile phone, and how satisfied you were with the result.

	No, I haven't tried to do this (1)	Yes, I did this but was not happy with most results (2)	Yes, I did this and was mostly happy with the result (3)	I don't want to answer (99)
I looked for a job online (1)				
I created a profile on a job site (e.g., LinkedIn, Indeed) (2)				

3.14   Has any of the following happened to you **in the past month**?

	Yes (1)	No (2)	I don't want to answer this question (99)
I saw jobs I liked but did not apply for them because they require technical skills or certifications that I don't have (1)			
I haven't got a response to a position I applied for online in the previous six months (2)			
I have been rejected for a job that I applied for online (3)			

Thank you for answering these questions. There are no more questions we have for you.

Please let us know if there is anything you would like to add.

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Part D. Uses and outcomes (post-intervention immediate)

Informal learning

4.1 Thinking about the following online activities (on the internet or mobile phone), please indicate how likely you are to do this **in the coming months**:

	No, I will not because I am not interested (1)	No, I will not because I don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
Look up information online to answer a question I have (1)						
Look for information which has opinions that are different from my own (e.g., in newspapers, on discussion boards, social media) (2)						

4.2 After taking this course, do you know how to achieve the following?

	No (1)	I am not sure (2)	Yes, I already managed to do this (3)	Yes, I will now manage to do this (4)	I don't want to answer (99)
Find quality information about something I am interested in online (1)					
Avoid being misled by fake news or misleading information online (2)					

Wellbeing

Here are a number of activities someone might do online. Were you able to do these before the course? And now, would you be able to do these?

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4.3 Thinking about the following online activities (on the Internet or mobile phones), please indicate how likely you are to do this **in the coming months**.
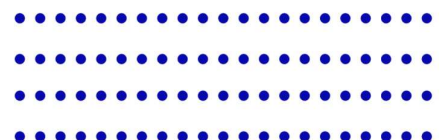
	No, I will not because I am not interested (1)	No, I will not because I still don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
I will use the internet and apps to get health advice (1)						
I will use the internet and apps for fitness (2)						

4.4 Can you manage to do the following?

	No (1)	I am not sure (2)	Yes, I already managed to do this before the course (3)	Yes, I now know how to do this (4)	I don't want to answer (99)
Avoid apps or websites that expose me to harmful content (1)					
Find information that helps me make decisions that are good for my health (2)					

Social

Here are a number of activities someone might do online. Were you able to do these before the course? And now, would you be able to do these?
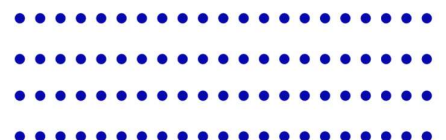
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4.5 Thinking about the following online activities (on the Internet or mobile phones), please indicate how likely you are to do this in the coming months.

	No, I will not because I am not interested (1)	No, I will not because I still don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
I will communicate with my family and friends online (1)						
I will use internet to get in touch with other people to solve a problem I face (e.g. council, utilities provider, medical practice) (2)						

4.6 Can you manage to do the following?

	No (1)	I am not sure (2)	Yes, I already managed to do this before the course (3)	Yes, I now know how to do this (4)	I don't want to answer (99)
Take positive action if I or someone I know is being bullied/harassed online (1)					
Engaging in productive discussions around social issues with others on the internet or mobile apps (2)					

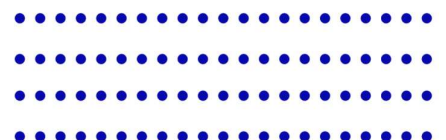REMEDIS

Occupation – Work

Here are a number of activities someone might do online. Were you able to do these before the course? And now, would you be able to do these?

4.7 Thinking about the following online activities (on the Internet or mobile phones), please indicate how likely you are to do this in the coming months.

	No, I will not because I am not interested (1)	No, I will not because I still don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
I will use Internet and my phone for work-related issues (1)						
I will create a profile on a job site (e.g. LinkedIn, Indeed) (2)						

4.8 Can you do the following?

	No (1)	I am not sure (2)	Yes, I already knew how to do this (3)	Yes, I now know how to do this (4)	I don't want to answer (99)
Managing my use of the internet so that I am more productive in my job (1)					
Networking with other people in ways that benefit work-related activities (e.g. LinkedIn, Zoom) (2)					

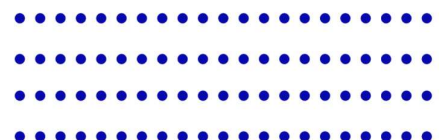REMEDIS

Occupation – Education

Here are a number of activities someone might do online. Were you able to do these before the course? And now, would you be able to do these?

4.9 Thinking about the following online activities (on the Internet or mobile phones), please indicate how likely you are to do this in the coming months.

	No, I will not because I am not interested (1)	No, I will not because I still don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
I will use internet to find study materials that I wouldn't find at the school/library (1)						
I will sign up for other courses online (2)						

4.10 Can you manage to do the following?

	No (1)	I am not sure (2)	Yes, I already managed to do this before the course (3)	Yes, I now know how to do this (4)	I don't want to answer (99)
Use the internet in ways that improve my performance on the course or at school (i.e. better presentations, better grades, hand in assignments)					
Avoid getting lost on the different platforms used to collaborate with fellow students and teachers (2a) [for those in formal education]					
Avoid missing out on digital learning opportunities (2b) [for those taking online courses]					

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Finance

Here are a number of activities someone might do online. Were you able to do these before the course? And now, would you be able to do these?

4.11   Thinking about the following online activities (on the Internet or mobile phones), please indicate how likely you are to do this in the coming months.

	No, I will not because I am not interested (1)	No, I will not because I still don't know how (2)	Yes, I might do this (3)	Yes, I will definitely do this (4)	I don't want to answer (99)	This doesn't apply to me (88)
I will use internet to buy a product or service online (1)						
I will compare products and services on different websites (2)						

4.12   After taking this course, do you know how to do the following?

	No (1)	I am not sure (2)	Yes, I already knew how to do this (3)	Yes, I now know how to do this (4)	I don't want to answer (99)
Save money by finding better prices for products and services online (1)					
Avoid being a victim of a scam or fraud (2)					

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