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MoER Topic: 'Introduction-Method-Result-Discussion (IMRaD)' approach to writing scientific papers

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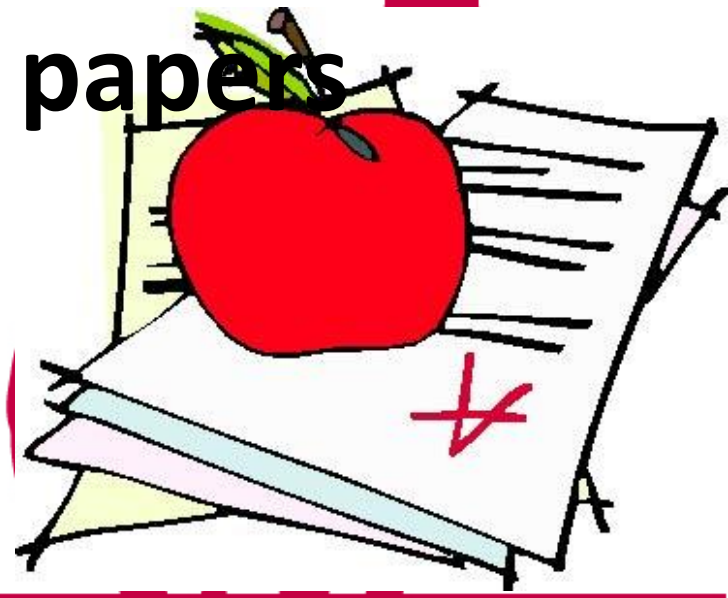

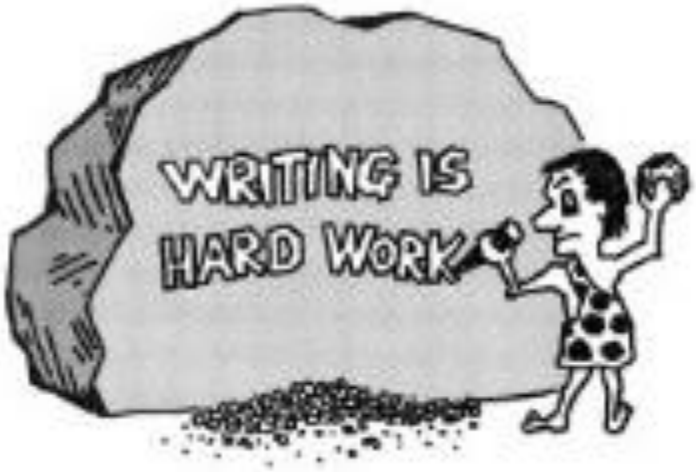

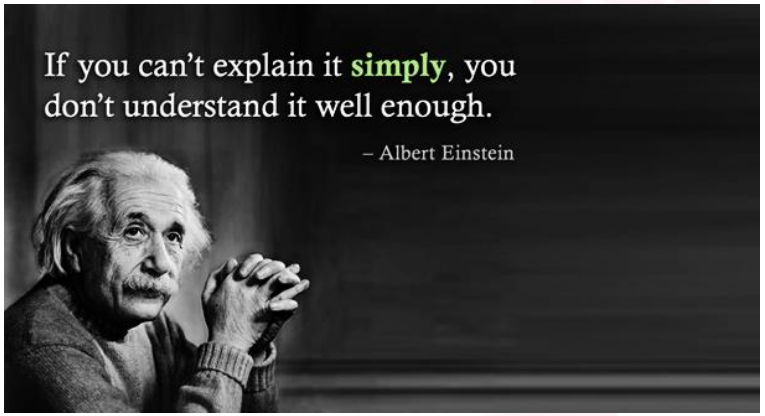

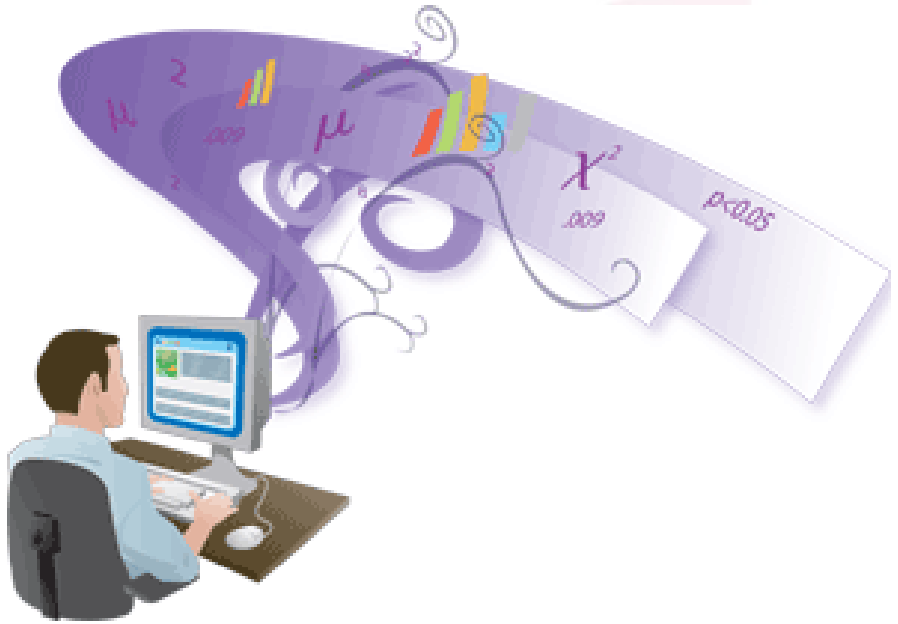

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What will you learn?

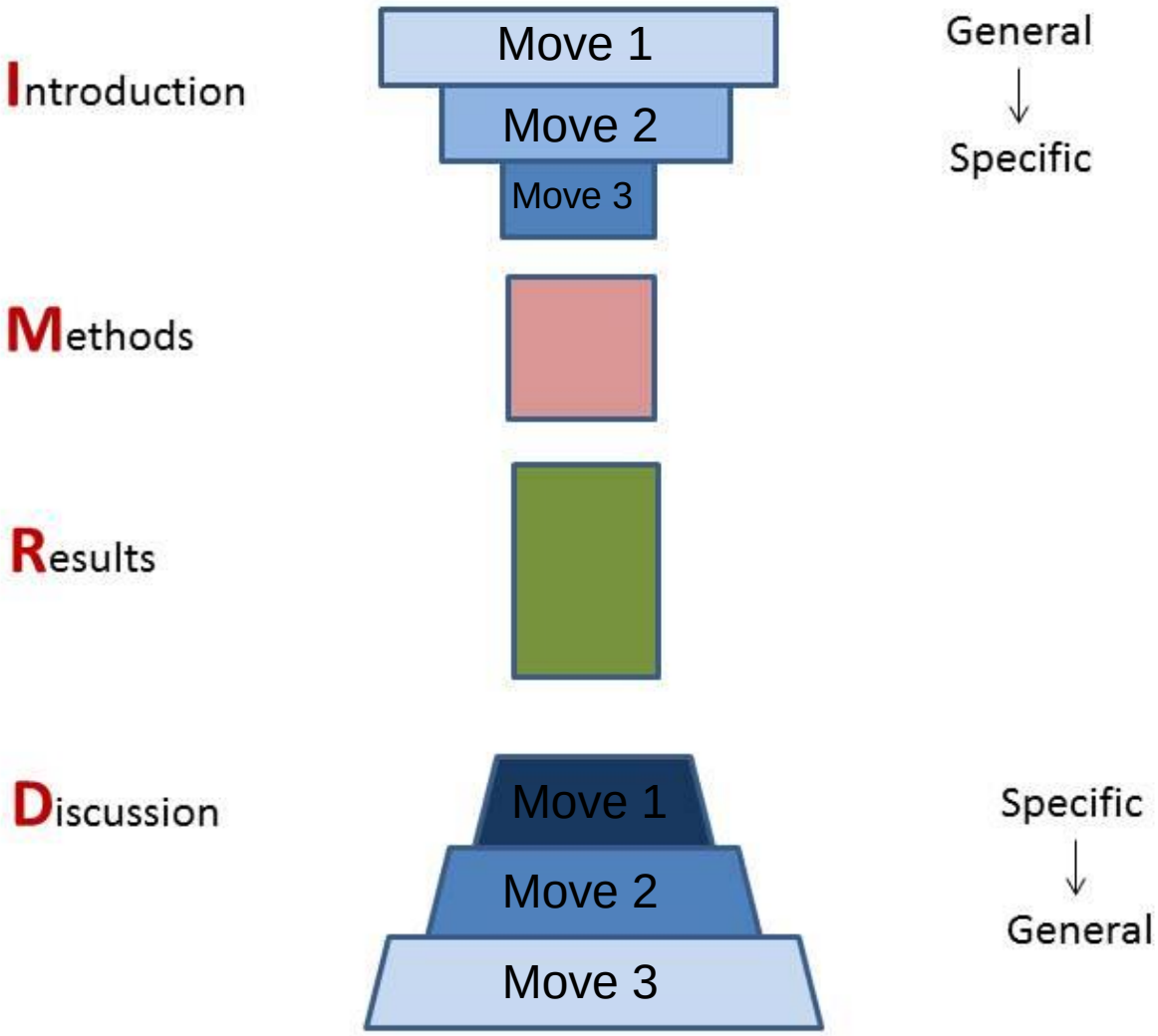
- What is ‘IMRaD’?
- What should be the purpose and obligatory key ‘moves’ in particular sections of the research paper?
- How to outline your own or review someone elses research paper?

What is IMRaD?

- An approach to structure your research paper in order to be clear and understandable to the audience (reviewers, scientists, and professionals in particular area)
- It is a pattern that makes writing a research paper easier.

- Introduction
- Methods
- Results
- and
- Discussion

Constructing a Research Paper – IMRAD structure



Source: Swales, J.M., Feak, C.B., Academic Writing for Graduate Students, The University of Michigan Press, Ann Arbor, 1999.

Introduction

- Brief and arresting
- Define nature and scope of problem, field area
- Usually goes from general to specific
- Key references, background info
- Define gaps and shortcomings in current state of knowledge
- Coins the purpose, expectation, value added,...

Two purposes of the Introduction:

1. To provide the **rationale** for the paper
   - From general context to specific research questions

2. To **attract interest** in the topics, and encourage readers to go on

Three ‘moves’ in Introduction

Move 1

Establishing a research teritory

a) By showing that the research area is important, problematic, or relevant (optional)
b) By introducing and reviewing items of previous research in that area (obligatory)

Move 2

Establishing a niche

a) By indicating a gap in previous research, raising a question about it (obligatory)

Move 3

Occupying the niche

a) Purpose of the paper (obligatory)
b) Principal finding (optional)
c) Structure of the paper (optional)

„Create a research space” -CARS model

(Swales and Feak, 1996)

Examples

„One of the first papers that studied the IT effect on business successfulness was written by Quirk and Douglas (1972).”	Move 1b
„After a literature review, the methodology used in the paper is described, followed by results and discussion.”	Move 3c
„However, none of the papers investigated if there is a reverse effect of business growth to the development of IT.”	Move 2
„This paper focuses on identifying some inventions in information technology that were directly or indirectly influenced by needs of fast growing companies.”	Move 3a
„Many researchers have noted that information technology (IT) plays an important role in business success.”	Move 1a
„It was found that there is a significant reverse effect of business success to IT development.”	Move 3b

Literature review

Previous research / Theoretical background (framework)

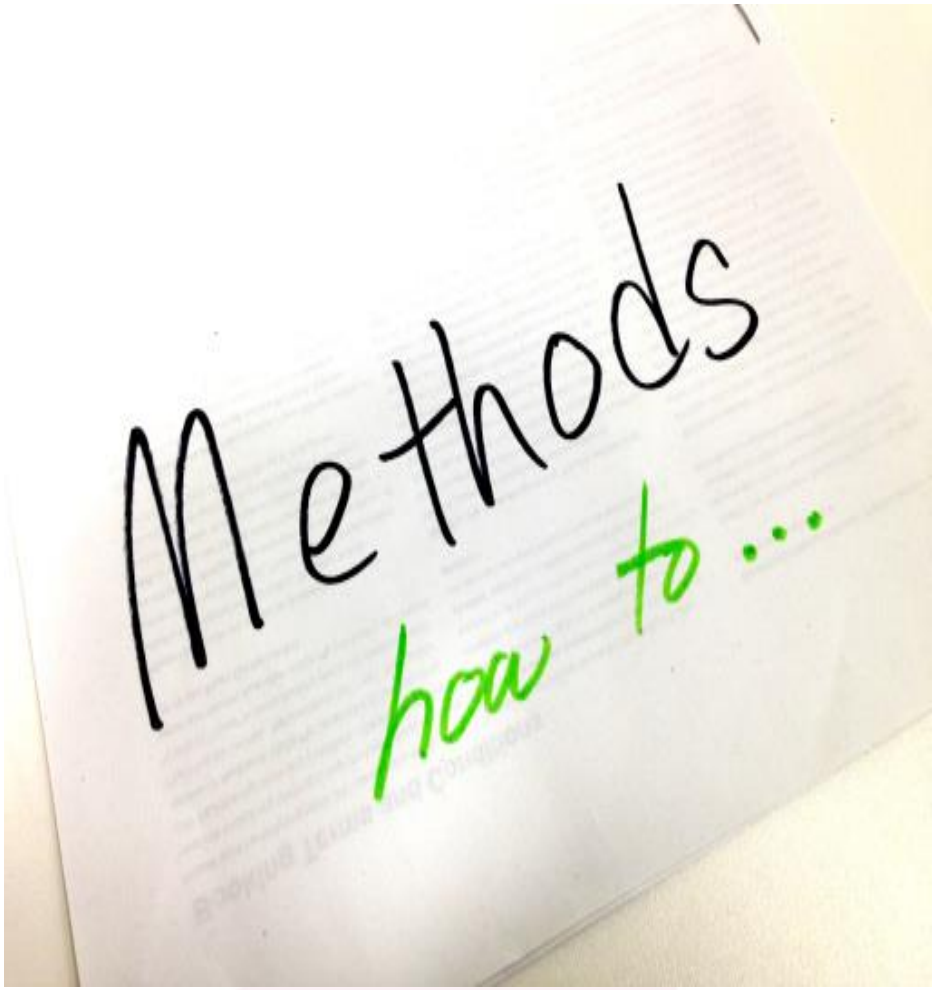
- Can be a part of Introduction, or a separate chapter
- Explicates or demonstrates author's knowledge in particular field of study
- Provides rationale for current study:
  - What gap in knowledge you try to fill?
  - What controversy you try to resolve?
- Gives framework for relating new findings to previous (how is author's research related with previous ones)
- If "Literature review" is separate chapter it usually ends with explicit identification of the aims of the study, main research questions/ or main hypothesis).

Common mistakes: Introduction /Literature review

- History starting from Adam
- Details of previous studies
- Megalomania
- Abbreviations without full form
- Details of Results and Conclusions
- Intermix with Discussion

Methods

- Methods enable evaluating your hypotheses, i.e. tackle the questions posed in your research
  - Methods used for **collecting data** needed to answer research questions
  - Methods used for **processing data** in order to get results and comment on findings



Methods (continued)

- **VALIDITY** - Scientific methods make your research paper valid to scientific community and enable obtaining valid scientific results
- **Impact** – should allow other to replicate your research design in other contexts, or to evaluate what you did

Methods (expected information)

- Should identify (for example in the quantitative studies)
  - Sampling procedures
  - Instruments used (surveys, open access datasets, interviews or other)
  - Variables observed and their descriptive statistics (in case of quantitative research)
  - Statistical methods

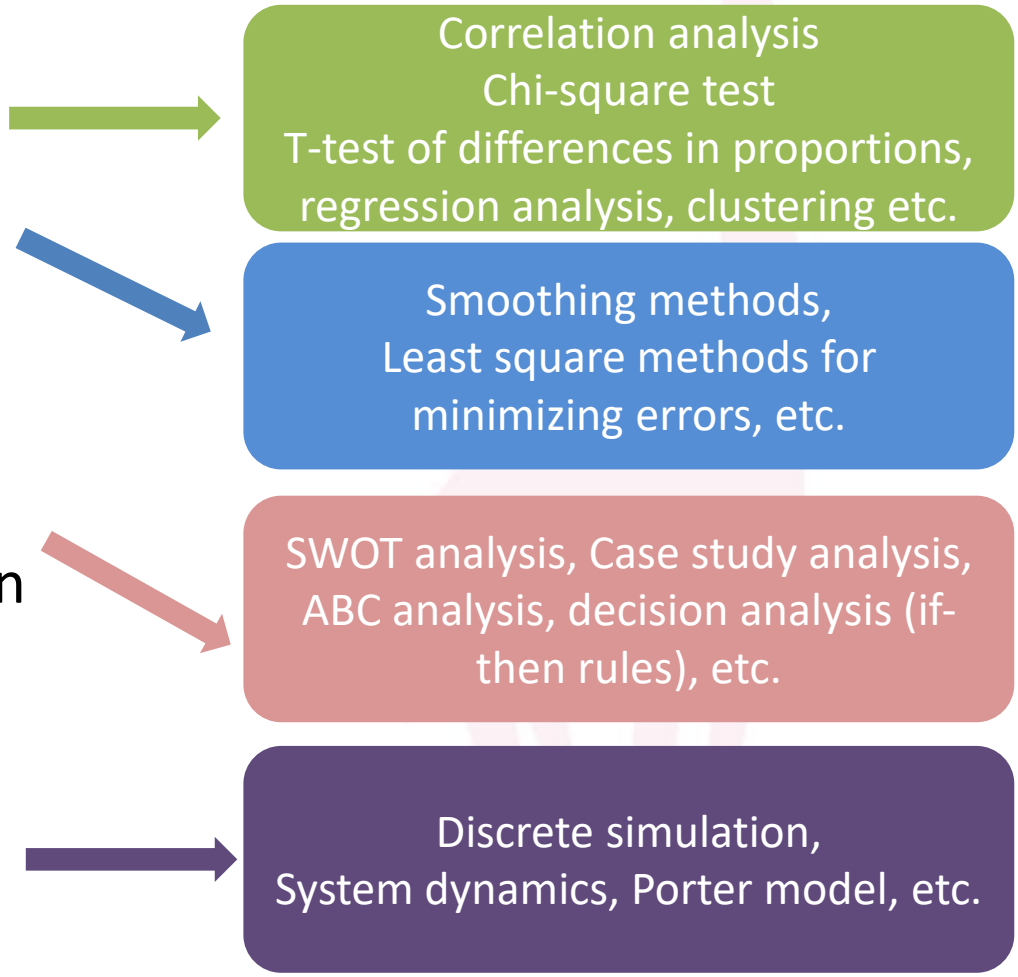
Selecting methods for collecting data

Types of research methods for collecting data (Educational Research, 2017):

- **Interviews** or **focus groups**
- **Surveys** - quantitative method that involves asking people to fill in a paper or online questionnaire
- **Observation** - looking at and recording how people behave in particular situations
- **Pictures, photos and videos** – analyzing
- **Literature reviews** - searching for and synthesising other people's research

Selecting methods for analyzing data

- Quantitative methods
  - Statistical methods
  - Mathematical methods
- Qualitative methods
  - Observation
  - Induction and deduction
  - Analyses and syntheses
  - Heuristic approach, etc.
- Simulation modelling, etc.

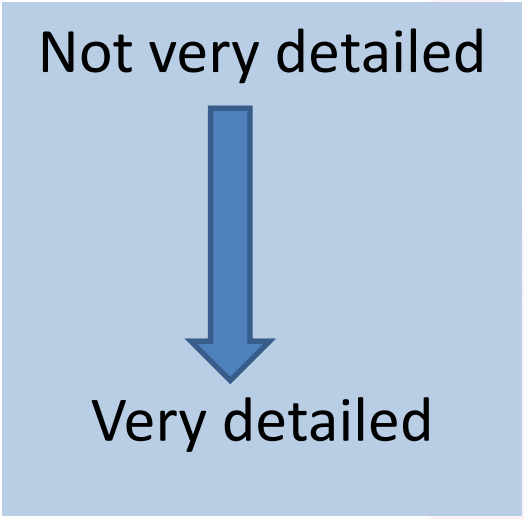


Challenge – potential pitfalls

How to do it in a concise way

The level of details:

- Well-known methods (just reference)
- Methods previously described but not well known (reference + short description)
- Methods or models that you yourself devised or invented (very detailed)



Results

- The central part (core of the paper)
- REMEMBER: The Results section is something that you have discovered, and you should be proud of!

Results

- Results section should contain **findings** and **outcomes** of your research. It should provide arguments for answering your research questions.
- It may be the longest part of paper (approx. 35% of the paper) – recall the IMRaD pillar!

According to (Carnegie Mellon University, 2017), the two main parts of the Results section:

- **Reporting** results – tables, figures, textual explanation
- **Commenting** results – partially here, partially in Discussion section

Results

- Include tables, figures or both
- Comments on findings should be partially here and partially in the Discussion sections
- An issue: how much the information in the text should overlap with that in the tables and figures?
- Advice: textually **refer to every table and figure in the paper**, and describe the most important numbers or other indicators shown in tables and figures

Example on how to refer to a table:

„Table II shows the results of the analysis of growth aspirations – employment: a mean percentage of early stage entrepreneurs regarding their plans on the future number of jobs for each of the three countries, as well as results on the significance of differences among countries. „ (Tominc, Rebernik, 2007)

Some tips

- Do not comment wider implications and conclusions that could be drawn from the results here – it goes to Discussion section.
- Percentages say more than raw numbers.
- If comparing two or more methods or models, give some statistical tests of comparison (p-values or other)
- In case of modelling, provide some measures of model fitting (How the model fits the data? F-test, or other appropriate tests)

Discussion

- Brief summary of the main findings
- Deals with points vs. Results section that deals with facts
- Typically should move from specific to general (opposite of introduction)
  - Discussion of major findings in light of available data
  - Discussion of important minor findings
- Answers the question stated in the introduction
  - State support or rejection of the hypothesis
  - Alternative explanations
  - Significance of the findings should be described.

Discussion - continued

- Discussion should go beyond the Results.
- It should be (Swales and Feak, 1996):
- More theoretical
- More abstract
- More general
- More integrated with the field
- More connected to the real world
- More concerned with implications or applications
- „In the discussion section, you should step back and take a broad look at your findings and your study as a whole.” (Weissberg and Buker, 1990, in Swales and Feark, 1996).

Three main ‘moves’ of the Discussion

Move 1

Consolidate your research space

State the research area, the niche, methods used, comment on results, conclusion that might be drawn

Move 2

Indicate the limitations of the study

Move 3

Identify useful areas of further research

Unanswered questions, possible improvements of research, guidelines

(Swales and Feak, 1996)

Examples

„Future studies could make more use of multi - item instruments and structural equation modeling in order to provide a more robust and accurate measure of direct and indirect effect, as well as interactions between the variables in the model. “

Move 3

„The paper contributes to the field of SCCT based intention models by filling the gap in the empirical evidence of the theoretical framework validity in the context of developing entrepreneurially young countries. ”

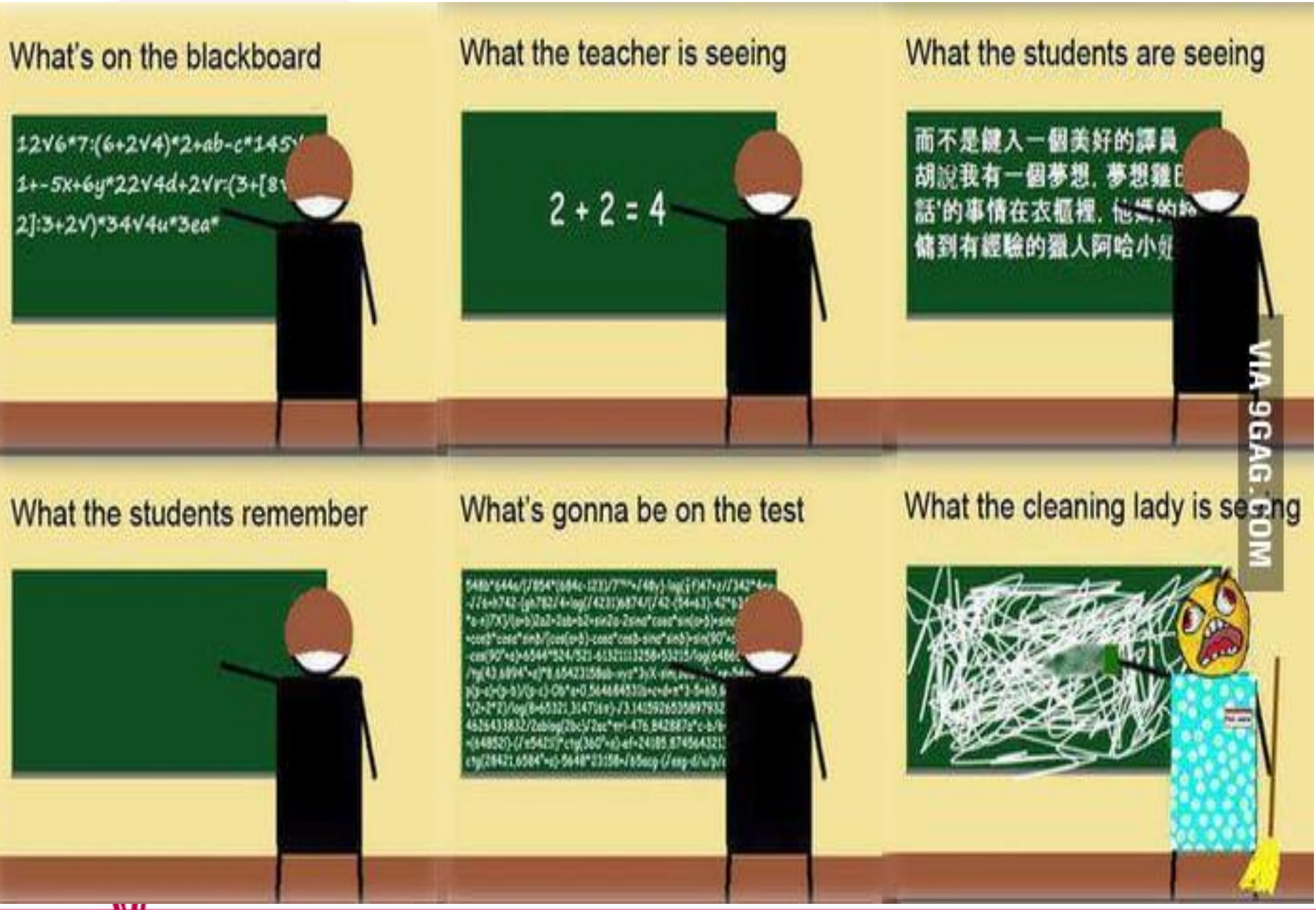
Move 1

„ This study used single constructs as the representative of multi-item measurement instruments of main dependent and independent variables. The more detailed and more robust exploration of the interaction between education and self-efficacy or identity construct goes beyond the aim of this article. “

Move 2

Discussion - Common mistakes

- Repeating results without insights
- Going beyond evidence and drawing unjustified conclusions (for example: the goal is to find out whether there is a relationship between entrepreneurial activity and economic growth and the authors concluded that entrepreneurial activity is the cause of the economic growth)
- Inflating importance of findings (first study in the world...)


What's on the blackboard
What the teacher is seeing
2 + 2 = 4
What the students are seeing
而不是鍵入一個美好的譯員
What the students remember
What's gonna be on the test
What the cleaning lady is seeing
VIA 9GAG.COM

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