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DOI

[10.1145/3340631.3394876](https://doi.org/10.1145/3340631.3394876)

Publication date

2020

Document Version

Final published version

Published in

UMAP 2020 - Proceedings of the 28th ACM Conference on User Modeling, Adaptation and Personalization

Citation (APA)

Muravyeva, E., Janssen, J., Dirx, K., & Specht, M. (2020). The Role of Trust in Personal Data Sharing in the Context of e-Assessment and the Moderating Effect of Special Educational Needs. In *UMAP 2020 - Proceedings of the 28th ACM Conference on User Modeling, Adaptation and Personalization* (pp. 328-332). (UMAP 2020 - Proceedings of the 28th ACM Conference on User Modeling, Adaptation and Personalization). Association for Computing Machinery (ACM). <https://doi.org/10.1145/3340631.3394876>

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The Role of Trust in Personal Data Sharing in the Context of e-Assessment and the Moderating Effect of Special Educational Needs*

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ABSTRACT

The current study investigated the role of trust in students' attitudes towards personal data sharing in the context of e-assessment, and whether this is different for students with special educational needs and disabilities (SEND). SEND students were included as a special target group because they may feel more dependent on e-assessment technologies, and thus, more easily consent to personal data sharing. A mixed methods research design was adopted combining an online survey and a focus group interview to collect quantitative and qualitative data. The findings suggest that a considerable number of students trust e-assessment technology that does not require the physical presence of a supervisor. Students who trust are more likely to perceive e-assessment technology as having no disadvantages, and are more willing to share their personal data for e-assessment purposes. The responses of SEND and non-SEND students do not differ significantly in terms of trust. However, the results diverge regarding the relation between trust and perception of e-assessment technology as having no disadvantages. Practical implications for informed consent are discussed.

CCS CONCEPTS

• Security and privacy ~ Human and societal aspects of security and privacy • Security and privacy ~ Social aspects of security and privacy

KEYWORDS

Trust, Decision-making, Informed consent, Personal data, Sensitive data, e-Assessment

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UMAP'20, July 14-17, 2020, Genoa, Italy

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ACM ISBN 978-1-4503-6861-2/20/07...\$15.00

<https://doi.org/10.1145/3340631.3394876>

ACM Reference format:

Ekaterina Muravyeva, José Janssen, Kim Dirkx, Marcus Specht. 2020. The Role of Trust in Personal Data Sharing in the Context of e-Assessment and the Moderating Effect of Special Educational Needs. In Proceedings of the 28th ACM Conference on User Modeling, Adaptation and Personalization (UMAP'20), July 14–17, 2020, Genoa, Italy. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3340631.3394876>

1 Introduction

1.1 General Problem

Art. 4 of the General Data Protection Regulation (GDPR) [1] clearly states that consent to personal data sharing should be “freely given”: “[...] any freely given, specific, informed and unambiguous indication of the data subject’s wishes by which he or she [...] signifies agreement to the processing of personal data relating to him or her”. However, there is little consensus around what constitutes “freely given” or voluntary consent. Consent reflects one of the fundamental ethical principles, namely, respect to the data subjects’ (i.e., those who are requested to consent) autonomy. Ach [2] describes two ways in which consent and autonomy can be linked to each other. First, autonomy as a feature of an act - a possibility to act in a particular way, which implies the data subject is given a choice. However, in practice, consent to personal data sharing is often offered on a ‘take it or leave it’ basis turning the choice into a dilemma [3, 4]. Second, autonomy as a feature of an individual. With respect to this, Appelbaum, Lidz, & Klitzman [5] speak of the importance of being “free from external, intentional, illegitimate, and causal influences” (p. 132).

Nelson, & Merz [6] define voluntariness of consent as “an exercise of free will or choice - an act being done volitionally or with intent and deliberateness, and one that is free from coercion and undue influence” (p. 69). The authors investigated the voluntariness issue by exploring characteristics of the data subjects and behaviours of the data controllers (i.e., those who request consent). Their study revealed that factors such as cognitive capacity, socioeconomic status, health state, and family position may constrain the data subjects’ ability to make a voluntary decision. This is particularly problematic when sensitive personal data is involved,

such as in health care or educational assessments. A study conducted by Wilkowska, & Ziefe [7] in the context of e-health illustrates these ethical concerns: in this study, less healthy people appeared to be less concerned about the secure storage of their personal data than healthy people. Here, Burgess [8] speaks of a potential trade-off between benefits and risks: even if people are aware of the risks involved, they may feel tempted or forced to provide their consent to access a particular product or service.

Similarly, in the context of e-assessment, a trade-off may exist between, on the one hand, the wish to study remotely (e.g., to combine it with work), and on the other hand, concerns about personal data sharing raised by the use of state-of-the-art e-assessment technologies. A previous study [9] involving technologies for identity and authorship verification in e-assessment showed that personal data sharing is considered a major disadvantage of such technologies by almost half of the students who participated in that study. About one in ten students are unwilling to share any personal data at all. Those who are willing to share their personal data are least willing to share video recordings of their face.

To weigh benefits and risks associated with personal data sharing can be extremely difficult for students, and additionally, as Nelson, & Merz [6] described, affected by personal characteristics, such as health state. Due to health issues, students with special educational needs and disabilities (SEND) might have a different perspective on the use of such technologies: they might feel more dependent, not to have a choice really, and thus, more or less compelled to consent. The results of the previous study [9] demonstrated that even though SEND and non-SEND students equally perceive the need to share their personal data as a major disadvantage, they are differently inclined towards sharing precisely the most sensitive type of personal data in that study: video recordings of their face. 60% of SEND students are willing to share these data compared to 42% of non-SEND students.

To explain this phenomenon, Campos-Castillo [10] refers to trust in technology - “the belief that it will execute a set of tasks with minimal risks” (p. 153). Trust in the ‘owner’ of the technology appears to play a role as well. In a study done by Schnall, Higgins, Brown, Carballo-Dieguez, & Bakken [12] in the context of e-health, participants “emphasized the need to trust the ‘owner’ of the app” to decide on “entering or sharing their personal health information” (p. 7). However, ‘too much’ trust can be harmful. Campos-Castillo [10] gives the example of relying ‘too much’ on cruise control while driving a car. With respect to this, McEvily, Perrone, & Zaheer [13] describe trust as a heuristic associated with biases “that can result in judgments that are substantially flawed and costly” (p. 100).

Luhman [14] distinguishes between trust and confidence. Both feelings are built on expectations which may be disappointed. However, when people are confident, they assume that their expectations will not be disappointed because the chances of that actually happening are very small. Trust, in contrast, assumes a situation of risk and a more or less deliberate consideration of alternatives. As Luhman [14] points out, the distinction between confidence and trust depends on perception, and both can constitute the basis for consent to personal data sharing.

When considering trust in the context of e-assessment, Edwards, Holmes, Whitelock, & Okada [15] identify different layers of trust, namely, trust: in an educational institution (e.g., based on reputation); in technology (e.g., functions as expected); in the deployment of technology (e.g., transparency); in personal data processing (e.g., processed as agreed and intended). They asked students to answer several questions about trust before and after they engaged with e-assessment technology. After engaging with the technology, students were less likely to say they fully trust the technology. The authors suggest that trust cannot be guaranteed by engaging with the technology, and may be affected by more factors. Students may need more time or more information to become familiar and feel comfortable with the technology. Another study by Okada, Whitelock, Holmes, & Edwards [16] in the same context showed that ‘older’ students who have less experience with e-assessment technology are more likely to trust.

Although some work has been done already, more effort is needed to research the relation between trust and students’ attitudes towards personal data sharing in this specific context, especially in regard to SEND students. To address this issue, this paper reports on a study that investigated students’ general trust in e-assessment technology involving identity and authorship verification.

1.2 Research Questions

What is the role of trust in students’ attitudes towards personal data sharing in the context of e-assessment, and is this different for SEND students? To answer this general question, the current study addressed the following sub-questions:

Q1: To what extent do students trust e-assessment technology that does not require the physical presence of a supervisor?

Q2: Is there a relation between trust and seeing personal data sharing as a major disadvantage of e-assessment technology?

Q3: Is there a relation between trust and willingness to share particular types of personal data?

Q4: Is there a relation between trust and reading the information provided alongside the request for personal data (informed consent)?

Q5: Is there a relation between trust and students’ demographic characteristics (sex, age, and educational level)?

Q6: Do the results for the above questions differ significantly for SEND students?

2 Method

2.1 Design

For the current study, an explanatory sequential mixed-methods design was adopted combining exploratory correlational analysis of quantitative data collected through an online survey with qualitative analysis of data collected through a focus group interview [17]. The online survey included questions investigating attitudes towards personal data sharing in the context of e-assessment, including trust. These questions were part of a questionnaire that was developed in the context of the TeSLA project pilot (<https://tesla-project.eu/>), which aimed to test and evaluate the

TeSLA technology for identity and authorship verification (including instruments for face and voice recognition, analysis of keystroke dynamics and writing style, and plagiarism detection) [18]. The online survey was presented immediately after an informed consent procedure. The main findings were discussed in greater depth through a focus group interview that took place after participants engaged with the TeSLA technology.

2.2 Participants

228 students from various faculties of the Open University of the Netherlands completed the online survey. 71% of the participants were female, and more than half were over the age of 40 years. These figures more or less reflect the overrepresentation of female and older students in the student population as a whole. 35% of the participants were SEND students, included as a special target group. The focus group interview involved four students, including three SEND students.

2.3 Materials

Informed consent. The informed consent procedure was conducted in Dutch and included an information letter and a consent statement. The information letter contained 996 words addressing the purpose of data collection, collection and processing details, and contact information. Data subject rights (e.g., the right to withdraw consent or to request deletion of personal data) were presented together with instructions on how to exercise these rights. The consent statement contained 303 words and was presented at the end of the information letter.

Online questionnaire. Data were collected using the Bristol Online Survey (BOS) tool (<https://www.onlinesurveys.ac.uk/>), and included a statement about trust 'I trust e-assessment technology that does not require the physical presence of a supervisor' (scale of 1 to 5, where 1 is 'Completely disagree', and 5 is 'Completely agree'), questions about perceiving personal data sharing as a disadvantage of e-assessment technology (yes/no), seeing no disadvantages (yes/no), willingness (yes/no) to share particular types of personal data (an image of face, a video recording of face, a voice recording, keystroke dynamics), reading the information provided alongside the request for personal data (yes/no), time spent reading (in minutes), and demographic characteristics (sex, age, educational level, SEND).

Focus group interview questions. During the focus group interview, students were asked to elaborate on their experiences with personal data sharing, decision-making with respect to personal data sharing, perception of advantages and disadvantages related to e-assessment technology. As SEND students were overrepresented, considerable attention was paid to the alignment of e-assessment technology with their needs and disabilities.

2.4 Procedure

Two sampling procedures were used, depending on the specific target group. SEND students were invited to participate in the study via e-mail by the university advisor for SEND students. Other students were invited following a two-stage sampling procedure. In the first stage, teachers of relevant courses were invited

to participate in the pilot. These teachers subsequently invited students enrolled in their course to participate in the pilot. All students were presented with an informed consent form through which they could indicate their decision with respect to personal data sharing for e-assessment purposes. For SEND students, a dedicated course environment was created to realise an experience similar to that of the students enrolled in regular courses. All students who provided consent were asked to complete an online survey and invited for a follow-up focus group interview.

2.5 Data Analysis

Quantitative data were analysed using IBM SPSS Version 24 [19]. Non-parametric tests were used in analysing the relations between variables. Depending on the measurement levels, these included Pearson chi-square, and Kendall's tau-b. We explored the relations: first, between trust and seeing personal data sharing as a major disadvantage of e-assessment technology; second, between trust and willingness to share particular types of personal data; third, between trust and reading the information provided alongside the request for personal data; finally, between trust and demographic characteristics. Due to skewed distributions, data collected on trust were recoded into three broader categories ('Disagree' (scores 1 and 2), 'Neutral' (score 3), and 'Agree' (scores 4 and 5)) to ensure a minimum number of cells with sufficient observations. For the focus group interview, a written report was produced.

3 Results

Q1: To what extent do students trust e-assessment technology that does not require the physical presence of a supervisor?

Out of 228 participants, 64% agreed that they trust e-assessment technology. With respect to this question, during the focus group interview, one student commented that analysing keystroke dynamics may be helpful to reduce unfair behaviour, but face and voice recognition may be easily manipulated. This suggestion was rejected by another student who could hardly believe that students can manipulate these instruments that seemed to her quite safe and secure.

Q2: Is there a relation between trust and seeing personal data sharing as a major disadvantage of e-assessment technology?

Previously we reported that 45% of the participants saw personal data sharing as a major disadvantage of e-assessment technology [9]. Follow-up analysis performed in the current study showed that these students expressed as much trust as students who did not see personal data sharing as a major disadvantage. Interestingly, students who expressed trust were more likely to perceive e-assessment technology as having no disadvantages ($\chi^2(2) = 5.667, p = .059$).

Q3: Is there a relation between trust and willingness to share particular types of personal data?

Previously we found that 9% of the participants were unwilling to share any personal data at all [9]. Of those who were willing to share their personal data, only about one in two students were prepared to share video recordings of their face, whereas images of their face, voice recordings, and keystroke dynamics appeared

to be less sensitive. Follow-up analysis exploring the relation with trust showed that students who do not trust e-assessment technology more often (22% vs. 9% overall) indicated they are not willing to share any personal data at all ($\chi^2(2) = 9.696, p = .008$). Trust did not appear to affect willingness to share particular types of personal data. During the focus group interview, students did not elaborate specifically on willingness to share particular types of personal data. However, they stressed that the fact that personal data sharing is voluntary, and consent can be withdrawn any time without giving a reason considerably contributes to a sense of trust.

Q4: Is there a relation between trust, and reading the information provided alongside the request for personal data (informed consent)?

Exploring the relation between trust and reading behaviour in more detail, we found a remarkable result: students who took a neutral position regarding trust more often indicated to spend 5 minutes or more reading the information letter: 74% compared to 51% in the group indicating no trust, and 55% in the group who trust ($\chi^2(2) = 6.153, p = .046$).

Q5: Is there a relation between trust and students' demographic characteristics (sex, age, and educational level)?

A positive relation was found between trust and age: 'younger' students were less likely to trust e-assessment technology than 'older' students ($\tau_b = .123, p = .032$). No relation was found between trust and sex or educational level.

Q6: Do the results for the above questions differ significantly for SEND students?

Regarding the question whether students trust e-assessment technology, the responses of SEND and non-SEND students were almost the same: 65% of SEND students said 'Agree' or 'Completely agree' compared to 63% of non-SEND students. Neither was a difference found between both groups when examining the relation between trust and seeing personal data sharing as a major disadvantage. However, the results did diverge for the relation between trust and perceiving e-assessment technology as having no disadvantages. For non-SEND students, the relation followed a linear pattern: trusting the technology was positively related to perceiving the technology as having no disadvantages. For SEND students, the pattern was different: here, students with a neutral position on trust appeared less likely to perceive the technology as having no disadvantages (13%) than students who trust (28%) and do not trust (27%). Thus, the relation reported earlier in this paper (Q2) appeared to hold only for non-SEND students. The general pattern that trust enhances willingness to share personal data was visible in both groups, SEND and non-SEND students. For Q4, the remarkable result described earlier in this paper held for both groups. Finally, regarding Q5, the results did not differ significantly.

4 Conclusions and Discussion

The current study was initiated to investigate the role of trust in students' attitudes towards personal data sharing in the context of e-assessment, and whether this is different for SEND students. The

findings suggest that more than 60% of the students who participated trust e-assessment technology that does not require the physical presence of a supervisor. Especially 'older' students are more likely to trust, which is in line with the previous study by Okada et al [16]. This may be because 'older' students are less experienced with technologies in general, and also less aware of risks and dangers related to personal data sharing. In contrast, 'younger' students have grown up engaging with technologies every day that help them acquire relevant knowledge and skills in this field, and adapt their behaviour and attitudes towards personal data sharing accordingly.

Furthermore, students who trust are more likely to perceive e-assessment technology as having no disadvantages, and more willing to share personal data. This might be indicative of 'too much' trust described by Campos-Castillo [10], and MsEvily et al [13]: people may become less critical, accept more easily, and take poor decisions, when they put 'too much' trust. However, this is a fine line: when does trust become 'too much' trust?

Concerning reading the information provided alongside the request for personal data, those students who have a neutral position seem to spend more time reading the information letter.

Finally, SEND and non-SEND students equally express trust. For both groups trust is positively related to willingness to share personal data. However, a different pattern appears in both groups when it comes to the relation between trust and perception of e-assessment technology as having no disadvantages. These results merit further investigation.

The current study points out that trust plays a role in students' attitudes towards personal data sharing in the context of e-assessment. Taking it from a more practical point of view, there is a need to shift efforts towards translating knowledge we have about trust into practice to identify ways of improving practice. With respect to informed consent to personal data sharing, to ensure informed decision-making, various decision aids are currently being explored to help data subjects better understand their choices, and in the end, make a choice consistent with their needs, preferences, and expectations [20, 21].

Several limitations concerned the current study. First, the data collected included only self-reported data. Second, the focus group interview demonstrated that students who participated were very interested in e-assessment technology, while students with less favourable opinions did not participate. With respect to this, the results of the focus group interview can be considered as rather optimistic.

ACKNOWLEDGMENTS

This project has been co-funded by the HORIZON 2020 Programme of the European Union. Project number: 688520 – TeSLA – H2020 – ICT – 2015/H2015 – ICT – 2015. This publication reflects the views of the authors only, and the European Commission cannot be held responsible for any use, which may be made of the information contained therein.

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