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Understanding Environmental Factors in Academic Honesty Awareness Towards a Better Interpretation of Plagiarism via Turnitin Similarity Scores

Dr. Mireia Perera-Gonzalez, Northeastern University

Mireia Perera-Gonzalez is a recent Ph.D. graduate in Bioengineering at Northeastern University, Boston, MA. She found herself calling at the intersection of becoming a doctor and an engineer in the discipline of biomedical engineering, motivated by the thought of helping others whilst also creating a meaningful impact in healthcare. Mireia obtained a BS in Biomedical Engineering from Carlos III University of Madrid, Spain. During their BS, Mireia participated in two internships and attended three different academic institutions internationally, providing her with an open-minded experience, and the importance of a research of collaborative nature. During her doctoral studies, Mireia has been highly dedicated to optimizing contrast-enhanced magnetic resonance imaging (MRI) methods for preclinical studies. In parallel to her research, she is committed to implementing best DEI practices and facilitating communication at the institutional level, which she has accomplished as a Teacher Assistant, Graduate Researcher, and President of the Graduate Student Council.

Dr. Shiaoming Shi, Northeastern University

Assistant teaching professor in the Bioengineering Department at Northeastern University

Lessons Learned: Understanding environmental factors in academic honesty awareness towards a better interpretation of plagiarism via Turnitin similarity scores   Paper ID: 37577

Mireia Perera-Gonzalez[1], Shiaoming Shi[1]

[1]*Department of Bioengineering, Northeastern University, MA.*

Abstract

This Lessons Learned paper evaluated the influence of cultural and environmental factors on student academic honesty awareness. Technology advancement can improve students' learning experience and skillset while triggering an increasing concern about dishonest practices, including plagiarism. There is a need to identify the reasoning behind academic dishonesty to increase awareness and improve students' success rates. This study analyzed Turnitin® similarity scores before receiving a lecture on the importance of academic integrity and a chance to repeat the assignment, in which results significantly improved. International students (who scored worst in the first assignment) might suffer more from language barriers (non-English speakers), cultural shock, and pressure from their circles to perform well. Non-native English speakers (60% of total) performed worse than native fellows in the first submission (25 ± 21 % and 14 ± 12%, respectively), but improved after resubmission hinting that language barriers can influence academic performance and highlighting the importance of identifying optimized academic techniques and adequate integrity training to improve students' experience and performance. These results highlight the need to investigate and understand factors potentially contributing to students' elevated Turnitin similarity scores to achieve the goal of helping students from all backgrounds to succeed in their graduate studies. Preferred presentation format: "Lightning talk"

Introduction

Advances in technology can facilitate how education increases students' knowledge and skills[1], but can also offer a means to practice dishonest behaviors[2]. Plagiarism, the use of other's work or ideas without proper reference to the author, hinders education and raises an important ethical issue[3]. Turnitin is one of the software tools used worldwide to help identify situations of unacceptable plagiarism[4] by means of an originality score (or percentage of similarity), despite being marketed instead as a tool to enable academics "to focus on teaching"[3]. There have been numerous concerns about grading with these software options, including incorrectly flagging commonly used expressions, particularly in very niche fields, highlighting a need for further investigation to avoid false accusation of plagiarism[5].

Understanding the root cause for academic dishonesty can facilitate how to successfully address these behaviors[4], especially when they stem from lack of awareness and know-how in specifying references appropriately[4]. Field of study[6] and culture background[4] have been correlated with the likelihood of plagiarism[3], [4]. Students who lack comprehension necessary to follow a class and feel uncomfortable asking critical questions, or cannot comfortably express themselves may feel more inclined towards dishonesty, being non-native English speakers with poor study skills the group with the highest risk[6]. International students likely have higher demands to succeed and invest more energy and resources (mental, financial, and familiar); which combined to the

inherent challenges of living, studying, or working in a new place constitutes an undesirable recipe for elevated likelihood of academic dishonesty[7].

Previous studies have demonstrated an imbalance in education and academic integrity awareness across the globe[6], finding disproportionate amount of integrity work for the same size of population[8], as well as unmatched opinions from geographic locations when interpreting dishonest practices[9]. These examples highlight the influence of demographics on students' academic honesty awareness. This study aims to evaluate the potential field of study, cultural, and environmental factors with the students' similarity scores from their first and second submissions; to better understand the reasoning behind plagiarism and how to prevent it in academic settings.

Methods

Two cohorts of first-year Master of Science in Bioengineering at Northeastern University, instructed by the authors of this paper, were evaluated (104 total students, roughly 50/50 ratio men and women). They were tasked to analyze a CRISPR/Cas9 publication by R. Barrangou *et al*. as the first assignment of the course, then they had a lecture on academic honesty, and they were asked to repeat the assignment if their similarity score was above 20 % (optional if < 20 %). 29 students repeated the assignment.

Demographic information (country of origin, undergraduate/graduate background, languages) was collected from voluntary surveys and combined with the Turnitin data. In cohort 2 (Fall 2022), we carried a more exhaustive evaluation of academic honesty[10] from a voluntary survey to gage understanding of the university guidelines[11], as well as an estimation of frequency for certain dishonest practices[12]–[15]. This approach was followed in agreement with previous studies that demonstrated a positive impact in students' comprehension, learning, and performance in topics such as research/academic integrity, citations, and referencing[10].

Statistical analysis was done with GraphPad online t-test calculator to find statistically significant differences between Turnitin similarity scores for first and second submissions, and to find significant differences between demographics and similarity scores. The demographic categories were binarized, field of study was established as engineering background (yes/no) and biological sciences background (yes/no); cultural and environmental factors were attributed to the native language being English (yes/no).

Results and Discussion

Table 1 Breakdown of averaged Turnitin scores for each submission (S).

	Turnitin Scores (%)						
	All	YES Eng	NO Eng	YES Biol	NO Biol	YES Native	NO Native
S #1	20 ± 19	22 ± 12	$15 \pm 16^{\dagger}$	20 ± 19	23 ± 19	14 ± 12	$25 \pm 21^{\dagger}$
S #2	$14 \pm 14^{*}$	$13 \pm 10^{**}$	$10 \pm 13^{*}$	$12 \pm 10^{**}$	$19 \pm 18^{\dagger}$	$10 \pm 7^{**}$	$17 \pm 16^{**,\dagger}$

YES/NO refers to their background in: Biol = Biological Sciences, Eng = Engineering. *,** denotes statistically significant differences (t-test) between submissions (*p<0.05, **p<0.01); † between YES and NO categories (†p<0.01).

From averaging participants' results from both cohorts, 47 ± 2% went to college in USA, 43 ± 11% were native English speakers, 85 ± 1% are engineers by background, and 95 ± 4% were in their first semester of graduate school. Turnitin results for each cohort are summarized in Table 1.

Students that repeated the assignment improved their Turnitin score by a factor of three (35 % to 12 %). When accounting for these improved scores, the result was significantly lower than the initial score (14 % vs. 20 %, $p < 0.05$). Engineers performed worse than non-engineers in the first assignment (22 % vs. 15 %, $p < 0.01$), but reached comparable levels after resubmission (13 % vs. 10 %, n.s.). Students with a background in biological sciences performed similarly to their fellows with different backgrounds (20 % vs. 23 %, n.s.), but experienced a sharper improvement in their scores after resubmission (12 % vs. 19 %, $p < 0.01$). Native speakers performed significantly better than their non-native fellows (14 % vs. 25 %, $p < 0.01$), likely due to challenges attributed to lack of fluency in the language[7] and improved at a similar rate after submission. However, the resulting scores were still lower for the native students than their non-native fellows (10 % vs. 17 %, $p < 0.01$). These results highlight the impact of language barrier, and the potential for appropriate training on academic honesty and awareness to improve originality.

From the Academic Honesty & Integrity Awareness Survey results, students agreed the policy was clear (4.44 ± 0.57, n=26) and effective (4.66 ± 0.48, n=28), but disagreed with the severity of the penalties (3.83 ± 1.03, n=27). Students determined that "Paraphrasing coping w/o citation" (2.00 ± 1.83) and "Falsifying/fabricating data" (1.19 ± 1.40) were the most and least likely situations to occur, respectively. Over 93 % understood most of the principles of the policy. However, 19% of students wrongly determined "*I can store notes in a portable electronic device and use notes that the instructor has provided us, when indicated in the syllabus, and unless the instructor says the opposite*" as false, and 16% wrongly categorized "*Citing a long bibliography is recommended to get a better grade, even if I have not used all the sources, and is not an example of academic dishonesty*" as true. The reasons behind why these questions were answered incorrectly is beyond the scope of this study, but we hypothesize the wording might not be clear enough and students could be driven by good intentions (not using notes/electronic devices and citing bibliography).

These results hint the need to investigate originality reports to understand students' perspective and improve learning potential as well as to identify optimized academic techniques to improve students' experience and performance.

The small sample size and specificity of the course are limitations of this study, which is the motivation behind acquiring data from 2 cohorts. In addition, Covid-19 may have affected likelihood of dishonest practices and therefore skewed our results[16]. Future studies should aim for larger sample size and could include evaluation of additional factors, including course workload and engagement with the subject[17], [18].

Conclusion

Technological advances are thought to be impacting the frequency and severity of dishonest behaviors in academic settings[2]. To better understand the reasoning behind these practices and

provide sufficient resources against these situations, it is crucial to understand the intentionality of these behaviors, potentially triggered by the influence of the student's background and consequent perspective on the matter[4]. This study evaluated the effects of demographics and integrity awareness in the Turnitin score from an assignment in a graduate class in USA to understand better the reasoning behind plagiarism and how to prevent it in academic settings.

Improvement was observed for all demographic groups after learning about academic honesty, pointing at its importance[4], particularly to mitigate unintentional plagiarism[19]. Qualitatively, students improved paraphrasing and referencing in their resubmission, although evaluating the exact mechanism to improve originality score is beyond the scope of this study.

Instructors should investigate Turnitin results before determining the final grade for any assignment. For instance, two students in the first cohort had a score of 21 % in the first assignment and did not repeat it, but it was considered acceptable since Turnitin flagged the title of the assignment as plagiarized and discarding this would drop the score below the threshold.

The critical aspect to highlight here is the importance of consideration of students' background and perspective on academic honesty and integrity in our teaching practices to better educate future generations of engineers. We hope to continue these evaluations to improve our understanding of how to better support our students and what the next steps are to successfully capture the significance of the similarity score offered by Turnitin in these types of assignments. Throughout future iterations of this study, and potentially insight from other centers, we aim to obtain a higher sample size and to evaluate further if and how the student's perception of plagiarism and awareness of Turnitin influences the similarity scores and how to act correspondingly.

In summary, non-English native speakers showed worse similarity scores initially. After receiving training in integrity awareness, students' originality scores improved significantly. These discoveries highlight a need to investigate the reasonings behind elevated similarity scores in efforts to ensure equal opportunities for students from different backgrounds to succeed.

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