THE UNIVERSITY OF TEXAS AT DALLAS

“Students’ Attitudes towards the Use of Algorithms in Educational Environments”

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EPPS 7386 Survey Research

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Research Question

Context:

- Progressive use of Automated Decision Systems (ADS) in health and judicial systems.
- ADS in educational settings is a vacant area.
  - Early Warning Systems for the detection risk of dropping out.
  - Evaluation systems to select students who obtain scholarships and fellowships.

What are the Attitudes of University Students toward the Use of Algorithms in Educational Environments?

Initial Hypothesis

(a) The lack of transparency in access to analysis mechanisms,

(b) failure to preserve the privacy of student data, and

(c) the high degree of decision automation

negatively impact the attitudes that students have towards the use of algorithms for decision-making in educational settings.

Literature Review

PUBLIC ADMINISTRATION

- Organizational factors that influence the implementation of these systems,
- Effects that promising e-governance technologies have from the perspective of citizens (Androutsopoulou, Karacapilidis, Loukis, and Charalabidis, 2018; Margetts and Dorobantu, 2019; Vogl, Seidelin, Ganesh and Bright, 2020; Young, 2020).

ATTITUDES TOWARDS AI

- How people evaluate the performance of algorithms in terms of fairness, usefulness, transparency, privacy, etcetera (Araujo, Helberger, Kruikemeier and de Vreese, 2021; Charbonneau and Doberstein, 2021; Miller, and Keizer, 2021; Zarsky, 2016).

VARIABLES AFFECTING ATTITUDES

- Prior knowledge of mathematics/programming, general level of education, age, income level, concerns about data privacy, perceived online self-efficacy, etcetera (Logg, 2017; Smith, 2018; Zhang and Dafoe, 2019).

Method

- Survey to analyze attitudes towards algorithmic use in different educational scenarios (vignettes).

- **Target population**: all National University of Cordoba (Argentina) N= 157,919 students.
- **Sampling Frame**: obtained through the institution.
- **Sampling Technique**: Systematic Random Sampling. N=1580 students.

- **Response Weighting**: population characteristics (gender, age, occupation, and distribution in schools are available at the Statistical Yearbook of NUC).

- Independent variables:
  - **SITUATION 1: lack of transparency** in access to analysis mechanisms.
  - **SITUATION 2:** failure to preserve **students' data privacy**.
  - **SITUATION 3:** high degree of **decision automation**.
- Dependent variable: students' attitudes towards algorithmic use (feelings, trust, quality)
- Control variables: gender, age, familiar income level, perceived previous knowledge about algorithms, work status.

Preview of the survey in mobile view

Survey Design

- **Survey** confronts students with different situations. They are asked to express their personal opinions about these algorithmic applications.

- **Questions** based on Schiff, Schiff, and Pierson (2021[a,b]) and Zhang and Dafoe (2019) considering adaptations to educational scenarios.

- **Structure:** (18 questions)
  - Q1: Presentation, survey objective, stipulated time, and consent form.
  - Q2: Respondent's prior knowledge of algorithms.
  - Q3, Q4, Q5: Situation 1 and questions about feelings, trust, and quality.
  - Q6, Q7: Situation 2 and questions about feelings and trust.
  - Q8, Q9: Situation 3 and questions about feelings and trust.
  - Q10, Q11, Q12: Situation 4 and questions about feelings, trust, and quality.
  - Q13: Overall opinion about the impact of these systems.
  - Q14-Q18: Sociodemographic block (age, gender, employment status, family monthly income).

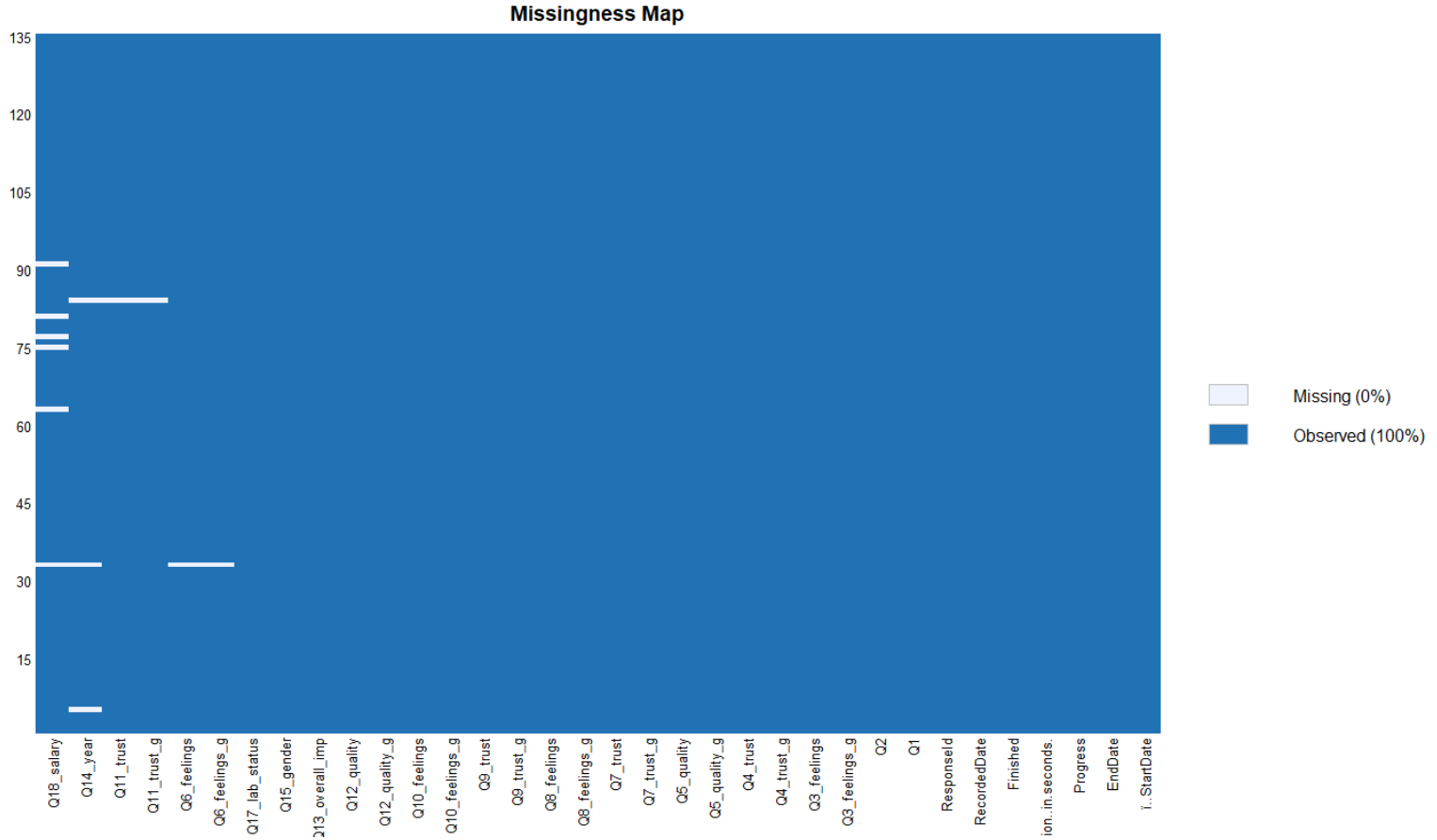
Table 1. Description of the hypothetical situations presented in the survey

#	Variation	Text
Situation 1	**Neutral scenario**	Imagine that your university is considering using a predictive computer algorithm to make decisions. The new predictive algorithm makes **automatic recommendations to instructors and administrators about which students may be at risk for dropping out**. The university members hopes that this information will help them decide which student may be most in need of support and intervention.
Situation 2	**Lack of transparency**	Finally, the new predictive algorithm that makes automatic recommendations to instructors and administrators about which students may be at risk of dropping has been implemented at your university. A few months later, an investigation pointed out that **students and community members do not have much knowledge about how the predictive algorithm works**.
Situation 3	**Not preservation of students' data privacy**	Consider again the new predictive algorithm that makes automatic recommendations to instructors and administrators about which students may be at risk of dropping out. Notice now that a few months after its implementation, another investigation indicated that **the privacy of student data has not been fully preserved**.
Situation 4	**Automatic decision-making**	Now, let's think about a different type of algorithm. Imagine that your university is considering using a predictive computer algorithm that **automatically selects students who get scholarships and fellowships**. By using it, the decisions of who obtain grants would be solely made by the machine based on the data provided by the applicants. This algorithm would **completely replace human decision-makers** and the discretion they use to make their decisions.

Pilot Study

- **Online administration** to a convenience sample of **Argentine university students.**
- **Spanish** version.
- Published and open from **14th April to 28th of April** 2022.
- **N= 135 students.**
- **Average time of response:** 7.25 minutes.

Missing Data



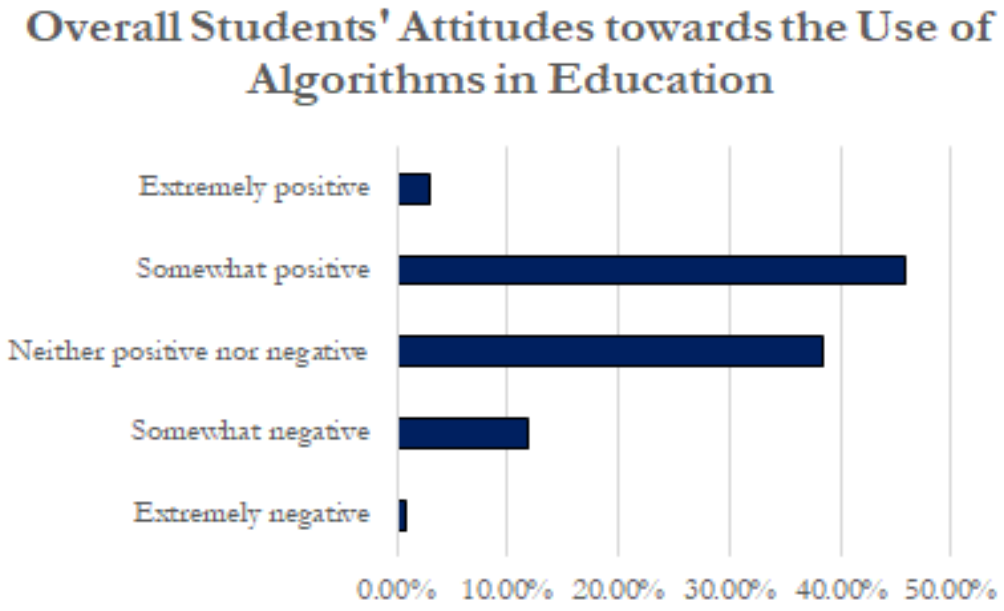
- Only situations 2 (in assessing feelings) and 4 (in assessing trust) show a missing value each (corresponding to **P6** and **P11**).
- The **sociodemographic block** shows some data missingness in variables such as Year of Birth and Family Monthly Salary.
- **Mean imputation** was employed to guarantee the conservation of the 135 observations.

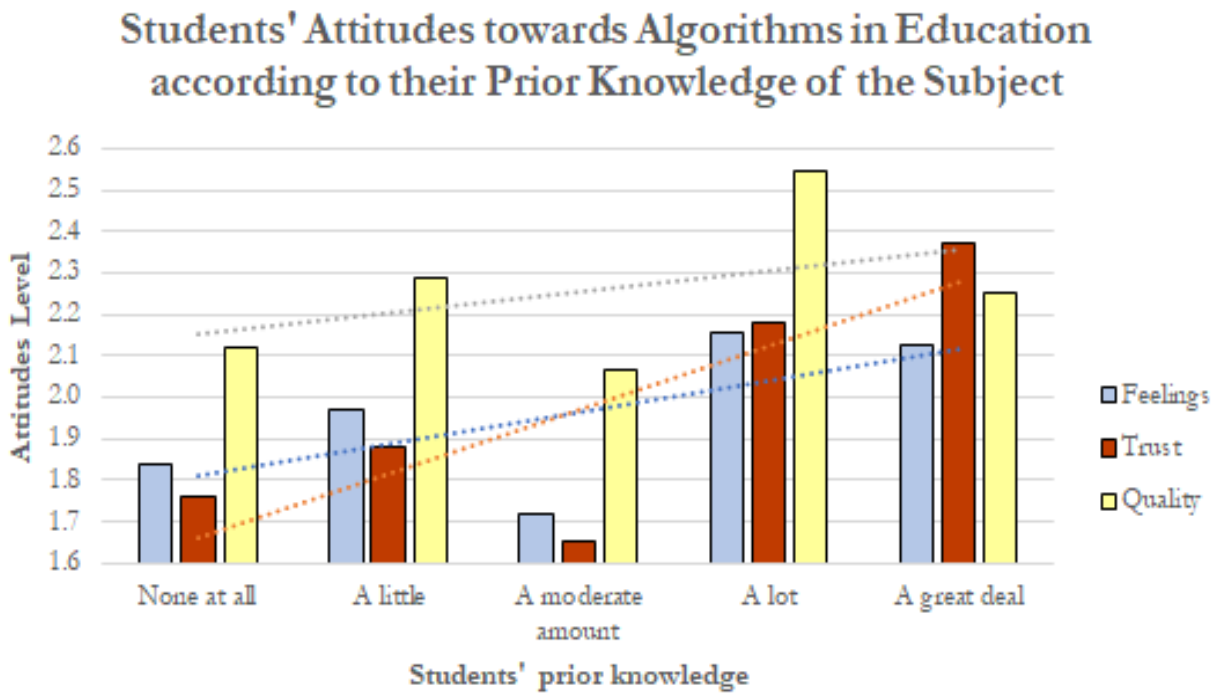
Pilot Study: Preliminary Results

Table 2. Descriptive Statistics

Variable		*Observations*	*Mean*	*Std. Dev.*	*Min*	*Max*
Age		135	26	9.685731	18	66
Gender		135	Female	0.667661	1	4
Female (1)	58.52%					
Male (2)	36.30%					
No-binary (3)	2.96%					
Prefer not to answer (4)	2.22%					
Laboral Status		135	4	1.460291	1	5
Employee for salary (full-time) (1)	14.07%					
Employee for salary (part-time) (2)	14.81%					
Self-employee (3)	14.81%					
Out of work and looking for (4)	20.00%					
Out of work but not currently looking for (5)	36.30%					
Family Monthly Income		135	3	1.071156	1	4
Less than $33.000 ARS (1)	12.59%					
$33.000 - $65.999 ARS (2)	24.44%					
$66.000 - $96.000 ARS (3)	22.96%					
More than $96.000 ARS (4)	40.00%					

Pilot Study: Preliminary Results

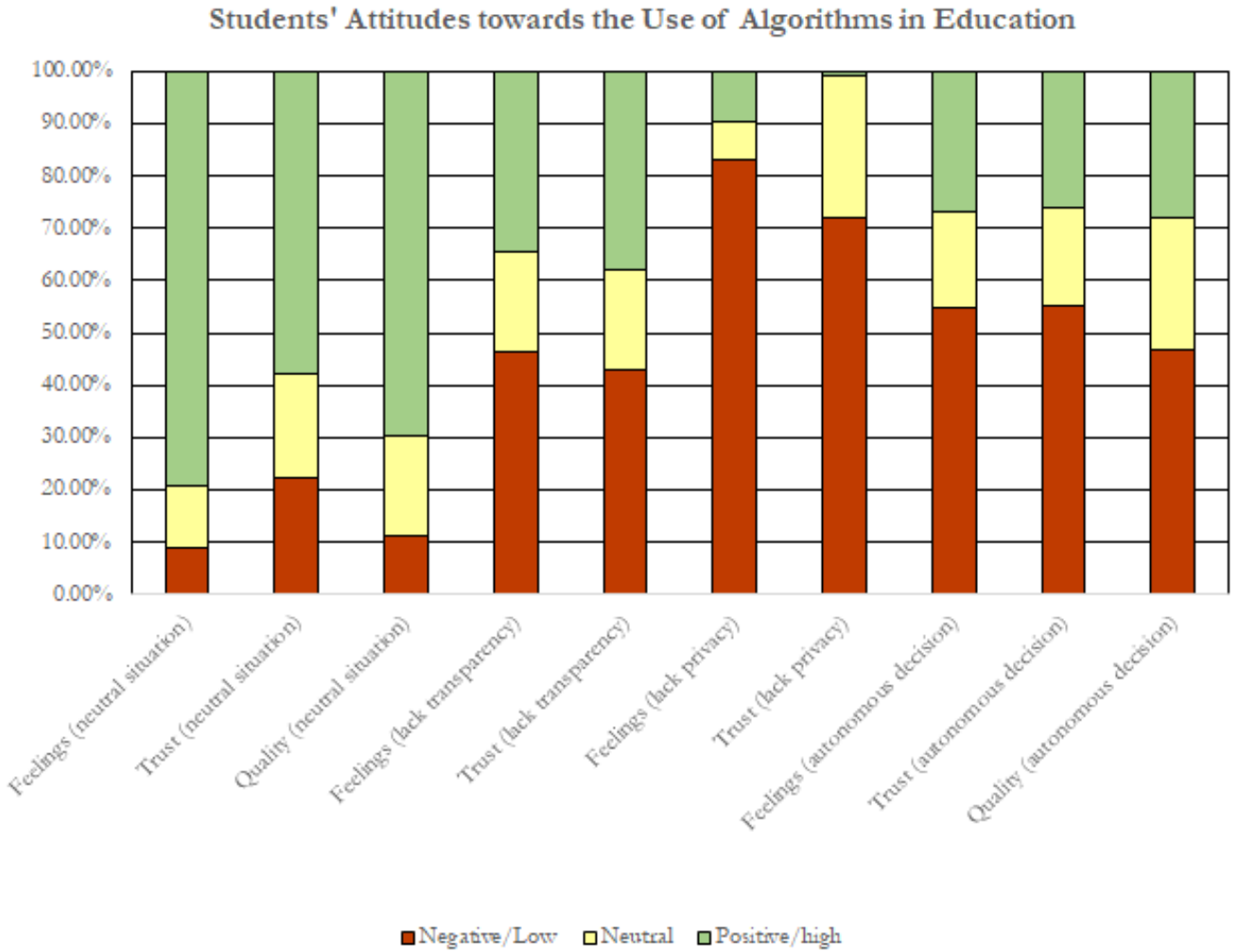




- *The majority see as "somewhat positive" the overall impact of the use of algorithms in education. Skeptical views are also considerable in amount.*

- *The more prior knowledge they say they have, the more positive attitude they show, especially in terms of trust.*

Pilot Study: Preliminary Results



- **Situation 1 (neutral):** positive attitudes predominate.
- **Situation 2 (lack of transparency):** more than 40% of students show negative opinions, 15% have neutral attitudes, and around 35% are favorable.
- **Situation 3 (failure in preservation of data privacy):** at least 70% of students show negative attitudes.
- **Situation 4 (automatic decision-making):** negative attitudes predominate but around 25% of respondents see these systems positively.

Conclusions & Future Research

- *The pilot study shows that instrument is adequate in terms of wording, sequence, and structure.*
- *At least in descriptive terms, differences in students' attitudes seem to be related to distinct scenarios of algorithmic application in educational settings (data privacy, lack of transparency, and automation of decisions).*
- *However, as all situations were presented to all the respondents (not variation in treatments or IV) we cannot conclude statistically significant differences.*
- *Consequently, future research contemplates an experimental survey design to test the causal hypothesis before mentioned.*
- *Institutional Review Board (IRB) & applying for a grant are next steps.*

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