O-032: Taiwanese and US graduate students’ alternative concepts of responsible conduct of research: A comparison study

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**Introduction**

*Culture* has always played an important role in the promotion of research integrity.

**Current Gap**

Students have *less opportunities* to discuss cultural integrity issues.

Empirical research on students’ capabilities to perform ethical decision-making (EDM) in research integrity is *minimal* also.

**Target Problem**

This may lead some *difficulties* for PIs and thesis advisors when faced with research dilemmas involving students of *transnational* backgrounds.

e.g., establishing cross-cultural mentor-student relationships
e.g., handling disputes in authorship due to cultural differences.
This study aims to inquire cross-cultural graduate students’ understanding and their alternative conceptions regarding responsible conduct of research (RCR)-related issues.

Participants were recruited from two universities in Hsinchu and California.
**Research Method & Questions (RQ)**

**Method:** Their RCR concepts were examined through

- “Responsible Conduct of Research Reasoning Test (RCRRT)”
- containing 10 RCR-related scenario-question sets;
- presented in a two-tier diagnostic test format (science education);
- the total score of RCRRT was 100 points.

#1 How does the general performance on the RCRRT of the two groups (TW and US) of students?

#2 What alternative concepts the two group of students are holding, respectively?

#3 Do the students perceive RCR differently when compared by gender, academic level, research discipline, and prior RCR training experience?
RCRRT: Format and Scoring (online format)

Whether students’ correct Yes/No judgements are based on wrong reasons?

Case scenario: A RCR-related scenario

First-tier: A Yes-or-No question (2 points for each)

[the system skipping to one of “Yes” or “No” second-tier page]

Second-tier: A set of items in multiple-choice format along with an open-ended space. (8 points for each)

☐ Item 1  ☐ Item 2  ☐ Item 3  ☐ Item 4  ☐ Specify:
☐ Item 5  ☐ Item 6  ☐ Item 7  ☐ Item 8  ☐ Specify:

[end of answering a scenario-question set]

Knowing “How:” Exploring the levels of factual RCR knowledge students are holding.

Knowing “Why:” Inquiring students’ (alternative) reasons used to support their judgments in first tiers.

Each given item embeds one alternative/correct RCR-related concepts.
RQ #1: Students’ General Performance (1 of 2)

**T-test:** In general, **U.S. students** had **significantly higher scores** on the 1st-tier questions and on the RCRRT as a whole.

U.S. students had greater *RCR factual knowledge* and relevant concepts than Taiwanese students.
RQ #1: Students’ General Performance (2 of 2)

Students’ performances were generally acceptable on 1\textsuperscript{st}-tier items. However, their performance on 2\textsuperscript{nd}-tiers was \textit{inferior} to their performance on 1\textsuperscript{st}-tiers.

\begin{quote}
\textbf{“To know how but not know why.”}
They did know what RCR-related practices were ethically acceptable, but they had \textit{insufficient} capabilities to offer supporting reasons accurately.
\end{quote}

\begin{itemize}
  \item TW students (N = 120)
  \item U.S. students (N = 136)
\end{itemize}
**RQ #2: Students’ Alternative Concepts (1 of 4)**

*T-test:* Two groups of students performed *significantly differently* in certain scenario questions.

**#3: Piecemeal publication**

- **TW:** 3.77
- **US:** 5.90
- *t* (254) = −4.00***

**#6: Human-subjects protection**

- **TW:** 2.33
- **US:** 5.01
- *t* (254) = −6.37***

**#10: Authors’ responsibilities**

- **TW:** 4.37
- **US:** 6.74
- *t* (254) = −4.34***

**Taiwanese students** performed significantly *worse* in Scenarios 3, 6, and 10 than U.S. students.

- **TW students (N = 120)**
- **U.S. students (N = 136)**
**RQ #2: Students’ Alternative Concepts (2 of 4)**

*T-test*: Two groups of students performed statistically **significantly differently** in certain scenario questions.

#2: Duplicate submission and publication

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<th>US &lt; TW</th>
<th>TW &lt; US</th>
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US < TW: $t_{(254)} = 2.48^*$

#4: Plagiarism of academic writing

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<td>t</td>
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US < TW: $t_{(254)} = 2.37^*$

#7: Originality in research

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<tr>
<td>t</td>
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<td>2.35</td>
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US < TW: $t_{(254)} = 3.31^{**}$

**U.S. students** performed significantly **worse** in Scenarios 2, 4, and 7 than Taiwanese students.
RQ #2: Results and Discussion (3 of 4)

T-test: Two groups of students performed statistically significantly differently in certain scenario questions.

#2: Duplicate

These results shows “where” the students answered poorly. However, it’s still unclear “how” they answered poorly.

We therefore conducted *Frequency Distributions / Chi-Square Test* to identify the patterns of their question-item selections to further extract their alternative concepts.

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<tbody>
<tr>
<td></td>
<td>$t_{(2,254)} = 2.48^*$</td>
<td>$t_{(2,254)} = 2.37^*$</td>
<td>$t_{(2,254)} = 3.31^{**}$</td>
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</tbody>
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| TW students (N = 120) | U.S. students (N = 136) |
RQ #2: Students’ Alternative Concepts (4 of 4)

TW Students (N = 120)

• Scenario 3 / Piecemeal publication:
  Some of them had less knowing regarding piecemeal publication, particularly about the exact reasons of *why the practice is ethically unacceptable*.

• Scenario 6 / Human-subjects protection:
  Some of them had less knowledge concerning *researchers’ dual-role* (e.g., TA-researcher) and *their responsibilities* in in-class studies.

• Scenario 10 / Authors’ responsibilities:
  Some of them misunderstood the criteria and responsibilities of being an scholarly author, particularly about the *joint responsibilities among all authors in a collaborative research*.

U.S. Students (N = 136)

• Scenario 2 / Duplicate submission and publication: Some of them misunderstood the practice of academic publishing and believed that *duplicate submission is conditionally acceptable*.

• Scenario 4 / Plagiarism of academic writing: Some of them had vague concepts about *how to cite others’ work* in ethically acceptable ways.

• Scenario 7 / Originality in research: Some of them had vague concepts about the *plagiarism of research idea* and misinterpreted the nature of performing scientific verification (e.g., *reproducibility in research*).

*Results of frequency distributions and Chi–Square test analyses*
Among all participating students, their prior RCR training experience played a critical role in their test performance.

Students who had ever received RCR training (in any format) had a better performance on the RCRRT than those who never had.

No differences led by genders, academic levels, and research disciplines.
Implication

For RCR instructors
The present findings will guide their better selections and design of RCR educational contents and approach to teach targeted students.

For RCR Researchers
They can develop more two-tier RCR diagnostic tests for various research disciplines and/or RCR-related subjects (e.g., publication ethics, ethics in AI research) to promote more effective RCR teaching and learning.

For students
Those who are (or might will be) involving in cross-national collaborations are encouraged to learn cross-cultural RCR-related subjects in order to broaden their current understanding, as well as know more about others’ expectations regarding performing RCR.
Future Endeavors

We will inquire opportunities to **collect RCRRT test performance in countries** other than Taiwan and the U.S. Then, we can compare students’ performance and misconceptions differences by their countries, regions (e.g., Western and Eastern), or cultural values and norms further.
Acknowledgment

We would like to thank Dr. Michael Kalichman for his valuable assistances for this study in IRB-related work and spreading participant recruitment information in the U.S.

Other statements:

- This study is based on Dr. Pan’s PhD dissertation research; Dr. Chou is her research advisor.
- This study is supported by the Ministry of Science and Technology of Taiwan (No. 105-2917-I-009-001).
Thank you for the listening.
Any comments are very welcome.

✉ sophiapan.nctu@gmail.com
Benson, a 4th-year PhD student working under the research funding support of his supervisor (an assistant professor, Dr. Lopez), has completed a research study in psychology. With the consent of his supervisor, Benson plans to submit his research results to a world-renowned academic journal as an independent author. The journal defines an author based on “the extent of contribution made to the research and can be held accountable for the content.” However, when Dr. Miller (administrative director of their research institute) learns of Benson’s submission, she suggests that Benson put her name as the second author of the research because of her significant achievements, influence, and renown in the field. If Benson lists Dr. Miller as co-author, there will be a higher chance of his research garnering significant attention. It will also be more eye-catching in future academic citations or discussion and may possibly lead to a higher chance of Benson acquiring a research job.

First-tier question: From a research ethics point of view, is the practice of Dr. Miller in violation of the related ethical principles?
If the participants checked “Yes,” the following items would show up for their further selection.

☐ 1. Since the listing of Dr. Miller’s name will have a positive impact on Benson’s future, even though she made no substantial contribution to the research, it is still negotiable whether she is listed as one of the authors.

☐ 2. Dr. Miller’s willingness to be listed in the research result of a graduate student indicates that she has acknowledged the research results and is willing to endorse it, which is indeed a sufficient condition for being listed as author of the research.

☐ 3. Dr. Miller is in the highest tier of administrative management in charge of the administrative operation and research work of the institute to which Benson belongs. By virtue of this, she has the right to be listed as co-author in any of the publications generated in this institute.

☐ 4. Benson is merely a rookie graduate student and has not yet built his own professional reputation in academia. In order to catch people’s attention and foster discussion of his research and publication, it is valuable to list Dr. Miller’s name as co-author, and this is a common approach in the academia.

Other reasons. Please specify: _____________________________________________________________
RCRRT: Example (Second-Tier “No”)

If the participants checked “No,” the following items would show up for further selection.

☐ 5. Once Dr. Miller is listed and the research is accepted by the academic journal, Benson’s research contribution and academic credit will be shared with Dr. Miller. However, such “sharing” behavior of authorship credit is in violation of the principles of research ethics.

☐ 6. Benson’s supervisor, Dr. Lopez, is the supporter of research funding. Therefore, Dr. Miller not only needs to solicit Benson’s opinion but also needs to secure consent from Dr. Lopez before her name can be listed together in the research. Therefore, in this case, the fact that Dr. Miller only solicited Benson’s opinion is in violation of the principles of research ethics.

☐ 7. Since there is a chance that Benson will apply for a faculty position in the department after graduation, the listing of Dr. Miller on his research will pose a possible conflict of interest in future reviews of his employment eligibility.

☐ 8. Without making any substantial contribution to Benson’s research, neither Dr. Miller nor Dr. Lopez, qualifies to be listed as co-author on the research. Therefore, Dr. Miller’s request has violated the principles of research ethics. *(correct answer)*

Other reasons. Please specify: ________________________________________________________________
RCRRT: Domain and Topic

The context of each scenario-question set covered one of following RCR domains along with one or two affiliated type(s) of research (mis)conduct.

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<thead>
<tr>
<th>RCR Domain</th>
<th>Type of Research (Mis)conduct</th>
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<tbody>
<tr>
<td>Authorship</td>
<td>Definition of authorship</td>
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<td>Authors’ responsibilities</td>
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<td>Research-data management</td>
<td>Human-subjects protection (informed consent)</td>
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<td>Data fabrication and falsification</td>
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<td>Originality in research</td>
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