

# Shorter Texts, Less Scrolling, More Visual Support for Younger Learners: Low-Threshold GDPR Conform Registration Form with Double Opt-In for the Learning Management System Moodle

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**Keywords:** Opt-In, Double-Opt-In, Wizard Form, Progressive Form, Age Dependency, LMS, Moodle, Low-Threshold Access.

**Abstract:** Access to learning platforms must be as low-threshold as possible for all interested parties in order to make learning on eLearning platforms attractive for everyone, even those with few digital skills. The native General Data Protection Regulation (GDPR)-compliant registration process of the Moodle learning management system has been optimised for low-threshold access to the Onlinecampus Pflege a mobile learning offering for teaching digital skills for nursing professions. GDPR compliance goes hand in hand with a lot of text and confirmations in the opt-in and double opt-in process. The evaluation of a GDPR-compliant registration form for registering on the learning platform has shown that a progressive form for experienced native German-speaking participants with an average age of 44.5 years is perceived as low-threshold and target group-appropriate for accessing the platform. Data collected using the thinking-aloud method however revealed usability problems for participants who are in their first and second year of training. For these much younger participants, the registration process was designed to be low-threshold using a wizard form with a plain text password option, little immediately visible text and the graphic representation of the double opt-in process.

## 1 INTRODUCTION

In the age of digital transformation, the integration of innovative teaching and learning methods in nursing education is playing an increasingly important role. Against this background, the Onlinecampus Pflege (Online Campus Care) is becoming particularly relevant as a mobile learning offer for teaching digital skills for nursing professions. Through the use and target group-oriented further development of a Moodle instance, not only tailor-made learning content is developed, but also low-threshold accessibility for a broad target group is ensured (Wullf et al., 2022).

The perception of low-threshold depends on the existing digital skills of the target group. The target group for which the Moodle instance Onlinecampus Pflege is being developed includes both nurses with advanced digital skills and those who are still at the beginning of their digital competence development.

Currently, there is a lack of anchoring the teaching of digital skills in the nursing school curriculum, so that a common basic level of these

competencies for the target group cannot be assumed. This fact necessitates the need for individualized competence development in the field of digital skills. Independent learning in learning management systems such as Moodle offers the opportunity to do so.

The use of all platform functions of the developed Moodle instance requires a personal registration and thus goes hand in hand with the data collection of user data. The processing and use of personal data in the European Union (EU) is subject to the General Data Protection Regulation (GDPR). "[...] the General Data Protection Regulation (EU) 2016/679 (GDPR) came into effect in 2018, superseding the 1995 Data Protection Directive as the overarching dictate on all European data." (Andrew & Baker, 2021)

The GDPR-compliant design of access requires the initiative of the user and thus already requires certain digital skills, which, however, are very heterogeneous in the target group.

Under the research question (RQ) given below, the article describes the strategic development of the design of access to the platform, which pursues the

goal of ensuring low-threshold access already during registration on the platform and thus for the development of skills in the learning opportunities for the heterogeneous target group of nursing professionals.

### **RQ: How Can a GDPR-Compliant Personal Registration Be Designed to Be Perceived as Low-Threshold by the Heterogeneous Target Group of Professional Caregivers?**

On the one hand, the implementation is based on the results of repeated quantitative and qualitative evaluations of the entire platform in various development and testing phases. Above all, however, it is based on think-aloud technique data that could be obtained in teaching and learning events in which the registration process was personally guided.

## **2 CONCEPTS, TECHNIQUES & RELATED WORK**

### **2.1 GDPR Compliance**

Danezis et al. (2014) describe the requirements of the GDPR for the collection, processing and use of personal data and propose design patterns for the technical implementation with the following strategies:

- Strategy #1: MINIMISE
- Strategy #2: HIDE
- Strategy #3: SEPARATE
- Strategy #4: AGGREGATE
- Strategy #5: INFORM
- Strategy #6: CONTROL
- Strategy #7: ENFORCE
- Strategy #8: DEMONSTRATE

Strategy #5 goes hand in hand with the demand for transparency and openness. To protect personal rights, the GDPR requires users to be informed about all aspects of data collection, processing, and storage. Clear and comprehensible information must be provided, including the purpose of the data processing, the legal basis, the storage period, and the potential recipients of the data.

Strategy #6 enables the user to decide based on the information whether the data collection, processing, and storage are desired or individually acceptable. The user's consent to the processing of their data must be voluntary, specific, informed, and unambiguous. (EU Parliament and Council of the

European Union, 2016). "[...] while in several countries outside Europe processing of personal data is permitted unless it is explicitly forbidden, in the EU processing is usually forbidden unless there is an explicit permission, e.g. by the individual's consent or by statutory provisions." Danezis et al. (2014, p. 8)

### **2.2 Opt-In and Double Opt-In**

The double opt-in procedure is characterized by the fact that users must first receive a confirmation e-mail after signing up for a service. This confirmation e-mail contains a link or code that the user must actively confirm before gaining access to the desired service. This additional level of verification is used to verify the user's identity and ensure that they intend to sign up for the service.

The double opt-in process is a popular and commonly used method to make web forms GDPR compliant. Nevertheless, the procedure is not self-explanatory, requires a certain amount of effort and an understanding of the process. A graphic representation of the double opt-in procedure may help to inform the user about it see Section 6, (Strzyzewski & Karpa-Tovar, 2019).

In contrast to the double opt-in, the opt-in process allows users to simply confirm information by actively ticking a box or clicking a button. This method assumes a certain level of trust, as the authenticity of the information provided is not verified by a separate confirmation step.

### **2.3 Progressive and Wizard Data Collection Forms**

HTML forms are a fundamental element of web development. They allow users to send information to web servers. In the early days of the web, HTML forms were relatively simple. They consisted of a series of fields where users could enter text, numbers, or other data. Choosing the right type of form depends on the requirements of each use case. For simple forms, progressive forms are usually sufficient. For complex forms, wizard forms may be a better choice.

Purin, B. & Ricci, E. (2008) implemented a form with identical content in both versions. However, they attribute the slightly stronger preference of the wizard over the progressive form to the subjective experiences of the participants and objectively do not recognize any advantage of the wizard over the "traditional" form.

### 2.3.1 Progressive Forms

In progressive forms, the HTML fields are traditionally arranged in a linear order, and the user must fill in all the fields before submitting the form.

Progressive forms have a few advantages. They are easy to understand and use, and they can be used for a variety of tasks. However, they also have some drawbacks. They can be frustrating for users with long or complex forms, and they can lead to errors if users forget or fill in fields incorrectly.

### 2.3.2 Wizard Forms

In recent years, wizard forms have become increasingly popular. Wizard forms are a type of form that guides users through a series of steps. In each step, the user is presented with only a limited number of fields that are relevant to each step. This can help reduce the complexity of the form and avoid errors.

Wizard forms have some advantages over progressive forms. They tend to be easier to understand and use, and they can lead to a higher level of usability. However, they also have some drawbacks. They can be less flexible for complex forms, and they can lead to a longer form completion time.

## 3 METHODOLOGY

The LMS Moodle “supports GDPR through the Policies plugin and Data privacy plugin in the standard distribution [since] Moodle 3.5” (Moodle documentation).

The native implementation of the registration form in the LMS Moodle embeds the input surface for new registrations on the login page, where already registered users can log in. The actual data collection may be preceded by different terms of use.

Natively, the data collection registration form is a progressive form. It holds a manageable amount of data entry fields, which include, but are not limited to, login name and e-mail, as well as the user password field. The password field is not repeated. Therefore, there is no verification of the password by re-entering, nor can the password be displayed in plain text.

### 3.1 Data Collection for Platform Access

#### 3.1.1 Inform

As a web-based learning platform, the Onlinecampus Pflege uses technically necessary cookies. In addition, server log data is transmitted by the browser and the

learning offer also contains content from third-party companies that have their own terms of use. To be able to optimally design the learning offer, usage data from the log files of the learning platform are evaluated. The data is pseudonymised for analyses.

All this information is GDPR-compliant, comprehensible and detailed (Strategy #5). Acknowledgment and consent will need to be obtained (Strategy #6). „The choice of how consent is collected can take several approaches. The GDPR does not define the form or format in which the information should be provided.“ (Almeida and Monteiro, 2021, p. 6)

### 3.1.2 Collect Data

Registration forms should ask for only those personal data that are strictly necessary for the specific purpose of processing to comply with the principle of data minimization (EU Parliament and Council of the European Union, 2016).

In line with the principle of data minimization (Strategy #1), but still enabling the development and use of a customizable platform, the data collection includes eight pieces of information that the LMS natively requests, including the user account password, five additional details on personal data and one each on the personalization of the platform and the event setting (if the registration is part of a learning event and thus not on one's own initiative). In total, up to 15 entries are made.

### 3.1.3 Authentication

The information for authentication, in this case the e-mail address, is personal data. According to the GDPR, the processing and use of the GDPR requires explicit consent as described above. The use of the e-mail address as a contact address to which data can be transmitted requires the active and verifiable consent of the e-mail account holder in a double opt-in process.

## 3.2 Initial Platform Testing

In the first platform testing phase, a Moodle instance with several learning units was made freely available to practice partners and interested parties for testing over three months. Access to the platform was realized via self-registration. At the beginning of the trial phase, practice partners received an online introduction in which registration and learning on the platform were presented. The recording of the introductory event has been made available as an on-demand offer on the project website so that interested parties can also find out more during the current trial period.

### 3.2.1 Implementation of the Registration Procedure

In the first phase of testing the platform, the native login procedure was used (see Figure 1). To comply with the GDPR, a short text of 780 characters on 14 lines is displayed in the maximum screen width of the form (one third of the platform width) before the input surface for creating a new account is visible. At this point, the user is already informed and can voluntarily decide whether registration is an option.

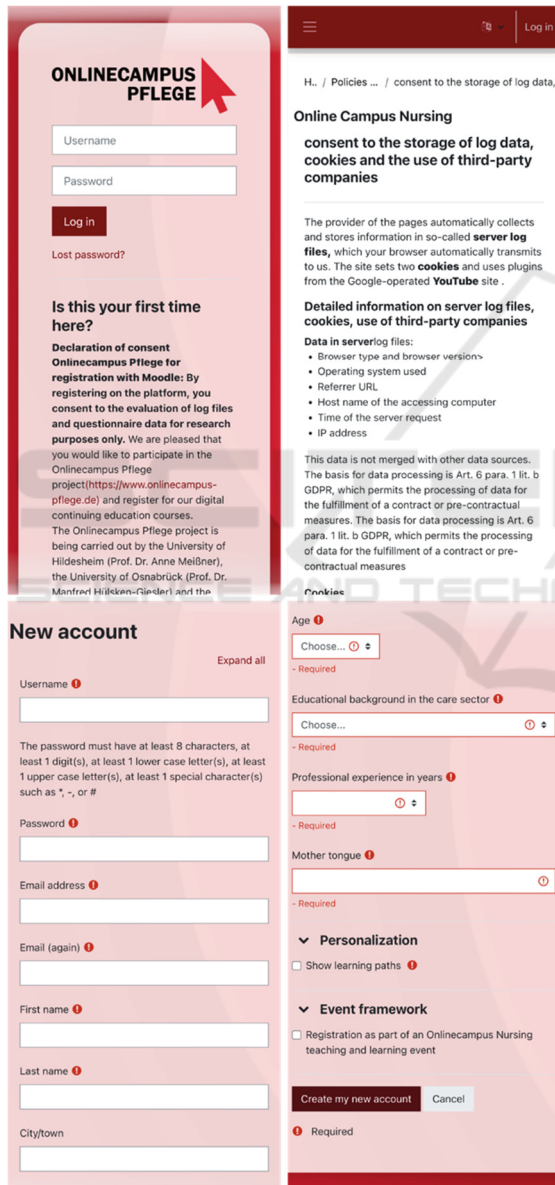


Figure 1: Registration form and process of the first approach with initial policy (top left), an example of one of the policies (top right), and some of the registration form entries (bottom) and the end of the form (bottom right).

With the voluntary decision, the opt-in procedure first obtains consent to terms of use, the use of cookies and third-party providers in separate information texts. For this purpose, the corresponding texts (each approx. 1500 characters on approx. 12 lines full of platform width) are displayed for viewing and an input is necessary to be able to continue.

Seven more fields are added to the native progressive form. With the form confirmation (opt-in), the consent to the use of the e-mail address and the user data in the double opt-in procedure is given.

### 3.2.2 Evaluation

As described in detail in Möller et al. (2023) the evaluation was based on questionnaires already tested in other projects, adapted to the current platform in terms of the format of the learning materials and the target group. It was divided into four categories, including the respondents' willingness to use technology. To assess the subjective usability of the learning platform, the 10-item SUS (System Usability Scale) was integrated into the evaluation as a standardized instrument (Brooke, 1996).

The results of the questionnaire evaluations of 38 participants in Möller et al. (2023) show a low-threshold access to the platform. The information from the questionnaire on the readiness to use technology was well within the positive range. The average age of the participants was 44.5 years and they had several years of nursing experience.

Qualitative data, which could be collected by three focus groups with a total of 7 interviews from the participant cohort, confirm the results of the quantitative analysis. The registration process itself was not negatively evaluated by the questionnaires or interviews, nor by thinking-aloud experiences with accompanied registrations.

### 3.3 Second Platform Testing

In the second platform testing phase, the learning platform was expanded to include additional functions and learning content. The platform was still freely accessible to practice partners from the first trial phase, but also to new practice partners and interested parties. A reintroduction did not take place.

#### 3.3.1 Implementation of the Registration Procedure

The registration procedure was maintained unchanged from the first platform trial due to the positive results from the evaluation and focus groups.



### 3.3.2 Evaluation

The qualitative analysis of the evaluation is still pending. However, the second trial was accompanied by teaching and learning events, whereby the thinking-aloud method was used to gain early knowledge for short-term adjustments to the platform. The platform was actively presented in nursing schools as part of the class. Participants logged on to the platform during the event and provided direct feedback that the thinking-aloud technique data provides.

The participants are in their first and second year of training. The average age of the participants is much younger than in the first trial phase (average 22 years). In contrast to the first test, a high degree of diversity can be derived from the given personal information, especially from the information on the mother tongue.

In the described cohort of about 40 participants, the registration process was described as very difficult. Common problems were the inappropriate password when logging in after registration. As described above, the native login form does not require password verification and does not provide a clear text view of the password, so users must be sure that the password is spelled correctly when entering it. The registration itself is perceived as long. Participants uttered phrases such as:

- "that's too much text",
- "You have to scroll so much!"
- "What do I do with the e-mail?"
- "Where do we go from here?"

The texts were perceived as too long to read. The technical handling of the long texts also caused problems. The double opt-in procedure was not understood.

### 3.4 Short-Term Intervention Within the Second Platform Testing Phase

To advance the development of the platform, short-term interventions that fix program errors and strengthen the readiness for use have already been implemented within the individual testing phases. Problems with the registration process lowers the willingness to participate and have been tried to fix.

#### 3.4.1 Implementation of the Registration Procedure

The native login process has been fundamentally changed (see Figure 2). The progressive form has been replaced by a five-step wizard form. The form

only asks for semantically related information per page. The wizard itself immediately provides a graphical view of each step to be completed. In this way, the double opt-in procedure is also displayed graphically and is followed by the graphical representation of the five steps of the wizard. It shows what the users need to do once they have completed the

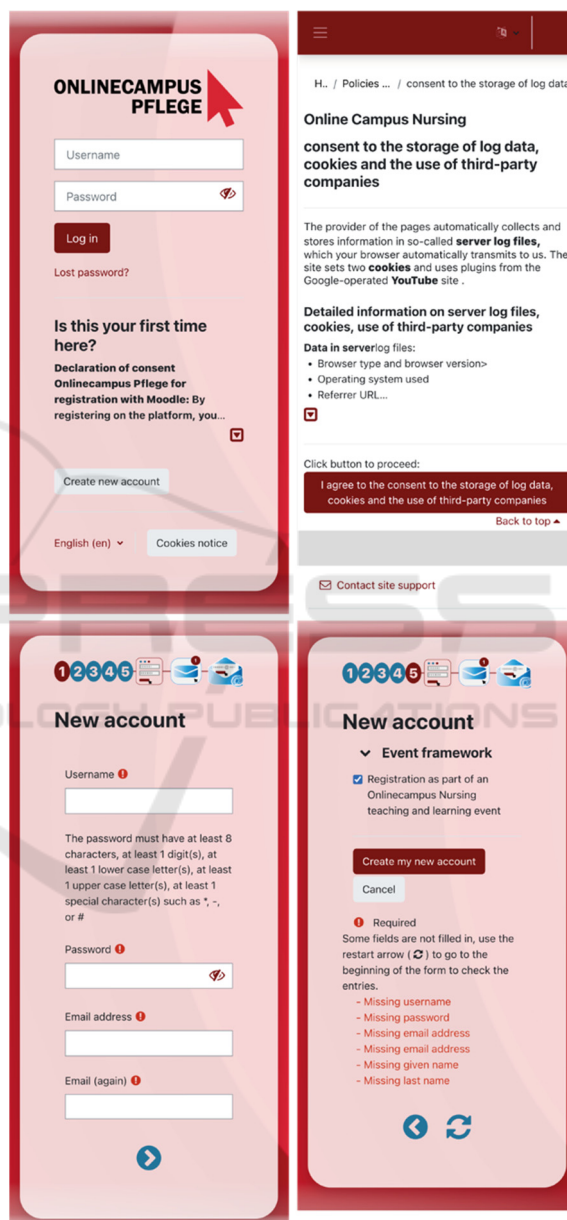


Figure 2: Registration form wizard of the intervention with toggle-able initial policy (top left), an example of one of the toggle-able policies (top right), the first wizard step with clear text password ability, visualisation of the wizard steps and the double opt-in process visualisation (bottom left) and the wizard's final step with information of missing entries (bottom right).

form, namely complete the registration by clicking on the confirmation link in the e-mail that is subsequently sent (Strzyzewski & Karpa-Tovar, 2019).

All policy texts have been reworded in such a way that the most important points can be found summarized at the beginning of the text. In this way, the text can be collapsed in parts and expanded if additional information is needed. In doing so, it was important to ensure that the texts continued to be perceived as GDPR-compliant.

The user password field has been updated to include the option of plain text view.

### 3.4.2 Technical Implementation

Especially for the implementation of the wizard, a child theme of the Moodle theme used, which determines the design, had to be created (John, 2023). Since the Moodle instance of the Onlinecampus Pflege already uses a child theme, a grand-child theme had to be created accordingly. In this theme, the available templates of the Moodle native policies have been supplemented by the toggle buttons as an HTML DOM and the theme css has been extended according to the necessary functionality.

The additional DOM elements and the dynamics of the wizard form were implemented via Javascript, AMD modules and necessary css.

### 3.4.3 Evaluation

This intervention in the ongoing trial, like the entire second testing phase, cannot yet be substantiated with quantitative data. However, initial thinking-aloud data from other courses with also about 40 participants in their first and second year of training already show a very positive effect, as the following statement sums up:

"I've never been so easily registered anywhere."

## 4 RESULTS & DISCUSSION

Kwon et al. (2023, p. 7) emphasize the usability challenges for GDPR compliance for users: „The process for users to exercise data rights is generally considered to have poor usability. [...] Numerous studies have concluded that [...] policies are typically too verbose and complex for the average person, as evidenced by various readability metrics, including word count and Flesch scores.“ The same is confirmed by Tsohou et al. (2020).

Surprisingly, the registration procedure in the first testing phase was not criticized at all. The length of

the policy texts was accepted without comment. The double opt-in procedure was also not named as a problem. The latter can possibly be explained by the introductory event to the Onlinecampus Pflege, in which the procedure was presented. However, new registrations did not only take place at the beginning of the trial phase, but throughout the entire trial period. The high level of technical readiness of the participants in the first test phase could promote an understanding of the procedure. The average age of the participants in the first test phase was 44.5 years.

It was only the results of the thinking-aloud data collection in the teaching and learning events with much younger participant in the second testing phase that revealed problems in the GDPR-compliant registration procedure.

A surprising finding is that younger participants expressed problems understanding the double opt-in process. Double opt-in is very widespread because it is indirectly required by law. According to the German Federal Statistical Office's statistics on internet activities for private purposes by age, the younger age groups up to 44 years old are more likely to participate in social networks than the age groups over 44 years old (Statistisches Bundesamt (Destatis), 2020). The double opt-in procedure is usually used to register with social networks. It was therefore expected that younger people would have more or the same experience of it as the older ones. However, single sign-on is now being used more and more. Single sign-on is as procedure, where a double opt-in process is used once for an authentication. This authentication can then be used for multiple services, including social networks. Therefore, the younger participants may lack the experience equally.

The implementation of the registration form in the wizard shows the different steps of the registration and also visualizes the steps of the double opt-in procedure that follows. According to the first collected thinking-aloud data after the intervention, it seems to provide an understanding of the procedure. In Moodle's native progressive form, the information about the subsequent double opt-in process is completely missing. In this respect, it can only be derived from the experience with other registration processes in web forms without explanation as in the videos.

The perception of the policy texts as too long is to be expected for the young participants. On the one hand, the texts are quite long and therefore less user-friendly. On the other hand, the young participants are more influenced by modern digital media, which require only short attention, compared to the older ones. Tsohou et al. (2020) points out that policy texts

are not really read. The content of the texts themselves was not criticized. Either because they were easy to read, or they weren't read at all. The intervention measure of displaying the information in full as required but always presenting it in a short form makes it possible to skip the texts quickly, whereby less scrolling increases usability, but the complete information still remains available. The platform also provides the opt-out option required by the GDPR, so that consents can be withdrawn retrospectively.

While the lack of double entry of the password was not a problem in the first trial, it was detected as a problem in the second testing phase with the much younger participants. The reason for this could be that the young, more digitally native participants already rely so much on various security measures in online forms that they do not pay much attention to the correctness of the entry. In the older cohort, awareness of the need for correct input is likely to be greater. The readiness for technology is collected in the context of the evaluation via the questionnaire data collection so that this data could not be used for the teaching and learning events. The lack of willingness of the young participants to use technology may be the cause of the different results.

Doubling the number of input fields of Moodle's native progressive registration form increases the complexity of the form. Multiple pieces of information require not only a higher effort of data entry but also a higher navigation effort in the form of scrolling. In the five-step wizard form, there is a certain amount of navigation effort by clicking through the stages. Nevertheless, clicking is not as annoying as scrolling.

The results lead to the question of why the native login process is progressive in nature and why the user password is not checked by repeated entry. The progressive nature is due to the basic information provided by the learning management system. With a small number of eight inputs, a wizard is too complex. However, the lack of password verification cannot be explained, but does not seem to have posed such major problems so far, as was observed for the young, rather diverse participants in the second testing phase of the Onlinecampus Pflege in the thinking-aloud data collection.

Although the evaluation results of the second testing phase are still pending, first experiences with the younger learners in teaching and learning events show that the wizard form with shorter texts, less scrolling, more visual support and the plain text availability of the password is perceived as low-threshold.

Future work was to compare the two implementations of the registration form once again in a targeted manner. Based on the experience of this study, it is expected that the wizard form will be preferred to the progressive form, both subjectively and objectively, in contrast to Purin & Ricci (2008). The reason for this is that, in addition to the restructuring of the content, other features have been implemented in the wizard form, the absence of which is criticised, but the presence of which should not be distracting.

Access to learning platforms must be kept as low-threshold as possible for all interested parties. The accompaniment via demonstration videos can help to make the last hurdles surmountable.

## 5 CONCLUSION

Sign-up procedures for registering on platforms are common. In Europe, these forms are subject to the GDPR. This is accompanied by the additional effort for the user to read information in text form and to actively give consent to the recorded agreements and notices in opt-in and double opt-in procedures. Since this effort already requires digital skills, which cannot be taken for granted, the procedures must be kept as short and simple as possible.

There is a distinction between progressive forms, which collect all the necessary information in a list, and wizards, which record the entries step by step. For the younger participants in the Onlinecampus Pflege, the registration process is perceived as simple with the wizard implementation, which graphically supports the steps up to the double opt-in procedure, with text parts that can be shown and hidden for the policy texts and the plain text option for the password, which was not the case for the progressive form with the long texts.

Problems were solved that could only be uncovered by the thinking-aloud data collection method. This data collection therefore proves to be a favorable method for usability tests.

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