Macau Postgrad Research Symposium

How to improve students' research projects for publication: Case studies of University of Macau student competition winners

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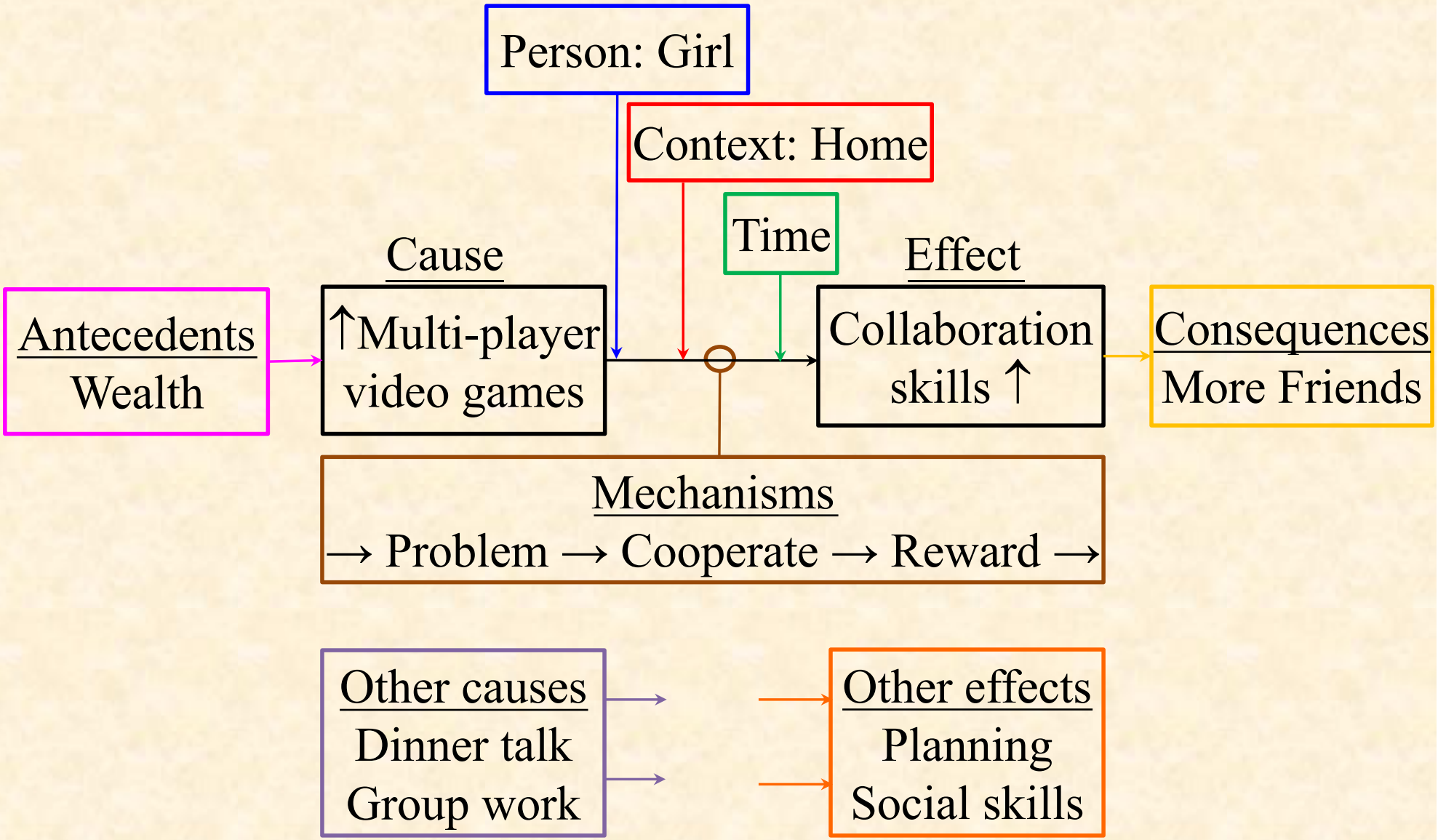
Research Steps

- Research question
- Create Theory
- Review literature
- Design study
- Execute study
- Write

Sharpen Research Question

- Brainstorm questions (e.g., for 15-30 minutes)
  - If you can't think of anything,
    - Write "research question, research question …"
- Spend 1 minute per idea to evaluate it
  - Reject ideas that are vague, costly, or unimportant
- For each workable idea,
  - Spend 5 minutes to elaborate/ plan project
  - Reject vague, costly, or difficult projects
  - Repeat until you have 1-3 ideas
  - For 2-3 similar ideas, just pick 1 to start

Create Your Theory



Review Literature

After you've created your theory model,

- Search literature for related papers
- Does each paper address your research question?
  1) Not relevant – Do not read
  2) Minor – Read abstract + tables / figures
     Summarize 1-3 key points
  3) Major (e.g., review) – Read & take careful notes
     (< 10 Major papers)
- How does your theory differ from the literature?
  - This is your study & potential contribution

Design Study

- Which hypotheses / questions do you test / ask?
- Which study design best addresses them?
  - Best data?
  - Best analysis of the above data?
  - If the best is not possible (e.g., cost),
    - What are reasonable trade-offs?
- Ask others to improve your study design
- Evaluate their suggestions and use (or not)
- Imagine possible problems & make backup plans

Execute Study

- Few studies are flawless
- Identify problems
  - Fix them with backup plan(s)?
    e.g., statistically estimate missing data
  - Note them as limitations?

Results

- Organize Results
  - Expected
  - Unexpected
    - Flaw in study design / implementation?
    - Conditions / people differ from past studies?
    - Test alternative interpretation if possible
      - Revise theory?
    - Suggest that future studies examine this issue

Discussion

- What do the results mean?
  - Interpret based on your theoretical model
    - Expected results
    - Unexpected results

- What are the implications of the results for …?
  - Theory
  - Methods
  - Practice / Policy
    - Which groups of people should do what?

Order of Outline / Writing

- Easier sections first
- Earlier sections are stepping stones for later ones

Methods

→ Results

Theory

→ Discussion

Conclusion

Abstract

Introduction, Title & Keywords

Often hardest to create hook to attract reader

Methods

- Detailed enough for reader to replicate study
- Standard sections?
  - e.g., Overview, Participants, Procedure, Data, Variables, Analyses
- Standard information within each section?
- Make / use checklists

Checklist for Survey Indices

- ☐ **Name of survey** (cite)
- ☐ # of Subscales
- ☐ *Construct name(s)*
- ☐ # of Items per *Construct*
- ☐ Reliability α for each population
- ☐ Sample item (no need to list all items)
- ☐ Scale endpoints and endpoint descriptions

Results

- Organize Results in Tables / Figures
  - Expected (major, minor)
  - Unexpected (major, minor)

- What order of results tell a coherent story?
  - e.g., Battle of 2 theories?
  - Put together archaeological pieces of a puzzle?
  - Choose learning strategy to suit specific context

- Use **same order** of ideas for **all** sections of paper

Theory

- Draw a diagram of the cause → effect sequences

  A → B → C …

- Use this order in your writing (A, B, C)

- Highlight known vs. unknown parts (contribution)

- Clarify theory conditions & boundaries (if needed)

- Clarify differences across people, time, location

Discussion

- Recall study purpose in 1 sentence
- Summarize main results in 1 paragraph
- Interpret each major result in its own paragraph

- Implications section
  - Theory, [Method,] Practice / Policy

- Limitations and Future Research
  - How should each major limitation be addressed by a future study?

Conclusion

- Summarize your major results
- 1 paragraph to 1 page long
- No speculation

Abstract

- Check journal for word limit (e.g., 150 words)
- Introduce study purpose in 1 sentence
- Summarize participants, data & analysis

  in 1-2 sentences
- Summarize Results
- Discuss most important implication in 1 sentence

Introduction

- Rank journals to which you will submit this paper
- Start at the top

  (unless you need a quick publication)

- Which study result will most attract this journal's readers?
- Why is this result / issue important?
- 1st sentence: Introduce importance of issue
- Specify vivid, concrete example
- Explain research gap / your contribution
- Often 1 paragraph to 1.5 pages

Title

- Reader's first impression
- Based on the title, many people will decide whether to read your paper or not
- Make 5 titles
- Ask colleagues

  Which one attracts you to read the paper?

Keywords

- Search algorithms mostly use title, keywords & abstract
- Pick suitable keywords that your target readers will likely use to search
- Pick keywords that complement your title and abstract

Thank You!

Ning Ren

Congratulations on your

Best Research Question Award!

Why is this a good research question?

Compared with physical study rooms, how do virtual study rooms impact students' learning motivation, stress levels, and learning performance?

Theory

A common strategy to improve informal learning is choosing an optimal learning space.

Recently, virtual study rooms become popular, where learners gather in a virtual meeting facilitated by digital platforms, sitting in front of their laptops livestreaming their learning progress.

What are the **cause → effect mechanisms** by which a good physical study room increases learning?

Specify in cause→effect order A → B → C …

Theory

A common strategy to improve informal learning is choosing an optimal learning space.

Recently, virtual study rooms become popular, where learners gather in a virtual meeting facilitated by digital platforms, sitting in front of their laptops livestreaming their learning progress.

How do **virtual study rooms differ** from physical study rooms?

How do these differences **disadvantage** virtual study rooms?

Theory

A common strategy to improve informal learning is choosing an optimal learning space.

Recently, virtual study rooms become popular, where learners gather in a virtual meeting facilitated by digital platforms, sitting in front of their laptops livestreaming their learning progress.

Why do you expect students in **virtual study rooms** to **outperform** those in physical study rooms on your task of **learning words reading English articles** and completing a **vocabulary test**?

Methodology

How will you measure participants' stress?

- Survey?
- Pulse?
- Blood pressure?
- Blood test?

Methodology

Your survey should include multiple questions for motivation (and stress) to measure it more accurately via *factor analysis*.

What **psychometrically validated surveys** will you use?

Methodology

If you include a pre-test and a pre-survey
(along with your post-test and post-survey),
you can test for changes from pre- to post-
via a *difference-in-differences* regression
(or *difference-in-differences structural equation model*).

What **questions** will you include on the **pre-test** and **pre-survey**?

Methodology

Why is your sample size 120 students?

Did you do a **power analysis**?

Do you have any questions for me?

Xiaonan Han

Congratulations on your
Best Theory Award!

Research questions

How does students' mathematics ability affect their mathematical writing (MW, organizational features, mathematics content, mathematics vocabulary, writing grammar, and clarity and precision)?

~~How do students with mathematical difficulties (MD) perform on MW?~~

~~How does students' mathematics ability affect their mathematics vocabulary use in MW?~~

How do these students' MW differ from their general writing?

Why is this good theory?

Compared to typically developing students,

- Mathematical difficulties (MD) students' writing show
  - less problem-solving accuracy
  - less mathematical reasoning
- MD students primarily used
  - formal mathematics vocabulary & numbers,
  - but fewer symbols.

Studies showed that writing activities improve MD students'

- understanding & achievement
- But omitted typically developing students
  - for comparison.

Theory

Why do MD students use fewer symbols?

Specify cause → effect mechanisms

A → B → C …

Theory

What thinking processes cause differences between math writing and other writing?

Theory

How do students with mathematics difficulties differ from other students?

How do these differences affect their mathematics writing?

Method

100 sixth-grade primary school students will ~~be divided into three groups (low, medium, high ability) and~~ do general writing, mathematics computation, and MW, ~~with analysis via MANOVA~~.

Do not divide into groups, which throws away information.

Use *regressions* and *mediation tests* to detect *indirect effects* (A → B → C)

Method

Use **regressions** and **mediation tests** to detect **indirect effects** (A $\rightarrow$ B $\rightarrow$ C)

What **indirect effects** can you test for regarding the **mathematics writing** outcome?

Method

Use **regressions** and **mediation tests** to detect **indirect effects** (A $\rightarrow$ B $\rightarrow$ C)

What **indirect effects** can you test for regarding the **general writing** outcome?

Method

Why is your sample size 100 students?

Power analysis?

Do you have any questions for me?