

# Do Desperate Students Trade Their Privacy for a Hope? *An Evidence of the Privacy Settings Influence on the User Performance*

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Abstract: Maintaining people's privacy should be the top priority not only in the context of Information Systems (IS) design. Sometimes, however, certain level of privacy can be traded for a gain in another IS quality or aspect. We present a real world example of IS with user maintained level of privacy and an evidence of its usage, correlated with users' performance. Recent students' and applicants' privacy settings in an educational IS were examined. According to our findings, a part of students voluntarily disclose their presence in the courses enrolled and on the examination dates registered. Surprisingly, the study results of the disclosed students are worse than the results of undisclosed ones. In the correspondence with our thesis, disclosed applicants have better entrance exam results.

## 1 INTRODUCTION

Privacy can be simply defined as the human right to be left alone. While it is individually perceived, all of us feel a need to stay hidden or unnoticed by others to some extent. With the advent of the information age, including popular online services dedicated to support social networking, our concerns about information privacy rise. At the same time, the trust to these technologies is conditioned by the reduced or nonexistent privacy concerns. Even a long term positive relationship can be lost by just one security accident involving privacy breach.

Proper definition of privacy, if possible, is harder to give, because we are dealing with a very elusive concept. (Solove, 2010) But it is worth of our attention as a fundamental value that is under attack from several quarters. (Wacks, 2010).

One characteristic change in social relations accompanies life in the information society as we become more and more connected. Maintaining one's privacy used to be cheap and publicity expensive. Now the opposite is true, privacy needs to be defended, all involved parties should care deeply about it and become aware of dangers consequent upon an improper use of the information technology.

End users are concerned with privacy/security problems more than they are with other types of computer problems. (Gross, 2007) The taxonomy of the regulatory and technological approaches to

protect privacy is available. (Chen, 2012).

Careful behavior is indeed recommended for young people accustomed to the use of new technologies, e.g. personal mobile devices, as a part of their needed e-safety awareness. (Atkinson, 2009)

We aim to provide an analysis of a complex real world example of an information system (IS) with user controlled privacy settings and the influence of these settings to the users' performance, as a non USA-centric evidence missing by the research community (Bélange, 2011), although it is yet another one based on students' behavior.

The rest of the paper is structured as follows. The second chapter deals with the description of privacy with focus on an educational IS and the description of particular optional privacy settings usage data. The third chapter introduce the hypothesis and its test on the usage data. The chapter four briefly discuss the results. The last chapter concludes the paper, including the possible directions of the future study.

## 2 INFORMATION SYSTEM USER PRIVACY

There are a number of important choices regarding the information privacy settings inside the majority of information systems. The very basic ones are if users are allowed to see each other existence, presence and activity.

Visibility is an important determinant of harm to privacy. Meanwhile, one of the essential social software features, the social translucence, includes visibility of participants and their activities to one another. (Erickson, 2000) It is advised for systems supporting communication and collaboration among large groups of people.

In the context of IS design, we must admit, that a certain level of privacy can be traded for a gain in another IS quality or aspect, being it any desired IS feature or functionality, e.g. mediation of interpersonal communication or better user comfort. Designers are expected to have a good reason for the tradeoff, however. They should clearly present and explain it to the user, in the case of both default and the user maintained privacy settings.

Basic system usage should be possible without involving users in the privacy setting, for those who don't care sufficiently, while the highest possible level of privacy is preserved by default. For advanced users, who value control over information, we have good experience with optional settings, which can lower one's own privacy when desired.

Individuals are willing to trade off privacy concerns for economic benefits (Hann, 2002) and we can confirm such behavior with non-economic and even indirect benefits.

## 2.1 User Privacy within an Educational Information System

For the purpose of this study, the goals of an Educational Information System (EIS) can be defined as improving the management of education and providing the digital learning environment.

Even though it is invaluable for the academic departments, the major EIS use involve students. Employees usually get proper instructions how to treat student information privacy and deal with it accordingly. (Earp 2001) It is inevitable to balance students' privacy concerns while increasing their engagement in computer mediated learning at the same time. (Siemens 2013) Privacy concerned students have interest in avoiding or selectively limiting their exposure.

The largest group of users are applicants, in the case of EIS administering an online admission procedure.

## 2.2 Masaryk University Information System

Being developed since 1999, Web-based Information System of Masaryk University (IS MU)

hosts numerous applications utilized for managing study-related records, e-learning tools and those facilitating communication inside the University. It is used by more than 30,000 users (of the total of 44,000 students and staff members) a day. It is also outsourced to another higher education institutions.

As a basic feature, every user has a customizable personal profile page, by default visible to logged in users. Students have access to the private list of enrolled courses. The IS serves as an educational environment, e.g. stores study materials, collects homework, includes discussion forums or runs and evaluates examination tests.

Admission procedures are a part of IS MU. About 70,000 students apply each year.

Students' and applicants' privacy is considered to be important of course. Default high privacy settings can be changed at the user will. We will examine three of these opt-in settings and their impact on users' performance in the following chapters.

### 2.2.1 Opt-in Visibility among Classmates

As IS MU developers, we value student privacy a lot, indeed, and therefore we do not provide complete list of classmates. Since we also want to encourage communication and collaboration among students, someone's presence has to be disclosed in the specific situations during learning process, such as the contribution to the discussion forum or a shared assignment. Eventually, students would become acquainted anyway in the corresponding situations during the in-person education form of the full-time study. A part of students expect to be visible to classmates and asking our user support personnel for navigation to the list of students.

On top of that, since Spring 2011, students are provided with the choice to reveal one's own course enrollment, but only to classmates which apply for the same option. Second and slightly weaker form of disclosure is to reveal of one's registration for a shared examination date. Opt-in enrollment/registration disclosure option is provided for every single course/exam or globally for all courses/exams ever attended.

### 2.2.2 Opt-in Visibility among Applicants

In the case of the admission procedure, applicants are provided with the choice to reveal their county of residence, but only to applicants which apply for the same option and for the same field of study as well.

### 2.3 Optional Privacy Settings Usage

We present data from IS MU from the several last semesters. To provide a perspective of the social networking role of IS MU we can tell that the percentage of users with at least one “friend”, which is the standard interpersonal relation agreed by both users, is 23.4%. We register more than 156,000 friendships.

#### 2.3.1 Course Enrollment Disclosure

The trend in opt-in enrollment disclosure option use is depicted in Figure 1. We selected courses from all 9 University faculties with more than 1 and 10 disclosed students. The more students disclose, the greater possible cooperation among them is possible. One disclosed student cannot make any difference on the results presented later.

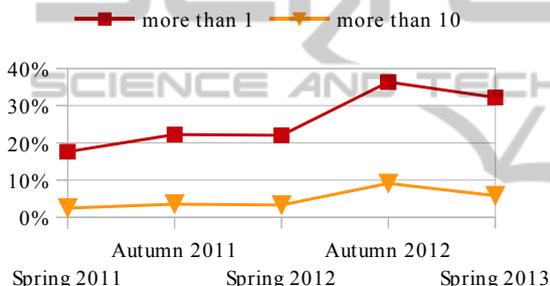


Figure 1: The percentage of courses per semester with more than 1 and 10 disclosed students.

The average number of courses per semester examined was 9,641 for the group of courses with more than 1 disclosed students. The second group's average was 6,767. The number is lower because of exclusion of courses with less than 10 students.

#### 2.3.2 Examination Date Registration Disclosure

In the same way to the previous chapter, the trend in the examination date registration disclosure is presented in Figure 2.

The trend in exam disclosure popularity as shown in Figure 2. is similar to the course enrollment disclosure, although percentages are about half of it.

The average number of courses in a semester is same as in the previous section. About 500 to 1350 courses per semester have more than one student disclosed on the same examination date.

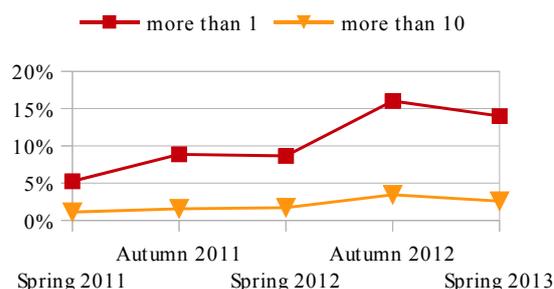


Figure 2: The percentage of courses per semester with more than 1 and 10 students disclosed on an examination date.

#### 2.3.3 Application for Study at the University Disclosure

The trend in county of residence disclosure by applicants which have sit for entrance exam is drawn in Figure 3.

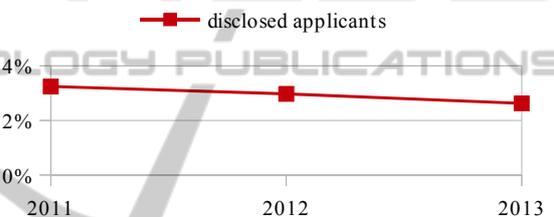


Figure 3: The percentage of disclosed applicants per year.

The average number of applications is about 41,750 a year. Opt-in disclose is thus used in 1100 to 1350 cases every year.

## 3 FINDINGS

We hypothesize that users which lower their privacy intentionally expect better performance in return, and actually achieve it.

When we know that sufficient number of our students are willing to trade part of their privacy for better contact with their classmates, so let's examine if there is any correlation with their study results. The percentage of application disclosures is smaller but a correlation with the admission results still can be there.

### 3.1 Influence of the Privacy Settings

According to our hypothesis, we are looking for the connection between disclosures and study or application results.

### 3.1.1 Influence of the Course Enrollment Disclose on the Study Results

We have done two simple analyses to compare study results of group of disclosed students versus others.

The first comparison is by the percentage of courses passed. The difference between the groups was below 1% in almost all semesters, which we consider insignificant.

The second comparison is by the average grade assigned. The results are presented in Table 1. We can see the percentage difference (PD) ranging from 4.8% to 8.7% in examined semesters, with the average PD of 7.3%.

Table 1: Gained Grades Averages.

	Disclosed Students	Undisclosed Students	PD [%]
Spring 2011	1.92	1.77	8.1
Autumn 2011	1.91	1.82	4.8
Spring 2012	1.90	1.78	6.5
Autumn 2012	1.96	1.80	8.5
Spring 2013	1.92	1.76	8.7

Students which disclose their course enrollment have gained slightly worse average grades.

Table 2 shows the average grades again, but counted for the courses where the disclose take place, considering only disclosed students. The percentage difference ranges from 5.1% to 14.1% here, with the average PD of 9.2%. Notice the reversed averages at the Autumn 2012 semester.

Table 2: Disclosed Students Grades Averages.

	Courses With Disclose	Courses w/o Disclose	PD [%]
Spring 2011	1.98	1.72	14.1
Autumn 2011	2.16	1.97	9.2
Spring 2012	2.18	1.95	11.1
Autumn 2012	1.92	2.05	6.5
Spring 2013	2.02	1.92	5.1

The disclose takes place within the courses with worse average grades assigned to disclosed students.

### 3.1.2 Influence of the Examination Date Registration Disclose on the Study Results

We have conducted the same two comparisons as in the previous section.

The first one ends with insignificant results again, with no difference in the percentage of courses passed between the groups.

The second one is presented in Table 3, with

substantial PD between the groups, ranging from 12.4% to 23.2%, with the average PD of 18.6%.

Table 3: Gained Grades Averages.

	Disclosed Students	Undisclosed Students	PD [%]
Spring 2011	2.15	1.77	19.4
Autumn 2011	2.06	1.82	12.4
Spring 2012	2.13	1.77	18.5
Autumn 2012	2.19	1.80	19.6
Spring 2013	2.21	1.75	23.2

Students which disclose their exam registration have gained notably worse average grades.

Table 4 shows the average grades in the courses where the disclose take place, considering only disclosed students. The percentage difference is very high here, ranges from 6.6% to 38.6%, with the average PD of 27.2%.

Table 4: Disclosed Students Grades Averages.

	Courses With Disclose	Courses w/o Disclose	PD [%]
Spring 2011	2.03	1.90	6.6
Autumn 2011	2.75	1.86	38.6
Spring 2012	2.70	1.84	37.9
Autumn 2012	2.37	1.80	27.3
Spring 2013	2.37	1.83	25.7

The disclose takes place at the courses with higher average grades assigned to disclosed students.

### 3.1.3 Influence of an Application for Study Disclose on the Admission Success

Applicant's capacity to study is tested during the entrance exams. Test is the same for majority of faculties. Table 5 consists of the disclosed and undisclosed applicants entrance exam results and their percentage difference.

Table 5: The entrance exam results (higher is better).

	Disclosed Applicants	Undisclosed Applicants	PD [%]
2011	59.00	50.55	15.4
2012	59.04	49.87	16.8
2013	60.58	53.92	11.6

Applicants which disclose their county of residence have better results of the entrance exam.

The average percentage of overall application success and the percentage difference is in Table 6.

Applicants which disclose their county of residence have greater probability of application success.

Table 6: The application success [%].

	Disclosed Applicants	Undisclosed Applicants	PD [%]
2011	47.15	35.83	27.3
2012	48.27	32.85	38.0
2013	47.55	33.85	33.7

## 4 DISCUSSION

The enrollment/registration/application disclosure option is the advanced IS MU feature. It is not visually strongly proposed in the system graphical user interface or promoted outside the system. The feature has found its users despite not being widely known.

So far we have found no evidence in the study results to support the change from opt-in visibility to opt-out. We cannot proceed to trade user privacy for IS functionality by default, unless a clear evidence of massive positive influence can be proven.

On the other hand, we cannot exclude the possibility of positive influence of the optional privacy settings in individual cases. Although the majority of students are not involved, there are probably numerous students benefiting from it.

The percentages of courses with both types of disclosure are different among the University faculties. The Faculty of Economics and the Faculty of Informatics have the most courses with disclosed students. The reason may be the high number of massively attended courses with final written tests. On the opposite side, the Faculty of Education and the Faculty of Medicine have the least courses with disclosed students. The reason may be the high proportion of the oral final exams.

Teachers have an educational intent to support acquaintance among students, since some study fields allow a lot of subject choices and e-learning coupled with massively attended courses becomes widely employed. Students with individual curriculum meet more people but usually only for a brief time and thus have a lower chance to familiarize each other.

## 5 CONCLUSIONS

Our hypothesis appears to be wrong in the courses disclosure and especially in the exams disclosure, where the results show the opposite phenomenon. Our best explanation is that students in need of help look for a classmate assistance. Unfortunately, we cannot prove it from the presented data. The only

way to answer the question “Do Desperate Students Trade their Privacy for a Hope?” could be to ask them. We are currently preparing such survey.

Regarding the application disclosure, the results support our hypothesis. As soon as the disclosed applicant is successful in the entrance exam, he or she may use the feature to the better start of the study, e.g. to find mates for the commuting to the University.

### 5.1 Future Study

We would like to propagate the disclosure options and to attract students to use this IS MU feature widely. The disclosure, an investigated parameter, can be eventually used for the student characteristics definition and can therefore result in the student performance prediction accuracy improvement. We have shown such technique in our previous work. (Bayer 2012).

The future study should extend this research in the area of subgroup discovery. Which types of students use the disclosure? Variables as the gender, the type of study, the field of study or the form of study can influence the percentage of the usage. It will be also promising to explore the courses in which students are disclosed. Courses can be of a high capacity, without seminar groups or more difficult than others.

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