

## Storytelling and Gamification in E-Learning – An Empirical Study to Educate Swiss Microenterprises in Data Protection

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### Abstract

*The huge volume of information processed electronically created a global interest in data protection regulations to ensure the correct handling of data and protect the individual. To reduce the risk of improper data processing, a basic understanding of data protection is considered essential for every employee. Existing methods of teaching data protection regulations tend to be passive and monotonous. Furthermore, formal training is often neglected in microbusinesses, which represent the majority of Swiss companies. This study elaborates a teaching approach that meets the needs of microentrepreneurs and helps them gain data protection knowledge. Based on design science research, an e-learning course incorporating gamification and storytelling is developed and evaluated.*

**Keywords:** Storytelling, gamification, data protection, microenterprises, e-learning

### INTRODUCTION

The enormous volume of information and the speed with which it is generated demand new management models and care with data. How to protect individuals as well as ensure fair markets is challenging for governments that must rapidly create, modify, and enforce regulations (Eggers, Kishnani, & Turley, 2018). For businesses, non-compliance with a growing number of regulations is a high risk, especially if employees do not understand how to properly handle and maintain the confidentiality of personal data (Guta, 2019). The role of data protection training is therefore becoming increasingly important (Brink, 2019), particularly for microenterprises (MEs), which account for almost 90% of Swiss companies and play a fundamental role in the Swiss economy (The Swiss Federal Council, 2019). MEs, similarly to

large companies, have to adhere to regulations, but the limited capacity and personnel resources make compliance difficult. (The Swiss Federal Council, 2019). Moreover, formal training and education in general are often neglected by these small organizations (EPALE, 2019).

Due to the numerous regulations and laws as well as special terminology, it is difficult to gain a sound knowledge of data protection. However, in the digital age, every employee, even in MEs with small budgets, should have a basic understanding of this matter. Nevertheless, surveys show that 34% of organizations see careless/unaware employees as the biggest vulnerability (EY, 2018). Almost 50% of small businesses responded in a survey that they do not always establish a legal basis as precondition for personal data processing, which is however a cornerstone of the European General Data Protection Regulation (EU GDPR; GDPR.EU, 2019).

Looking at existing training approaches, there are independent e-learning courses such as the ‘EU GDPR Foundation training course’ of BSI (2019), the ‘GDPR for Businesses and Individuals’ of the learning platform Alison (2019), or the ‘Data Protection Certification Course’ of the European Institute of Public Administration (2020). An analysis of the listed materials shows that there is a lack of training that focuses on interactive, engaging teaching methods that help learners to become more involved and internalize the content. In order to overcome this gap, the objective of this study is to conceptualize and develop an interactive e-learning approach helping in particular ME employees gain a basic data protection knowledge.

The remainder of this paper is structured as follows. Firstly, a brief summary of selected relevant data protection regulations is presented. Secondly, the educational theory is introduced, followed by the elaboration of the empirical study. As a core element, a novel e-learning prototype on data protection is presented and discussed. Finally, some suggestions for further research are put forward.

## **BACKGROUND ON DATA PROTECTION**

Data protection addresses methods to prevent unauthorized people from accessing data-critical areas and company-critical information, safeguarding information from corruption and loss (Brunswick, 2019). It is the group of policies and measures taken to regulate the collection, storage, use, and transmittal of personal information and to prevent unwanted processing of personal data (European Parliament, 2016). One of the recent achievements in data protection is the EU GDPR, applicable since 2018, which has significantly changed the obligations of companies that collect, process, and share personal data of people residing in the EU. Entities that do not comply with the regulation can face heavy fines. As Switzerland is neither a member state of the EU nor the European Economic Area, the Federal Act on Data Protection (FADP) is the legal framework for data protection in Switzerland (Federal Assembly of the Swiss Confederation, 1992). FADP is under a two-stage revision: The first phase is concerned with the requirements of EU Directive 2016/680 in context of the Schengen treaty and entered into force on 1<sup>st</sup> March 2019 (Consiglio Federale, 2019). The second phase, expected to be implemented in 2021, aims to strengthen data protection in general and to align the FADP with requirements of the GDPR. This revision is important to ensure that the legislators in Europe will continue to consider Switzerland as a third country with a level of data protection comparable to the EU (Hofmann-Hafner, 2019). When comparing the two regulations – GDPR and FADP (current and draft law) – common main topics can be derived: 1) Base terms around personal data and roles; 2) principles that should guide any personal data processing; 3) lawful bases for personal data processing; 4) rights of the individual, and 5) obligations of an organization. The details on the related articles can be seen in Table 1.

**Table 1: Comparison of law articles between regulations – GDPR, FADP, and FADP draft**

Area	Concept	FADP	FADP draft	GDPR
Key definitions	Personal data	3 (a)	4 (a)	4 (1)
	Processing	3 (e)	4 (d)	4 (2)
	Profiling	3 (d)	4 (f)	4 (4)
	Filing system	3 (g)		4 (6)
	Controller	3 (i)	4 (i)	4 (7)
	Processor		4 (j)	4 (8)
	Personal data breach		4 (g)	4 (12)
	Special categories of personal data	3 (c)	4 (c)	9 (1)
Principles	Lawfulness, fairness, and transparency	4 (1)(2)(4)	5 (1)(2)	5 (1)(a)
	Purpose limitation	4 (3)	5 (3)	5 (1)(b)
	Data minimization		5 (3) (4)	5 (1)(c)
	Accuracy	5 (1)	5 (5)	5 (1)(d)
	Storage limitation		5 (4)	5 (1)(e)
	Integrity and confidentiality	7	7	5 (1)(f)
	Accountability principle			5 (2)
Lawful base	Consent	4 (5)	5 (6)	6 1(a)
	Contract	13 (2.a, c)	27 (2.a)	6 1(b)
	Legal obligation		27 (2.b)	6 1(c)
	Vital interests		30 (4.c)	6 1(d)
	Public task	13 (2.f)	27 (2.f)	6 1(e)
	Legitimate interests	13 (2.b, d, e)	27 (2.c, d, e)	6 1(f)
Individual Rights	Right to withdraw consent	12 (2.b)	26 (2.b)	7 (3)
	Right to be informed	8 and 14	17	13 and 14
	Right to access	8	23 (1,2)	15
	Right to rectification	5 (2)	28 and 37	16
	Right to erasure	5	28 and 37	17
	Right to restrict processing		28 (2)	18
	Right to object	15	28 and 37	21
	Right to data portability		28 and 37	20
Company obligations	Rights related to automated decision-making		19 (2)	22
	List of processing activities		11	30
	Assign Data Privacy Officer (DPO)			37
	Obligation to register for data breach		22	33 and 34
	Data protection by design and by default		6	25
Data protection impact assessment		20	35	

Based on data protection regulations (Federal Assembly of the Swiss Confederation, 1992; Bundesversammlung der Schweizerischen Eidgenossenschaft, 2017; European Parliament, 2016).

## EDUCATIONAL THEORY

### Storytelling

Stories are an essential part of human culture used to convey ideas as well as knowledge (Davenport & Prusak, 1998). Storytelling as a method can be defined as the ability of an outsider to tell stories in a relevant way following a flow of events occurring in time and space. The purpose of telling a story is to

immerse and emotionally captivate the audience into its narrative flow (Lugmayr et al., 2017). Burroway (2019) suggests the following schema to build a good story: (1) introduction of characters and background; (2) occurrence of a problem or complication; (3) presentation of climax and what the characters did to try to resolve the conflict; and (4) resolution of the conflict. For several years, the use of storytelling gained popularity as a method for formal education. Arsenijević, Trivan, & Milošević (2016) conclude that storytelling is suitable for increasing understanding of information security as it guides learners by narrating successful or unsuccessful experiences. In the field of data protection, Glassey & Morin (2013) developed an online service called ‘ThinkData’, providing access to various data protection scenarios. Users can choose themes and job profiles to familiarize themselves with concepts of data protection, as well as real examples in the form of short stories.

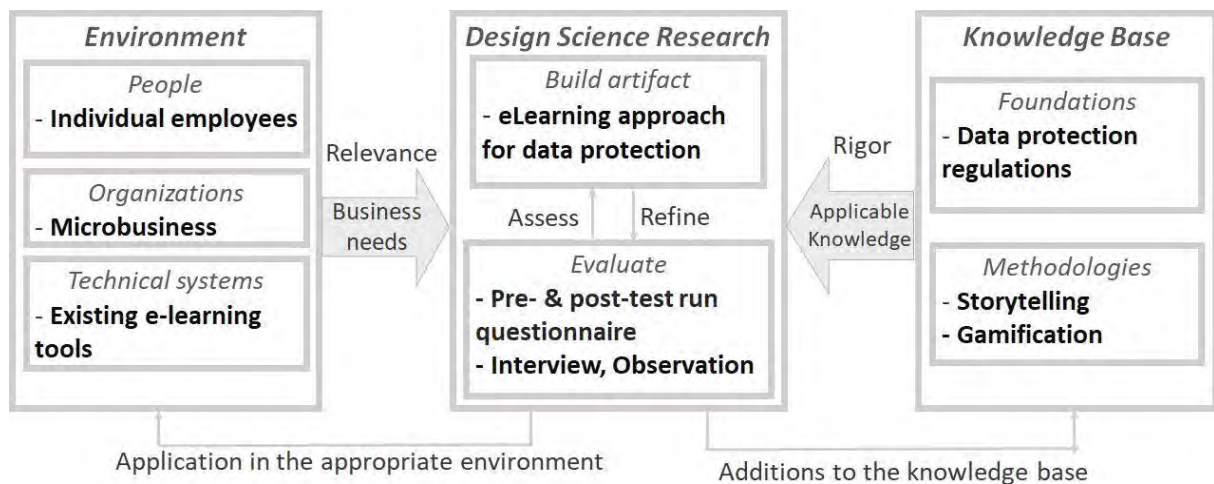
## **Gamification**

Gamification can be defined as the use of mechanics, layouts, interfaces, and logic commonly used in games, in order to engage people, motivate them, promote learning, and solve problems (Kapp, 2013). Reeves & Read (2009) identified components that are essential in the construction of a gamified environment, such as narrative context, instant feedback, badges (medals, trophies), classification and levels, reputation, tangible goals, time pressure, competitiveness, and collaboration. Zichermann & Cunningham (2011) postulate that people are motivated to play for four specific reasons: to master a subject, to relieve stress as a form of entertainment or as a means of socialization. In addition, the authors point out different aspects of fun during play: when the player is competing and seeking victory; when the player is immersed in the exploration of a universe; when the player feels changed by the game; and when the player gets involved with other players. In their study, Shahri, Hosseini, Phalp, Taylor, & Ali (2014) researched on the positive impacts of gamification to motivate employees altering their attitude and perception towards topics, such as cyber security, within enterprises. In the area of e-learning, Schmitz, Klemke, & Specht (2012) exemplified that gamification contributes to both the motivation and cognitive development of learners. One justification for using gamification is the fact that it can encourage employees to continue using an application because it offers an attractive interface (Fauziyah, Kaburuan, & Wang, 2019).

## **EMPIRICAL STUDY**

This study bases on design science research (DSR) as it aims to align research processes with real-world problems and to integrate business with technical aspects (Hevner et. al, 2004). DSR suits the goal of this research—the development of a novel data protection teaching approach for MEs. Figure 1 visualizes the application of Hevner’s research strategy to this study.

**Figure 1: Methodological approach of study**



Adapted from Hevner et al. (2004)

## Design Decisions

In order to create a learning experience meeting the needs of MEs and incorporating storytelling with gamification elements, the following design decisions have been made: (1) Scope: The background on GDPR and FADP revealed the main areas to consider when teaching data protection (see Table 1). The prototype presented in the study details three out of those five areas: firstly, basic data protection terms; secondly, the applicability of data protection regulations and thirdly, the rights of individuals. (2) Target group: We aspire to a pragmatic, realistic, and flexible solution for microbusinesses facing scarcity of resources. Therefore, a modular setup was chosen, where each of the three main areas forms a module and bases on an independent storyline containing own characters. That way, dependencies are avoided and it is easier for the players to differentiate the topics. Priority should be given to meaningful fictional stories or everyday situations that are easily accessible. (3) Each module follows a uniform structure and is divided into three sub-stories following Burroway's four-stage pattern (see learning theory section). To test the learning success, the participants answer quiz questions at the end of each sub-story and receive explanations for the correct answer (see Figure 2). In order to increase interaction between learners, the e-learning is designed as a multiplayer online game; this introduces a friendly competition among the participants, in which a time limit is set for the processing of each sub-story and where a result at the end of the game determines a winner. (4) Layout/Tooling: For avoiding visual fatigue and keeping the attention of the players high, the stories were accompanied by varying pictures. The selected technological base is MyQuiz, a web quiz game platform chosen for its ease of maintenance, good layout, online usability, winners' badges, adaptability to mobile devices, interactivity and commitment to follow GDPR principles (MyQuiz, 2019).

## E-LEARNING PROTOTYPE

The prototype begins with a brief introduction and instructions for the learners (see Figure 3). Participants are given a code to carry out the e-learning and it starts after each participant is confirmed in the game. The three storylines building the core of the game are explained in the following paragraphs.

**Figure 2: Sub-Story 1 on base terms**

Mary has a family business based in Zurich, Switzerland. They have a studio store, called YogaZen, which sells yoga products. A new client, Friedrich, comes into the store to buy yoga pants. After Friedrich purchased the item, Mary asks him to fill out a form with his name, date of birth and e-mail to add him in the YogaZen's customer database. Friedrich had some mixed feelings about it at first because he does not want to give his personal information. Mary insists and Friedrich fills out only the field name with "Friedrich Hans" for the sake of politeness. Is this a personal data?

Yes 0%

No 0%

I do not know 0%

NOTE: According to FADP and GDPR, personal data means an information that can be used to identify an individual. By itself the name Friedrich Hans may not always be personal data because there are many individuals with that name.

**Figure 3: Introduction to quiz**

**Personal data**  
is any information that can be used to uniquely identify a person.

Name/Photo Address IP address  
Bank details Medical records

**Individual rights**

- Right to be informed
- Right to access
- Right to rectification
- Right to erasure
- Right to object
- Right to restrict processing
- Right to not be subject to automated decision-making
- Right to data portability

**Data protection literacy quiz**

GDPR is an European law on privacy and protection of personal data, applicable to all individuals in the EU and the EEA. Where no EU presence exists, the GDPR still applies whenever: (1) an EU resident's personal data is processed in connection with goods/services offered to him/her; or (2) the behaviour of individuals within the EU is monitored.

FADP is a Swiss regulation which protects the privacy and the fundamental rights of natural and legal persons when their data is processed.

Quiz code: 029373  
Connected users: 0

**How to play:**

- The game starts with a question and several answers.
  - There could be more than one correct answer.
  - At least one answer option in a list is incorrect.
- Select the answer(s) and click on the "Answer" button.
  - The first three players who answer correctly get bonus points.
- At the end of the game a Leader board is shown.
  - If players have the same number of points, the winner will be the one who answered fastest on the last question.

Start game Stop game

**Basic Data Protection Concepts**

The first module focuses on base terms as mastering the vocabulary is essential to understand data protection. The first sub-story is presented in Figure 2, further sub-stories are shown in Table 2:

**Table 2: Sub-Stories of Storyline 1 on base terms**

Storyline 1: Sub-Story 2	Storyline 1: Sub-Story 3
<p>A few weeks later, Friedrich returns to the store to buy a new set of yoga mats. When it is time to pay, Mary remembers that he did not yet complete the form and asks again if he could finish. Friedrich responds that he does not like spam and prefers not to. Then, Mary explains that she will only send out birthday promotion emails. Friedrich likes this idea and fills out all fields (name, date of birth, and e-mail).</p> <p>Are these considered as personal data now?</p>	<p>Mary wants to modernize her store and implements a biometric control via fingerprints to access the warehouse. Products were stolen from the warehouse after an employee forgot the keys on the lock. Mary presents this change to her employees but some of them are not happy with this. She explains the benefits of biometrics and starts to collect her employees' fingerprints.</p> <p>Is it legal for Mary to collect the employees' fingerprints this way?</p>

**Applicability of Regulations**

Having in mind that Swiss MEs might have to follow different data protection regulations, the second module focuses on the applicability of regulations (Table 3). It presents a dilemma, which Swiss MEs may face when building a website to market their products, especially if companies want to target only Swiss citizens but happen to attract EU customers. For example, in the second sub-story it is asked whether the personal data processed about an EU customer is subject to the GDPR and/or the FADP. Players must appreciate that this operation is only covered by the FADP, since this specific organization

does not target the EU market and the processing of personal data of the Italian citizen is not in itself sufficient to trigger the application of the GDPR (Article 3, European Parliament, 2016).

**Table 3: Sub-Stories of Storyline 2 on applicability of regulations**

Storyline 2: Sub-Story 1	Storyline 2: Sub-Story2	Storyline 2: Sub-Story 3
<p>David is a marketing student that just started to work at Rouge, a streetwear brand with one physical store in Geneva. David observes that Marina is a loyal customer from Zurich who always travels to Geneva to shop at Rouge. He proposes an online marketing plan to his manager to launch an eCommerce app focusing on Swiss customers. The supervisor reviews the plan and decides to start the website, which carries out operations and data processing activities in Switzerland. Does this website fall under scope of GDPR and/or FADP?</p>	<p>An Italian citizen, Silvia, is traveling around Switzerland during her holidays. While in Zurich, Silvia meets Marina. The cool sneakers Marina is wearing catch Silvia’s attention. Marina suggests visiting Rouge shop in Geneva as she intended to buy a new hoodie anyway. Silvia fears that she will spend too much, but she is convinced by Marina. When arriving at the store, both are welcomed to a bright and hype shop full of streetwear grails. Silvia chooses three sneakers to try on and buys all three on account. Are the personal data processed for Silvia’s invoice subject to GDPR and/or FADP?</p>	<p>Rouge wants to expand its business. David does another online marketing plan, now focusing on designing and shipping personalized t-shirts. He also noticed that the store is receiving a lot of suggestions from customers from neighbouring countries. David pitches a new app to his supervisor supporting German, English, Italian, and French language. The supervisor likes the idea and now Rouge’s app offers services for the creation and shipping of personalized t-shirts, delivery by mail in Germany, Italy and France, in addition to Switzerland. Is the company subject to provisions of GDPR?</p>

**Rights of Individuals**

The third module focuses on data protection rights of individuals. The storyline presents a dilemma; a Swiss hotel employer is confronted by an employee whose data rights might have been compromised (Table 4). As an example, the player has to identify between the given options that the individual could potentially claim to restrict personal data processing (foreseen by Article 28 of FADP draft).

**Table 4: Sub-Stories of Storyline 3 on rights of individuals**

Storyline 3: Sub-Story 1	Storyline 3: Sub-Story 2	Storyline 3: Sub-Story 3
<p>Marco is promoted as manager at Swiss Mountains Hotel and the HR department requests a new photo for his employee ID card. As an excuse to visit her son and celebrate his success, Marco's mother books a room at the hotel and notices that a picture and Marco's name appear on the website. Upon arrival at the Swiss Mountain, the mother brags to other guests that her son is the manager and shows the photo on the website. Marco discovers this picture and asks his employer why it was published though he has not given consent to use it. The employer explains that the picture is used to display information on the staff working at the hotel. Can Marco request to remove his photo from the website?</p>	<p>After Marco has spotted his picture on the website, he requests to see all data the hotel holds on him. His employer refuses claiming that Marco has already seen the most important data with this picture. Marco insists on checking whether the processing of all his personal data is lawful. The employer consults a lawyer who explains this request cannot be refused. Which individual right is referred to here?</p>	<p>A new hotel offers Marco a job and he accepts. Marco asks his old employer to delete all his personal details. The old employer denies his request given that it is subject to a law obligation to keep personnel files for ten years. The employer can ensure that the data is erased later on. Which right Marco can claim meanwhile?</p>

## EVALUATION

The evaluation with three randomly chosen microenterprises was based on a pre- and post-self-assessment questionnaire, structured interviews, and observation. Before participating in the e-learning, most employees stated having poor or average knowledge on data protection in the professional context. Six out of seven participants regarded their capability to identify cases of personal data processing and to know the difference between personal and sensitive data as average. In the understanding of individual rights, the majority of learners indicated having poor or very poor knowledge. Similarly, most of them stated to have no knowledge or very poor knowledge of the main differences on relevant data protection regulations. After the test run, the questionnaire results showed that there was a slight improvement in employees' perception of their competence to discuss data protection topics. There was no significant change in the perception of understanding of personal data and sensitive data or whether personal data was being processed. The most striking difference was the perception in identifying the applicability of data protection regulations, in which four out of seven participants marked an increase of points in the scale analysis. In the same line, the majority of participants scored higher regarding their knowledge of individual rights.

The data collected during the interviews focused on four aspects taken from Ijsselsteijn, Kort, & Poels (2013): emotional effects, competence, immersion, and flow. All participants positively commented on emotional effects (1) regarding their experience with the quiz-game and mentioned fun, amusement, and excitement as most prominent. The young participants in particular found the competitive approach more exciting than reading text-based guidelines. During the execution of the e-learning, they joked about wrong or complimented right answers and were euphoric when they outperformed their peers in the ranking. With regard to competence (2), participants reported that the explanations shown together with the results of the quiz questions were most beneficial in expanding knowledge and building competence. All employees stated that they experienced immersion (3) while engaging in the e-learning. It could be observed that the participants not only answered the questions and quickly finished the



activity, but that they were really engaged. The play time was considered too long by some respondents; nevertheless, playing together was a motivating factor. Regarding the flow (4), participants reported that the e-learning was fluid; however, in the current multiplayer version, learners must adhere to the same time limit before moving on to next questions. This was considered tedious, especially by players with a faster pace.

## OUTLOOK

E-learning has proven to provide a good experience and knowledge foundation in the field of data protection. As next steps, the prototype should be both improved (e.g., by making the fixed time setting more flexible or adding multi-media content) and enhanced with additional modules. As suggestions for further research, the evaluation should be intensified. This involves not only carrying out test runs on a larger scale, but also assessing medium- and long-term retention of learning content and assessing not only the perception of employees, but also the competence in their day-to-day work at the MEs.

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