More Training, Better Prepared: Increasing the frequency of training improves understanding of security instructions.

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Abstract

Research has been conflicted with regards to how often security awareness training needs to be undertaken in order to effectively implement changes in behaviors and knowledge (Stewart et al, 2012; Pattinson et al, 2017, Gundu er al, 2019). In this report we examine how clearly security instructions are understood by employees relative to the amount of security awareness training they have taken in the last 12 months. The comparison examined responses from those who completed no security awareness training, annual training, quarterly training, and monthly training. Data pre-processing revealed that no organizations implemented annual training. Statistical analysis for the remaining frequencies revealed an 84% correlation between training frequency and rating of instructions. Further examination revealed this increase occurred both between no training and quarterly training, as well as quarterly training and monthly training consistently across all industry types. Those with increased frequencies of training had a clearer understanding of instructions from their organization in the event of a security incident. Organizations looking to improve their security based communication should consider increasing the frequency of employees' security awareness training.

Executive Summary

Having security policies in place is an essential part of maintaining a good and strong security culture, however a policy is only effective if the employees are able to understand its instructions. This report examined how clear employees felt instructions were from their organizations with regards to what to do in the event of a security incident. The average clarity rating was 70/100, however a closer look at the data revealed that the clarity rating varied greatly depending on how much security awareness training had been completed in the last 12 months. Those who had received training on a quarterly basis gave an average clarity rating that was 8% higher than those who had completed no training. This number increased to 12% for those who completed monthly training. In 84% of cases, security awareness training increased employees' understanding of security instructions.

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Method

This report made use of items selected from the Security Culture Survey and Security Awareness Proficiency Assessment, both of which are available to KnowBe4 customers via the Kevin Mitnick Security Awareness Training (KMSAT) platform. The Security Culture Survey was developed by CLTRe (now KnowBe4 Research) based on a scientific approach that integrates survey methodology, statistics and scientific findings from security culture research and psychometrics (see Security Culture Report, 2017, CLTRe). The survey consists of statements designed to assess different aspects of security culture, during which respondents answer questions using a 5-point Likert scale. The Security Awareness Proficiency Assessment is a scientifically developed survey that assesses the behavioral knowledge of respondents using multiple choice questions. The analysis made use of one item from the Security Culture Survey and one item from the Security Awareness Proficiency Assessment that assessed the following statements:

1 - Perceived clarity of instructions from employees' organizations in the event of a security incident

2 - The frequency at which employees have completed security awareness training in the last 12 months.

The data for the report is aggregated from a single data collection time point for each employee per item. Participants were informed that their responses were anonymous prior to completing the survey. Data from individual respondents for both items were gathered and converted into percentage ratio values and were grouped by industry type (Banking, Financial Services, Technology, Education, Construction, Government, Manufacturing, Insurance, Consulting, Business Services, Consumer Services, Not for Profit, Healthcare & Pharmaceuticals, Transportation, Legal, Retail & Wholesale and Energy & Utilities) and global region (Asia, Africa, North America, Europe, Latin America, Oceania). While data for individual items included data from N = 526, 343 (clarity rating) and N = 523, 103 (training frequency), the correlation analysis could only include participants from two specific time periods, and so a subset total of N = 290 640 respondents were included for the correlation. The correlation analysis assessed to what degree an increase in training frequency coincided with an increase in clarity of instructions.

Highest rated	N	Yes %	No %
Insurance	18 881	88.1	11.9
Financial Services	51 871	87.1	12.9
Legal	3 606	86.1	13.9
Lowest rated			
Construction	11 057	79.4	20.6
Government	50 832	78.2	21.8
Education	17 280	71.6	28.4

Table 1: Summary of responses for whether organizations provide clear instructions in the event of a security threat by industry type

Region	N	Yes (%)	No (%)
Latin America	2 933	86.1	13.9
Asia	8 880	80.6	19.4
North America	232 497	82.9	17.1
Africa	11 023	82.9	17.1
Europe	21 955	80.8	19.2
Oceania	10 501	76.1	23.9

Table 2: Summary of responses for whether organizations provide clear instructions in the event of a security threat by global region. Data presented is that exclusively used in the correlation analysis.

Results

Item Highlights

Assessment of training frequency revealed no organization from the sample implemented annual training in the 12 month assessment period. The most popular training frequency was quarterly and this was reflected in all industries with the exception of hospitality, whose most frequent training was no training. Monthly training was completed by some employees in every industry, however the ratio of Quarterly to Monthly training varied (see Appendix B for a detailed overview of training frequency by industry and global region).

Employees from the Education industry rated the clarity of instructions in the event of a security incident as the lowest out of all industries examined, while regional analysis revealed organizations in Oceania to be the lowest scoring of the 6 regions examined. Detailed data for clarity of instruction rating for industry and global regions are available in Appendix A.

Highest frequency	N	Monthly Training %
Energy & Utilities	18 823	18.8
Transportation	14 116	18.4
Legal	3 606	10.8
Lowest frequency		
Healthcare & Pharm.	41 713	3.8
Technology	87 777	2.1
Education	17 280	1.6

Table 3: Summary of % of employees undertaking monthly training by industry

Region	N	Monthly Training %
Latin America	2 933	8.9
Asia	8 880	8.6
North America	232 497	8.4
Africa	11 023	7.3
Europe	21 955	6.2
Oceania	10 501	3.8

Table 4: Summary of % of employees undertaking monthly training by global region

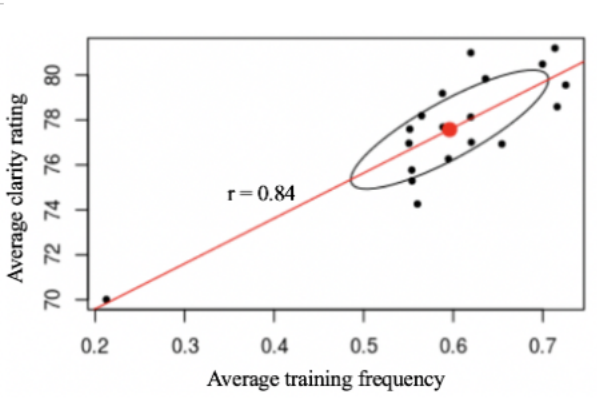

Figure 1: Scatter plot demonstrating the correlation between training frequency and clarity of instruction rating, grouped by industry type.

Correlation Analysis

Ratings for the clarity of instructions were converted to mean percentage ratios per organization, and then aggregated to the level of industry. Values were then assigned to the three average training frequencies for which data was available - None (0), Quarterly (0.75) and Monthly (1.00). A Spearmans Rho correlation analysis was then conducted to accommodate the categorical nature of time frequencies used. The results revealed a correlation value between training frequency and perceived clarity of instructions of 0.84. In 84% of cases, increased training resulted in improved perceived clarity of security related instructions (see Figure 1). A more detailed examination of different time frequencies showed that employees who received quarterly training in the previous 12 months reported an average improvement of 8% in their understanding of security instructions over those who have taken no training. Further, employees who had undertaken Monthly Training in the previous 12 months report an improved understanding of security related instructions of 12% over those who had taken no training (see Figure 2).

Discussion

This report demonstrates a clear relationship between training frequency and how well employees feel they understand instructions in the event of a security incident. This effect is highly consistent, with 84% of cases demonstrating improvements. In addition to the high correlation, the increase in rating with every increased training frequency was highly consistent across industry types (see Appendix B, pg 12).

While the improvement is most pronounced for those who received quarterly training in the 12 month period compared to no training, the effect was also present for those who completed monthly over quarterly training. At its most basic level, one can assume initial improvements on the basis of improved literacy in the language used around security related instructions, and explanations provided to employees about why security policies advocate specific actions. However, as it can be reasonably assumed that both of these achieved through quarterly training, the continued improvement would suggest an alternative reason why increased training frequency benefits the clarity of instructions.

A likely contributor to the ongoing improvement is that increased training improves the odds of employees accurately recalling training content, while further resulting in more consistent reinforcement of the importance of security aware behavior, which has been evidenced to increase information retention. Increasing the frequency of training also allows organizations to broaden the scope of security topics that can be covered. Security incidents, and in turn instructions on how to deal with them appropriately, do not operate on a one-size-fits-all basis. For example, policy on what to do in the event of a phishing attack differs from what to do in the event of unauthorized person(s) on the organizations' property. In comparison with monthly training schedules, quarterly training schedules would severely limit the ability of an organization to cover instructions across the range of potential security incidents, while also limiting how successfully they are able to reinforce previous training content.

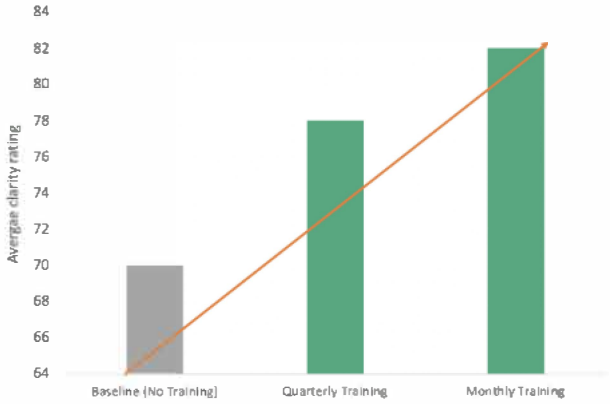

Figure 2: Graph detailing the average percentage increase of clarity rating by training frequency

Implications

Those who do not receive security awareness training have reduced understanding of organizational instructions in the event of a security incident. The data presented here highlights that simply communicating security policy to untrained employees is ineffective. Without the benefits of training, such as improved understanding of terminology and knowledge about why procedures are in place, it is more difficult for an employee to understand and, ultimately, appropriately implement security based instructions.

Conclusion

Organizations wishing to improve their communication with employees regarding what to do in the event of security incidents should implement security awareness training. Those who are already implementing security awareness training should consider assessing the perceived clarity of security policy instructions, and increasing the frequency of their training schedules accordingly.

About KnowBe4, Inc.

KnowBe4, the provider of the world's largest security awareness training and simulated phishing plat-form, is used by more than 50,000 organizations around the globe. Founded by IT and data security specialist Stu Sjouwerman, KnowBe4 helps organizations ad-dress the human element of security by raising aware-ness about ransomware, CEO fraud and other social engineering tactics through a new-school approach to awareness training on security. Kevin Mitnick, an internationally recognized cybersecurity specialist and KnowBe4's Chief Hacking Officer, helped design the KnowBe4 training based on his well-documented social engineering tactics. Tens of thousands of organizations rely on KnowBe4 to mobilize their end users as the last line of defense.

About the KnowBe4 Research Technical Report

Establishing an excellent security culture is an important aspect of developing an efficient defense against cyber security threats. Reports from KnowBe4 Research provide analysis of various aspects of security culture, in order to provide quantifiable, up to date information about global practices and standards in different industries.

About KnowBe4 Research

KnowBe4 Research is the research arm of KnowBe4, Inc. Our mission is to provide IT and security leaders with high quality, vendor neutral data-driven insights related to cybersecurity and the human element.

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Appendices

The appendices attached here offer visualizations and detailed overviews of the data described in the report.

Appendix A includes data for perceived clarity of instructions given by the organisation in the event of a security threat. Data presented here includes all respondents who completed the survey in January 2022 (N = 526 343).

Appendix B includes data for the amount of training completed by employees within the previous 12 months (N = 523 103).

Appendix C includes supplementary data. Here you will find the list of countries included in the regional analysis, training frequencies for individual countries, and table presented data for the average improvement % per industry.

Appendix A

Perceived clarity of instructions given by the organisation in the event of a security threat:

Industry and regional data:

Summary of responses for the highest and lowest scoring clarity of instructions in the event of a security threat by industry type:

Industry type	**N**	**Yes** (%)	**No** (%)	**Rank**
Insurance	18 881	88.1	11.9	1st
Financial services	51 871	87.1	12.9	2nd
Legal	3 606	86.1	13.9	3rd
Technology	87 777	84.9	15.1	4th
Banking	49 122	84.8	15.2	5th
Consulting	15 851	83.8	16.2	6th
Energy & Utlities	18 823	82.8	17.2	7th
Healthcare & Pharma.	41 713	82.3	17.7	8th
Consumer services	8 384	82.2	17.8	9th
Business services	24 428	82.0	18.0	10th
Transportation	14 116	81.8	18.2	11th
Not for Profit	16 307	80.9	19.1	12th
Manufacturing	52 633	80.3	19.7	13th
Retail & Wholesale	43 662	80.2	19.8	14th
Construction	11 057	79.4	20.6	15th
Government	50 832	78.2	21.8	16th
Education	17 280	71.6	28.4	17th

Summary of responses by global region regarding whether the organization provides clear instructions to employees in the event of a security threat, ranked from best to worst:

Region	N	Yes (%)	No (%)
Latin America	3 968	86.1	13.9
Africa	40 853	82.9	17.1
North America	398 706	82.9	17.1
Europe	50 946	80.8	19.2
Asia	16 652	80.6	19.4
Oceania	15 330	76.1	23.9

Appendix B

Frequency of security awareness training: Industry Data

The frequency of training by industry type, organised by highest rate of **any** training:

Industry type	**N**	**None %**	**Quarterly %**	**Monthly %**
Insurance	18 881	9.2	82.8	7.8
Financial services	51 871	11.1	78.2	10.6
Energy & Utilities	18 823	11.8	69.3	18.8
Banking	49 122	12.6	80.1	7.1
Business services	24 428	15.9	74.6	9.4
Technology	87 777	16.7	77.4	2.1
Government	50 832	19.7	72.7	7.4
Consulting	15 851	20.2	73.1	6.6
Transportation	14 116	21.8	59.6	18.4
Not for Profit	16 307	22.7	69.7	7.4
Healthcare & Pharma.	41 713	23.3	72.7	3.8
Retail & Wholesale	43 662	24.1	69.7	6.1
Legal	3 606	10.8	62.9	26.4
Manufacturing	52 633	28.2	62.4	9.3
Consumer services	8 384	34.1	56.5	9.4
Construction	11 057	38.5	56.1	5.3
Education	17 280	41.1	57.2	1.6

The frequency of training by industry type, organised by highest rate of **quarterly** training:

Industry type	**N**	**None %**	**Quarterly %**	**Monthly %**
Insurance	18 881	9.2	82.8	7.8
Banking	49 122	12.6	80.1	7.1
Financial services	51 871	11.1	78.2	10.6
Technology	87 777	16.7	77.4	2.1
Business services	24 428	15.9	74.6	9.4
Consulting	15 851	20.2	73.1	6.6
Government	50 832	19.7	72.7	7.4
Healthcare & Pharma.	41 713	23.3	72.7	3.8
Not for Profit	16 307	22.7	69.7	7.4
Retail & Wholesale	43 662	24.1	69.7	6.1
Energy & Utilities	18 823	11.8	69.3	18.8
Legal	3 606	10.8	62.9	26.4
Manufacturing	52 633	28.2	62.4	9.3
Transportation	14 116	21.8	59.6	18.4
Education	17 280	41.1	57.2	1.6
Consumer services	8 384	34.1	56.5	9.4
Construction	11 057	38.5	56.1	5.3

The frequency of training by industry type, organised by highest rate of **monthly** training:

Industry type	**N**	**None** %	**Quarterly** %	**Monthly** %
Energy & Utilities	18 823	11.8	69.3	18.8
Transportation	14 116	21.8	59.6	18.4
Legal	3 606	10.8	62.9	26.4
Financial services	51 871	11.1	78.2	10.6
Business services	24 428	15.9	74.6	9.4
Consumer services	8 384	34.1	56.5	9.4
Manufacturing	52 633	28.2	62.4	9.3
Insurance	18 881	9.2	82.8	7.8
Government	50 832	19.7	72.7	7.4
Not for Profit	16 307	22.7	69.7	7.4
Banking	49 122	12.6	80.1	7.1
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Retail & Wholesale	43 662	24.1	69.7	6.1
Construction	11 057	38.5	56.1	5.3
Healthcare & Pharma.	41 713	23.3	72.7	3.8
Technology	87 777	16.7	77.4	2.1
Education	17 280	41.1	57.2	1.6

The average percentage improvement by training increase per industry:

Industry	**Quarterly Improvement (%)**	**Monthly Improvement (%)**
Banking	4.7	8.3
Business Services	7.1	8.2
Construction	9.5	13.6
Consulting	12.7	15.9
Consumer Services	5.6	8.6
Education	5.8	13.8
Energy and Utilities	4.9	9.4
Financial Services	7.1	9.4
Government	7.3	10.6
Health & Pharm.	6.2	10.1
Hospitality	6.8	9.1
Insurance	5.4	7.2
Legal	3.1	8.7
Manufacturing	7.5	10.1
Not for Profit	7.7	10.4
Retail and Wholesale	8.9	14.1
Technology	6.7	11.2
Transportation	9.8	12.4

Frequency of security awareness training: Regional Data

Summary of average training frequencies for global regions, organised by highest rate of **any** training

Region	N	None %	Quarterly %	Monthly %
North America	232 497	17.7	74.0	8.4
Latin America	2 933	18.0	71.3	8.9
Africa	11 023	27.0	65.6	7.3
Europe	21 955	29.3	64.5	6.2
Asia	8 880	32.1	59.3	8.6
Oceania	10 501	42.8	53.4	3.8

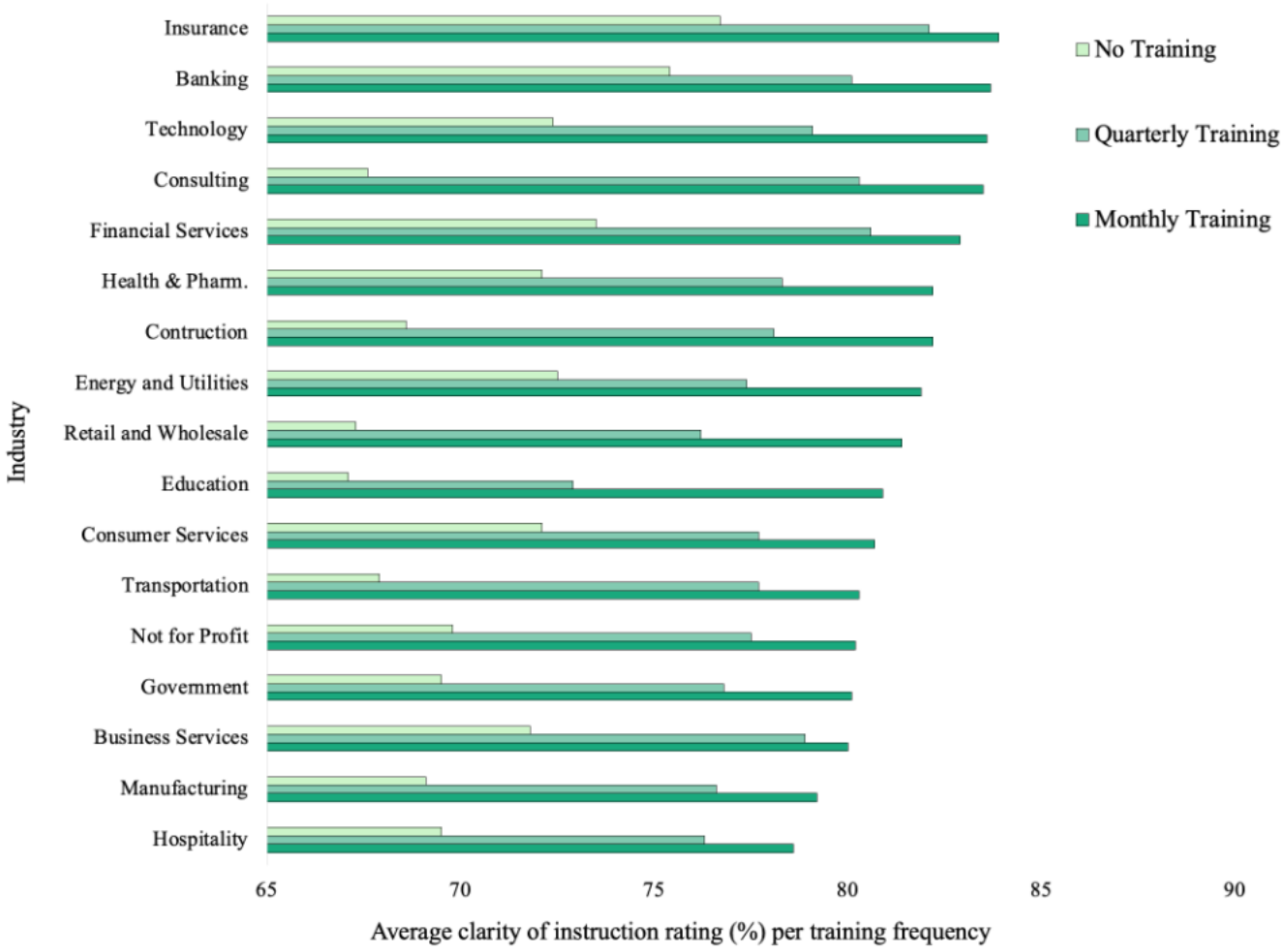
Summary of average training frequencies for global regions, organised by highest rate of **quarterly** training

Region	N	None %	Quarterly %	Monthly %
North America	232 497	17.7	74.0	8.4
Latin America	2 933	18.0	71.3	8.9
Africa	11 023	27.0	65.6	7.3
Europe	21 955	29.3	64.5	6.2
Asia	8 880	32.1	59.3	8.6
Oceania	10 501	42.8	53.4	3.8

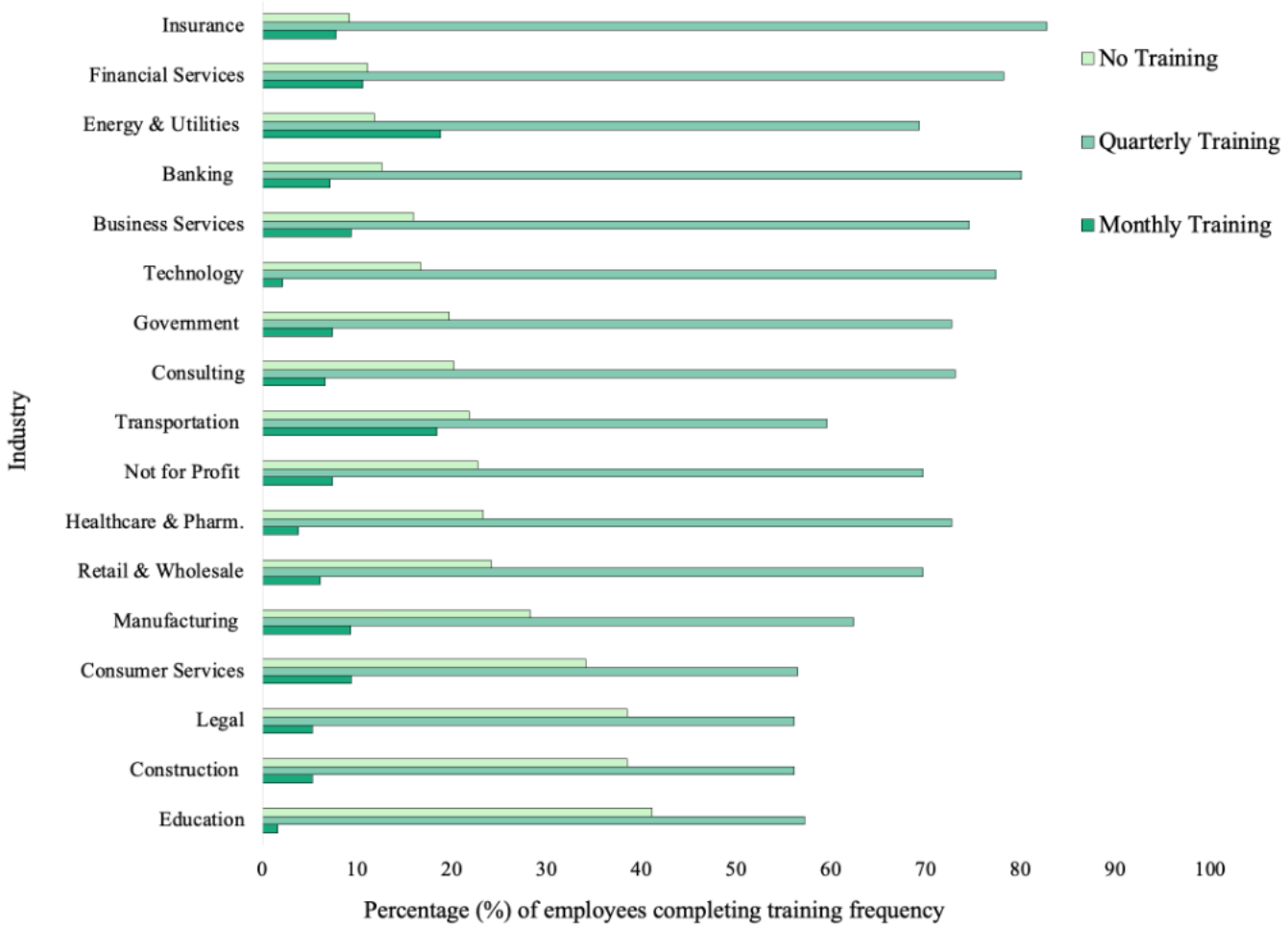
Summary of average training frequencies for global regions, organised by highest rate of **monthly** training

Region	N	None %	Quarterly %	Monthly %
Latin America	2 933	18.0	71.3	8.9
Asia	8 880	32.1	59.3	8.6
North America	232 497	17.7	74.0	8.4
Latin America	2 933	18.0	71.3	8.9
Africa	11 023	27.0	65.6	7.3
Europe	21 955	29.3	64.5	6.2
Oceania	10 501	42.8	53.4	3.8

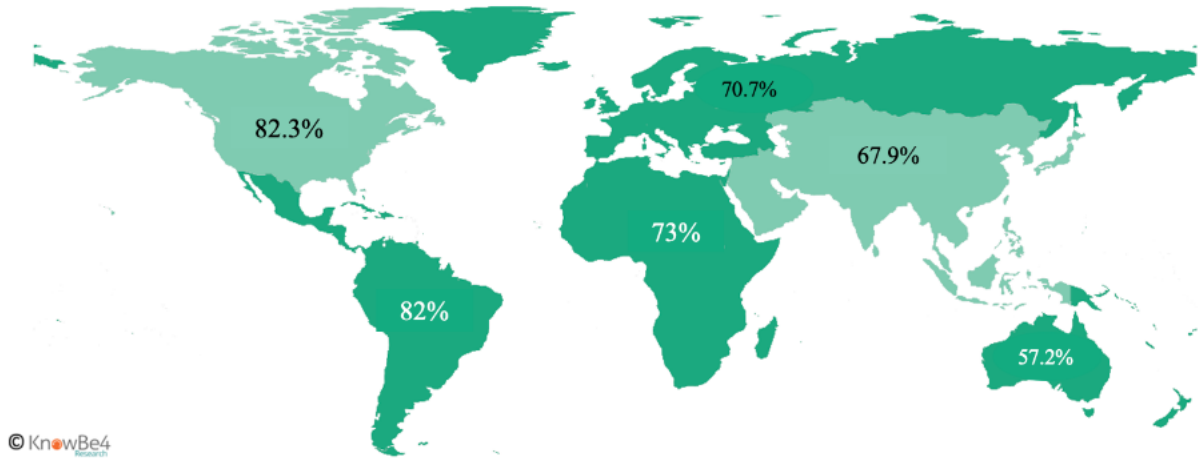
A graphical overview demonstrating how ratings of the clarity of security instructions improve with higher training frequency for each industry included in the analysis. The x-axis is the rating, while the colors note the frequency of training.



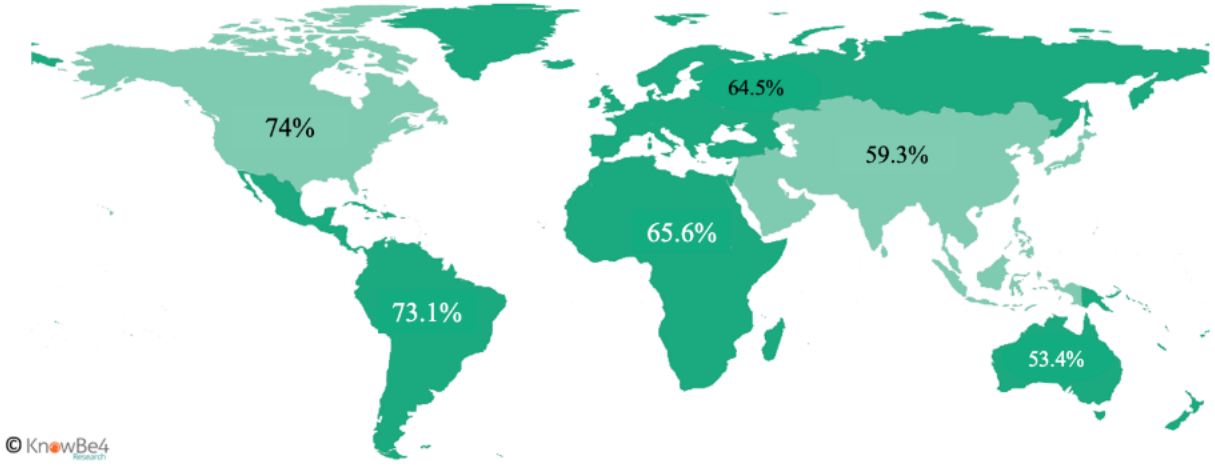
A graphical overview of training frequency for each industry included in the analysis. The x-axis shows the percentage of employees for each industry who trained at each frequency.



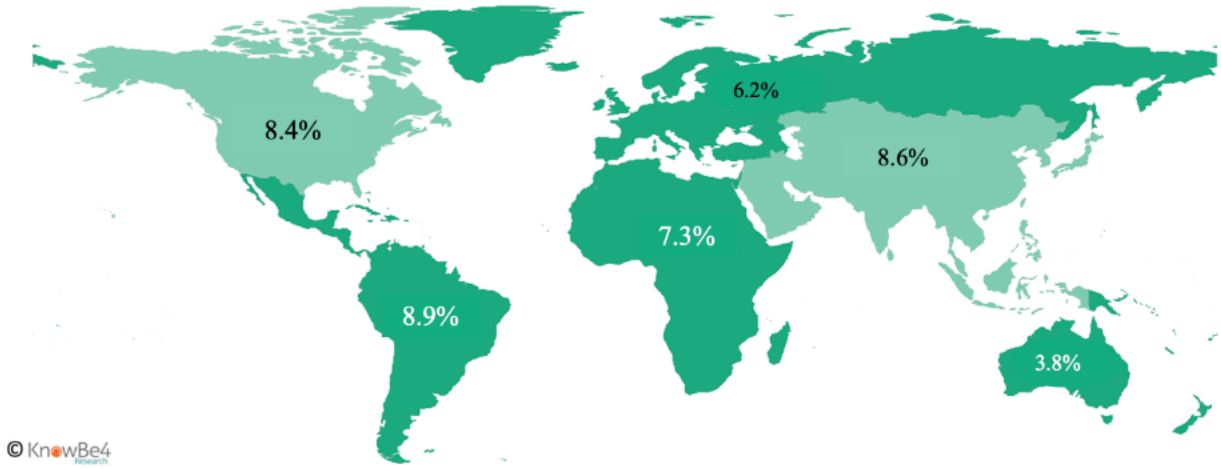
A map showing the number of employees in each region who report completing **any** training in the last 12 months



A map showing the number of employees in each region who report completing **quarterly** training in the last 12 months



A map showing the number of employees in each region who report completing **monthly** training in the last 12 months



Appendix C

Training frequencies from individual countries.

The frequency of training per country presented in alphabetical order:

Country	N	None %	Quarterly %	Monthly %
Australia	7687	44	55	1
Bahrain	208	43	57	0
Belgium	284	61	31	8
Belize	231	54	45	1
Bermuda	375	7	92	1
Botswana	1068	19	80	1
Brazil	420	5	92	4
Bulgaria	37	14	86	0
Canada	9180	21	68	11
Cayman Islands	44	14	86	0
Chile	13	69	31	0
Colombia	118	19	60	21
Costa Rica	13	0	92	8
Cyprus	10	0	40	60
Dominican Republic	718	19	60	21
Ecuador	193	23	76	1
Eswatini	14	7	93	0
France	35	57	43	0
Germany	40	20	80	0
Ghana	1559	7	84	8
Gibraltar	35	11	86	3
Hennepin	27	7	85	7
Hong Kong	1338	4	57	39
India	3941	51	49	1
Indonesia	53	57	43	0
Ireland	329	14	76	10
Italy	149	12	88	0
Jamaica	11	100	0	0
Japan	1771	27	70	3
Jersey	113	33	67	0
Kenya	556	7	88	5
Kuwait	144	31	69	1

Country	N	None %	Quarterly %	Monthly %
Latvia	84	60	39	1
Lesotho	145	83	17	0
Lithuania	71	83	17	0
Luxembourg	101	0	100	0
Malaysia	668	17	81	2
Malta	63	22	59	19
Mexico	676	12	84	3
Mozambique	66	8	68	24
Namibia	1385	48	42	1
Netherlands	2628	51	46	3
New Zealand	2761	40	49	11
Nigeria	534	22	75	3
Norway	86	7	76	3
Philippines	820	9	74	17
Poland	7	0	100	0
Portugal	379	84	16	0
Saint Kitts and Nevis	9	11	89	0
Saudi Arabia	826	40	57	4
Singapore	342	39	58	3
Slovakia	503	64	36	0
Slovenia	210	5	95	0
South Africa	4935	31	59	11
Spain	299	22	62	16
Suriname	329	10	88	2
Sweden	87	5	44	52
Switzerland	62	6	94	0
The Republic of Tanzania	416	0	85	15
Uganda	242	16	83	1
United Arab Emirates	58	19	79	2
United Kingdom	15 032	23	70	7
United States of America	222 915	18	74	8
Zimbabwe	103	57	39	4