

# DO STUDENTS TRANSITIONING TO UNIVERSITY JUSTIFY THEIR SCIENTIFIC PRACTICE IN A DIFFERENT WAY THAN ESTABLISHED STUDENTS AT UNIVERSITIES? A QUANTITATIVE STUDY ON JUSTIFICATION PATTERNS IN RESEARCH INTEGRITY

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## PROPOSAL INFORMATION

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The well-being of our society relies on reliable research results. Fostering Research Integrity and Responsible Conduct of Research (RI/RCR) is essential for our society's ecological, political, economic, medical, social, cultural, and ethical contexts. However, although numerous RI/RCR educational programmes have emerged in higher education in recent years, we observe misconduct [1, 2] up to increased violations [3] in research. For this reason, it is of utmost importance to improve these educational endeavours and start to collect basic information about students and their RCR training in higher education institutions.

Some studies show that RCR training fosters RI [4, 5, 6]. In contrast, others outline that RCR training does not always lead to the desired promotion of research integrity [7, 8, 9]. Watts et al. [10] emphasise that the RCR programme's effectiveness depends on how trainers instruct their students. Trainers refined and adapted such instructional approaches to affect RCR programmes in the last few years positively. In 2017, Watts et al. [11] confirmed an improvement but no significant breakthrough driven by these instructional alterations.

Results from other areas of education show that students' (mis-)conceptions play an important role in how effective programmes can be. How do students decide for and justify scientific practice? What ideas,

better say, what patterns do students use to justify their own and others scientific practice?

Uncovering these patterns can be a promising way towards effective RCR training. Moreover, uncovering these patterns on different levels of qualification in higher education can show if other factors such as students' institutional socialisation, their research experience, and being mentored influence students' patterns.

Based on the data collection from the European Horizon 2020 project Path2Integrity, this study answers the following research question: Do HEIs influence students' justification pattern that students use the common scientific sense to justify (their) scientific practice? To answer this question, we use Zollitsch et al.'s [in press, 12] eight justification patterns for scientific practice: common scientific sense, hierarchy structure, community benefits, equal treatment of everyone/everything, duty to act this way, orientation on others, quantitative majority decisions and rejection of binding codes.

The study evaluates the following hypothesis: Students transitioning to university (ST) justify their scientific practice less by using common scientific sense than established students at universities (ES). Because ES have experienced more training and experience in a research context in which RI is promoted, we predict that the justification pattern "common scientific sense" will be significantly higher

in the ES group than in the ST group. Europeans HEI's widespread RCR training and the impact of other European promotional strategies (such as establishing codes of conduct, preventing hyper-

competition, formalising procedures that protect both whistle-blowers and those accused of misconduct etc. [1]) support this prediction.

## METHODOLOGY

We follow the principle of preregistration and have not yet analysed the data. To avoid any data misinterpretation, to enable replication studies and to receive objective and transparent results, we only analyse the data when the above- described research questions and following analysis plan is accepted. If we receive positive review feedback from ENAI, we will analyse the data three weeks before the ENAI conference and present the results.

Participants are/will be 600 international students voluntarily attending the non- randomised Path2Integrity evaluation. They do and will not receive any credit for their participation. The participants are reached through the extensive Path2Integrity community. Standard demographic statistics of these groups will be included in the presentation.

Students' qualification level: Following the Framework for Qualifications of the European Higher Education Area, we group the participants by their qualification level, country and age into a) European secondary school students older than 16 and European bachelor students, b) European master students and European PhD students.

The first group represents students transitioning to university. The influence of HEIs research integrity promotion on this group is low. The second group represents established students at universities. The influence of HEIs research integrity promotion on this group is high.

Justification patterns for scientific practice: Selected subscales from the P2I questionnaire (Zollitsch et al.) will be used. The subscale of interest for this study is the third-tier justification pattern and fourth-tier confidence interval. The measure of justification patterns for scientific practice consists of six items. An example item is: "Sam's decision is in line with good research practices because ...

Choose one of the following answers

- it is Sam's duty.
- it protects the reputation of his organisation.
- it ensures reliable research results.
- it ensures an equal treatment of all misconduct cases."

Participants choose and indicate to what extent they endorse their answer with a 0–100 scale (0=no confidence, 100=confident). After reverse coding the appropriate items, the scale will be created by averaging across items. We will evaluate the internal consistency of the scale for our sample.

In particular, the study will develop appropriate graphical representations for the groups mentioned above ES and ST. We will present the results in two-dimensional raincloud and as 3D plots, representing how HEIs research integrity promotion influences the justification patterns for scientific practice.

A non-parametric significance test (*t*-test) will be performed to test the hypothesis with  $P < 0.005$ .

## CONCLUSION, INTENDED FOLLOW-UP STUDIES

As explained above, we follow the idea of preregistration and do not yet know the results of the study. However, if the test confirms a significant relationship, we document that ES more often use common scientific sense than ST to justify (their) scientific practice. Therefore, we show

1. that ES and ST have different justification patterns when they start their RCR training

2. that HEIs can positively influence students through training and other research integrity promotions (code of conducts, change of incentives etc.).

If we confirm a significant relationship between student's qualification level and their justification patterns for scientific practice examining appropriate educational programmes for these different target

groups and keeping up the established ways of promoting RI in HEI would be in order.

If there is no significant relationship between justification patterns for scientific practice and student's

qualification level, further explanatory studies on justification patterns in RI and HEIs influence on students RI conceptions needed to be provided.

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