

The Effects of Different Modalities on Reading Comprehension

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Why to Do This Study

- The structure of the current English for specific purposes (ESP) textbooks:
 - Pre-reading: Questions are in words or pictures
 - Reading
 - After reading
- Our sample
 - Not interesting
 - Take a lot of efforts to understand the reading

Introduction

- Not all classrooms, textbooks, or pedagogical interactions are filled with meaning potential. The lack of meaning potential poses a threat to meaning making (Lier, 2004).

Literature Review: Background Knowledge and RC

- To deal with demanding reading tasks, readers have to either resort to **background knowledge** or enhance their **language proficiency** (Alderson & Urquhart, 1985).
- L2 linguistic knowledge affects **low-level learners'** RC more than high-level learners' (Bossers, 1992, as cited in Alderson & Urquhart, 1985).

Literature Review (Cont'd)

- Synchronous computer-mediated communication (SCMC)
 - A combination of spoken and written features
- **Text mediation** of online discussion serves as a *thinking device*, helping discussants think, reflect, and revise their ideas (Lotman, 1988; Wertsh, & Biven, 1992).

Literature Review (Cont'd)

- **Visual and auditory modalities together** ease the limited capacity of the working memory (Brünken, Plass, & Leutner, 2003)
- **Animation and narration together**, rather than animation and on-screen text, help learners perform better on a problem-solving test, especially for those who know little about the topic (Mayer, 2001).

Literature Review: Motivation and Learning

- Self-determination Theory (SDT) (Deci and Ryan, 1985)
 - Extrinsic and intrinsic motivation
- Course-specific motivational components
 - Interest, relevance, expectancy, and satisfaction
- Teacher-specific motivational components
 - Affiliative drive
 - Authority type
 - Direct socialization of motivation

Literature Review (Cont'd)

- Amotivation (Gorham & Christophel, 1992)
 - Dissatisfaction with grading and assignments
 - Dislike of the subject area
 - Dislike of the teacher
 - Poor organization of teaching materials

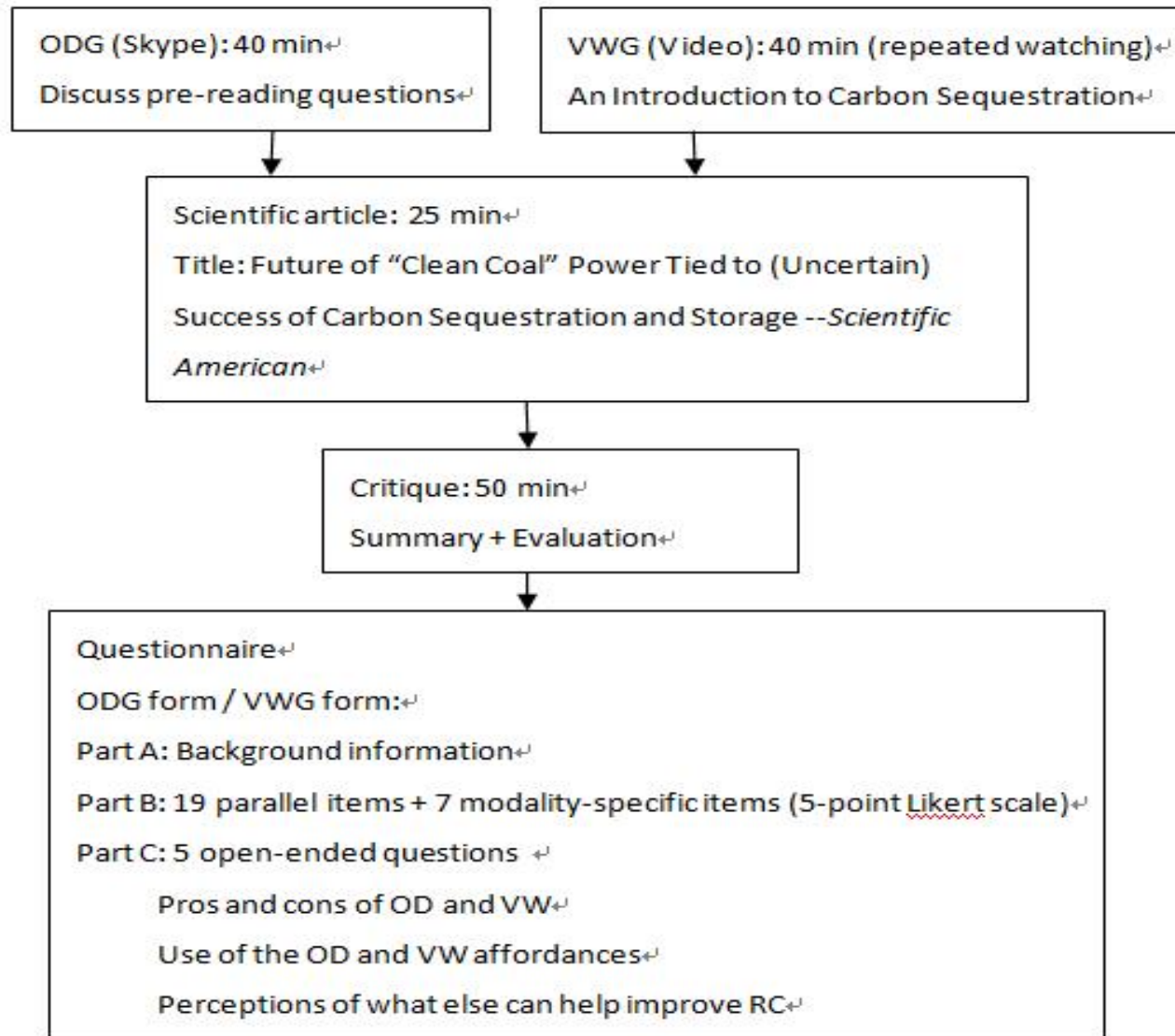
Research Questions

- How do online discussion and video watching affect the participants' **RC test**?
- What are the participants' **perceptions** of using the online discussion and video for RC?
- What are the participants' **opinions and suggestions** about using the online discussion and video for RC?

Methods: Participants

- 20 international students in UH (10 ODG; 10 VWG)
- Language proficiency:
 - TOEFL or IELTS from 2009 to 2011
 - TOEFL iBT reading ≤ 25
 - TOEFL PPT reading ≤ 59
 - TOEFL CBT reading ≤ 24
- IELTS reading ≤ 7

Methods: Research Design



Methods: Data Collection and Analysis

- RC test
 - Calculate the number of content main ideas and supporting details
 - An independent t-test
- Questionnaire
 - Descriptive statistics
 - Item analysis and Cronbach's alpha
 - An independent t-test (prior knowledge and parallel items)
 - Summary of open-ended answers

Results: Prior Knowledge

11. Before the video watching in the pre-reading activity, how much did you know about the following terms (1=nothing, 2= little; 3= some but not much; 4= much; 5=very much)?

Place a check (✓) in the cell.

| Term | 1 | 2 | 3 | 4 | 5 |
|----------------------|---|---|---|---|---|
| Clean coal | | | | | |
| Carbon storage | | | | | |
| Carbon sequestration | | | | | |

Results: Prior Knowledge

Test Statistics^b

| | Score |
|--------------------------------|-------------------|
| Mann-Whitney U | 45.000 |
| Wilcoxon W | 100.000 |
| Z | -.406 |
| Asymp. Sig. (2-tailed) | .685 |
| Exact Sig. [2*(1-tailed Sig.)] | .739 ^a |

a. Not corrected for ties.
b. Grouping Variable: Group

($p < .05$)

- Prior knowledge of the key terms
 - No significant difference in the ODG and VWG
 - More confidence in claiming the results of RC tests are due to the different modalities

Results: RC Tests

Test Statistics^b

| | Score |
|--------------------------------|-------------------|
| Mann-Whitney U | 48.000 |
| Wilcoxon W | 103.000 |
| Z | -.153 |
| Asymp. Sig. (2-tailed) | .879 |
| Exact Sig. [2*(1-tailed Sig.)] | .912 ^a |

a. Not corrected for ties.

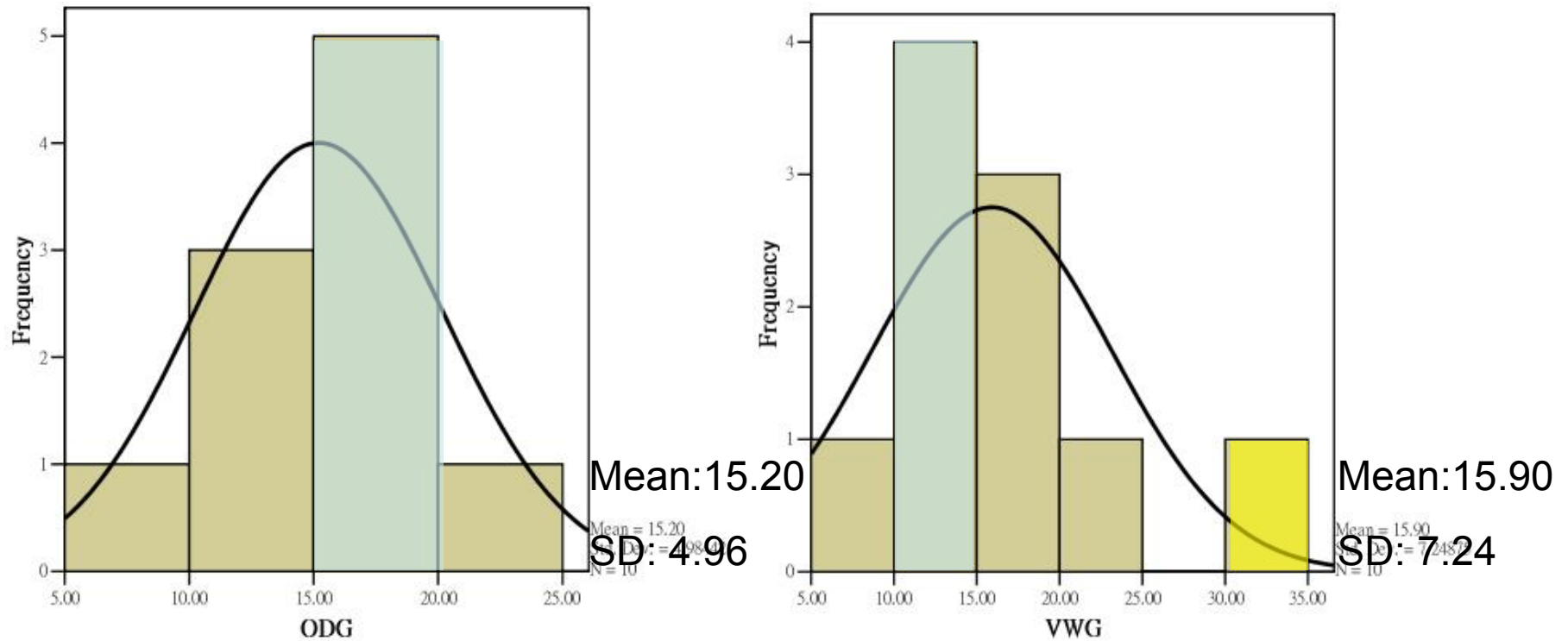
b. Grouping Variable: Group

($p < .05$)

- RC tests
 - No significant difference in the ODG and VWG
 - OD and VW are equally effective on RC

Results: RC Test

- The distribution of RC scores in the ODG and VWG



Results—Item Analysis

19 parallel items: Cronbach's alpha is .654

| Item | Statement | Reason |
|------------------------------|--|---------------------------------|
| Difficulty | | Deleted: |
| ODG I16 | The information discussed online was difficult for me to understand. | Other items about "difficulty" |
| VWG I16 | The information delivered in the video was difficult for me to understand. | |
| Helpfulness | | Deleted: |
| ODG I18 | Using online discussion did not help me understand the article. | A reverse item for double-check |
| VWG I18 | Watching the video did not help me understand the article. | |
| Teacher authority | | Kept: |
| ODG I25 | I will discuss online for learning only when the teacher requests me to do it. | Spontaneity of using SMCM or |
| VWG I25 | I will watch a video for learning only when the teacher requests me to do it. | videos for learning |
| No specific rationale | | Deleted: |
| ODG I26 | I will discuss online for learning only when other methods do not help me out. | No specific theoretical support |
| VWG I26 | I will watch a video for learning only when other methods do not help me out. | |

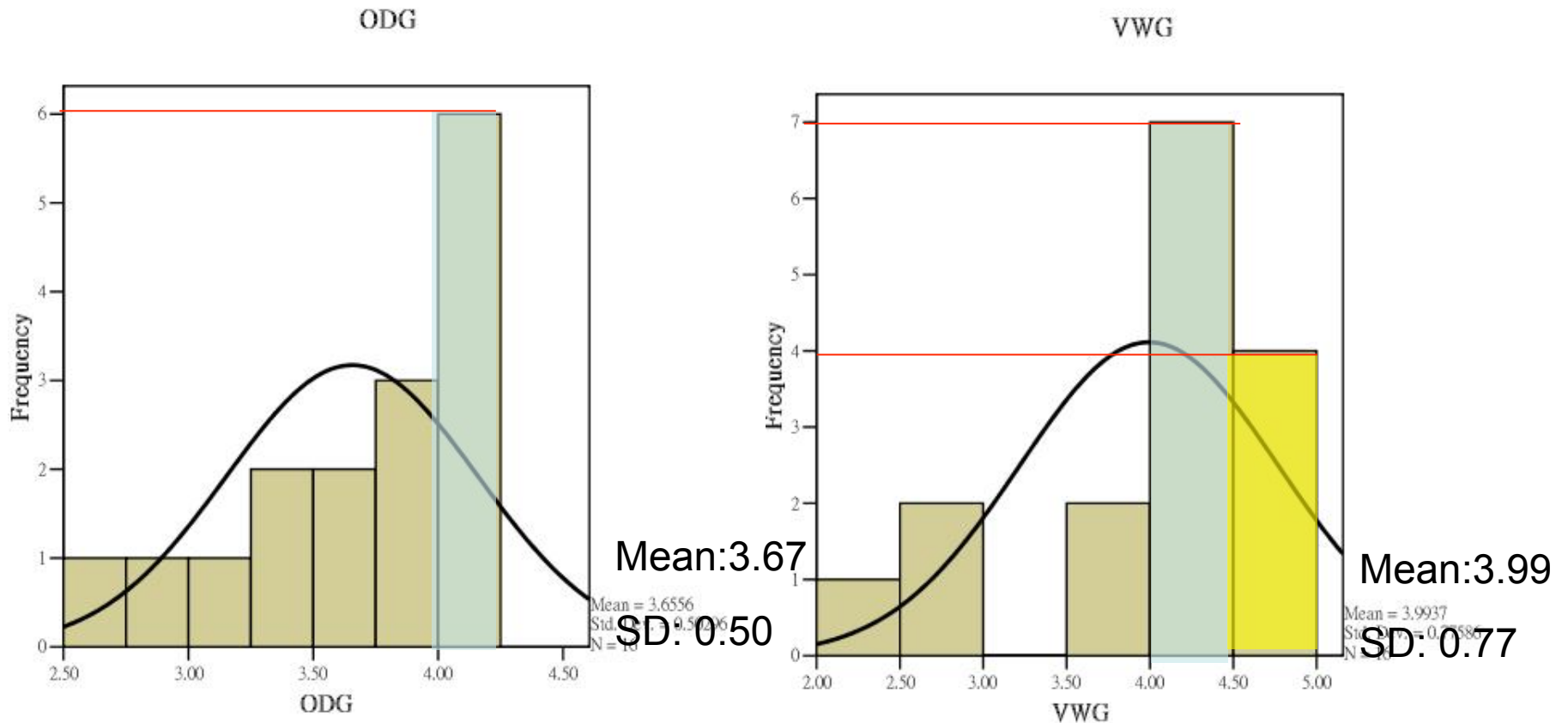
Results—Item Analysis

- Reliability increases
 - 19 parallel items → 16 parallel items
 - .65 → .76
 - ODG: 16 parallel items + 7 unique items
 - .79 → .84
 - VWG: 16 parallel items + 7 unique items
 - .64 → .71

Results—16 Parallel Items

- 8 orientations
 - Spent time
 - Interestingness
 - Helpfulness
 - Stimulation
 - Accomplishment
 - Difficulty
 - Use of SCMC and videos for future learning
 - Teacher authority

Results—Distribution of the Mean Scores of the 16 Parallel Items



1=strongly disagree; 5=strongly agree

Results—Adjusted Parallel Items

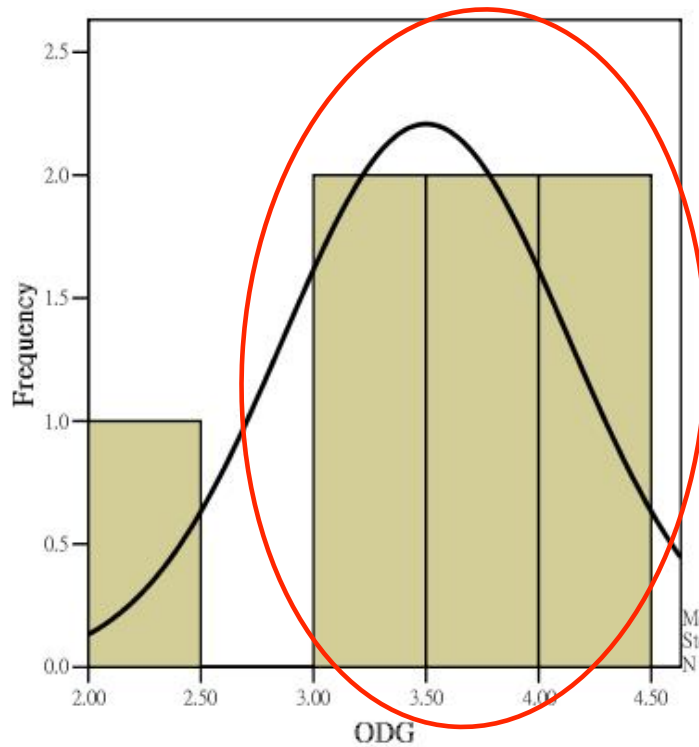
- An independent *t*-test
 - 19 parallel items: .080
 - 16 parallel items: .021 → significant different
- Eta squared: .39
 - The different mode of technology can account for 39% of the variance
 - Large effect size

Results: 5 Parallel Items

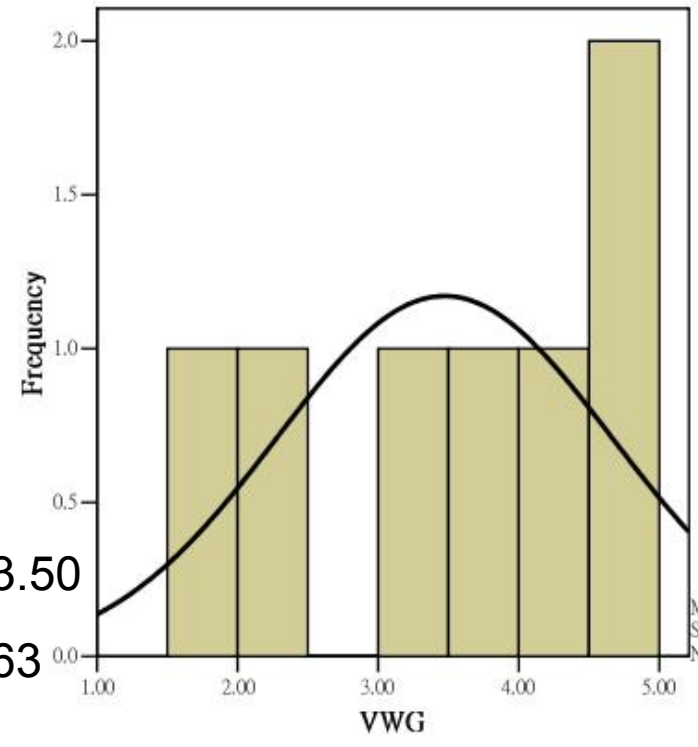
- 5 parallel items

| Item ↵ | Statement↵ | Mean score↵ |
|----------------------------|--|-------------|
| Interestingness ↵ | | |
| ODG I6↵ | The questions for online discussion were interesting.↵ | 3.4↵ |
| VWG I9↵ | The video was interesting.↵ | 4.4↵ |
| Helpfulness ↵ | | |
| ODG I7↵ | Using online discussion helped me understand the article.↵ | 3.6↵ |
| VWG I10↵ | Watching the video helped me understand the article.↵ | 4.6↵ |
| ODG I8↵ | Using online discussion helped me gain knowledge.↵ | 3.9↵ |
| VWG I11↵ | Watching the video helped me gain knowledge.↵ | 4.7↵ |
| Teacher authority ↵ | | |
| ODG I24↵ | I hope my instructors can give me some information about the topic of the article before I read it.↵ | 4.1↵ |
| VWG I24↵ | I hope my instructors can give me some information about the topic of the article before I read it.↵ | 4.8↵ |
| ODG I25↵ | I will discuss online for learning only when the teacher requests me to do it.↵ | 3.1↵ |
| VWG I25↵ | I will watch a video for learning only when the teacher requests me to do it.↵ | 2.4↵ |

Results—Distribution of the Mean Scores of the 7 modality-specific Items



Mean: 3.50
Std. Dev.: 0.63246
N: 7



Mean: 3.47
Std. Dev.: 1.12064
N: 7

1=strongly disagree; 5=strongly agree

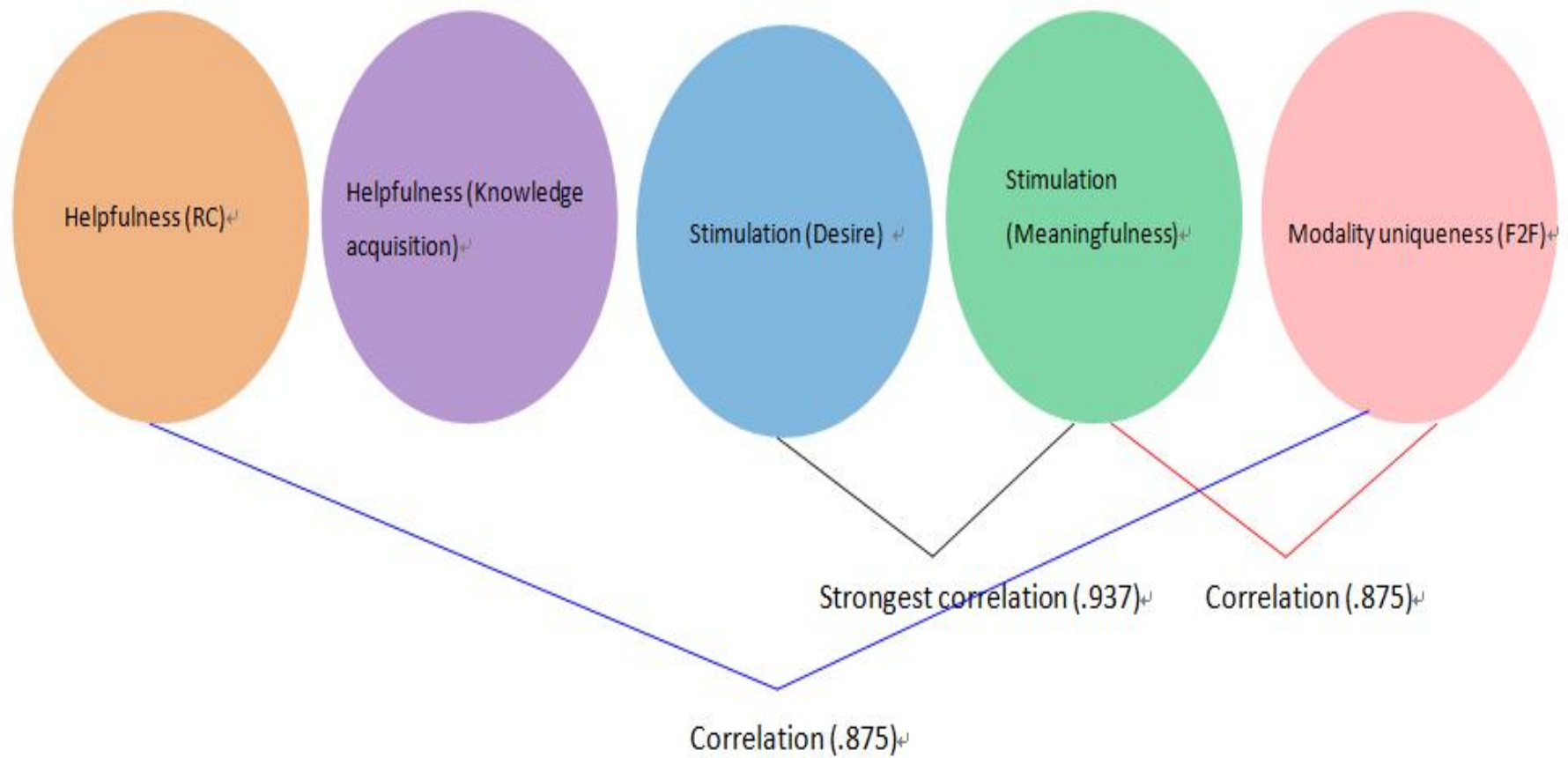
Results: 7 Modality-specific Items

| Item↵ | Statement↵ | Mean score↵ |
|--------|---|-------------|
| ODG1↵ | I liked the online discussion because what was discussed ↵ was written down. ↵ | 3.60↵ |
| ODG2↵ | I felt the way of communication in online discussion was ↵ <u>similar to face-to-face discussion.</u> ↵ | 3.30 ↵ |
| ODG10↵ | The questions for online discussion helped me discuss. ↵ | 4.00↵ |
| ODG13↵ | I liked the way of searching online for learning. ↵ | 4.30↵ |
| ODG15↵ | The questions for online discussion were difficult for me to ↵ discuss. ↵ | 2.30↵ |
| ODG19↵ | When searching online, I was overwhelmed by too much ↵ information. ↵ | 3.40↵ |
| ODG23↵ | I hope my instructors can join the online discussion with me ↵ and my partners.↵ | 3.60↵ |
| VWG1↵ | I liked watching the video because it had both visual and ↵ auditory input.↵ | 4.60↵ |
| VWG2↵ | I tended to focus on the visual input rather than the auditory ↵ input. ↵ | 3.60↵ |
| VWG3↵ | I tended to focus on the auditory input rather than the visual ↵ input. ↵ | 3.20 ↵ |
| VWG4↵ | <u>The dynamic images in the video (i.e. animations and video)</u> ↵ <u>facilitated me to understand the topic.</u> ↵ | 4.60↵ |
| VWG5↵ | The still images in the video (i.e. illustrations, pictures, ↵ charts, maps, and photos) facilitated me to understand the ↵ topic.↵ | 4.40↵ |
| VWG19↵ | <u>When watching the video, the speaker's narration distracted</u> ↵ <u>me from understanding the information delivered.</u> ↵ | 2.40↵ |
| VWG20↵ | Watching the video did not help me understand the article. ↵ | 1.50↵ |

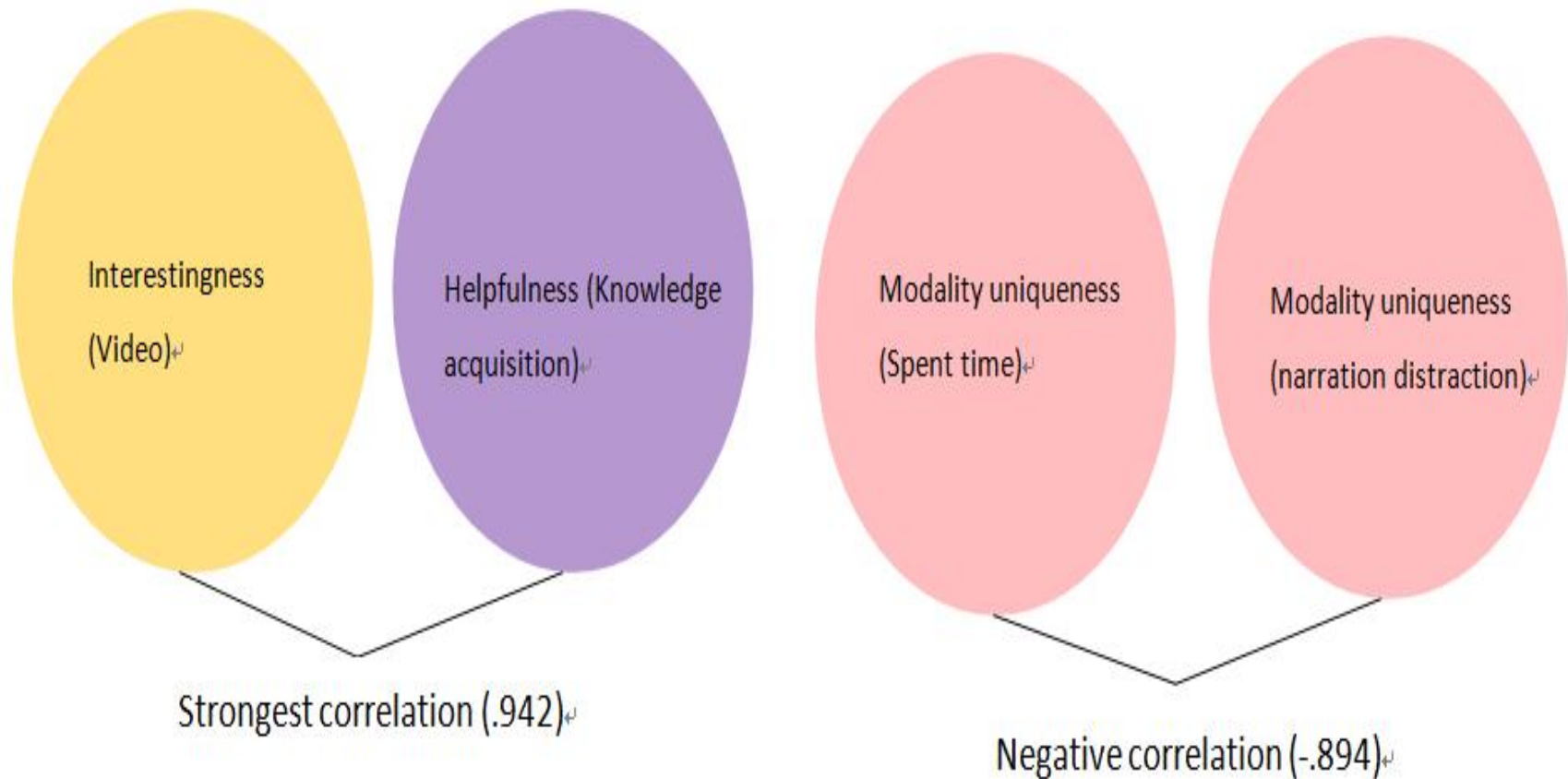
Results: Inter-item Correlation

- Look into the correlation coefficients over .80
 - More than half of the variance accounted for by both items

Results: Inter-item Correlation (ODG)



Results: Inter-item Correlation (VWG)



Results—Comments on the online discussion

- What do you like about the online discussion/video watching? Why?
- ODG
 - Multitasking
 - Discuss+search online
 - Collaborative learning: discuss with others help understand the topic
- VWG
 - Diverse modalities
 - Help understand the topic in depth
 - Help listening and speaking skills
 - Make learning interesting

Results (Cont'd)

- What do you dislike about the online discussion/video watching? Why?
- ODG
 - Physically absent interaction
 - Time consuming interaction → audio/video discussion
 - Scaffolding and organization needed
- VWG
 - Video
 - The narration is too fast
 - Students' ability
 - Listening ability is not good enough.

Results (Cont'd)

- How did you find out the answers of the questions when discussing online/watching videos?
- ODG
 - Search online to read other articles to generate one's own thoughts
- VWG
 - Online resources
 - Use online dictionaries
 - Read other articles
 - Repeated watching
 - Note taking

Results (Cont'd)

- What else could be done to help you discuss more smoothly online/ understand the video smoothly?
- ODG
 - The organization of the online discussion:
 - More specific discussion questions
 - More personal response
 - Subtasks: understand the topic→share views→conclude the discussion
 - Available resources:
Encyclopedia and dictionaries
- VWG
 - Multimodalities:
 - Captions
 - Online search:
Definitions of the vocabulary

Results (Cont'd)

- What else could be done to help you understand the article?
- ODG
 - Scaffolding and organization
 - Guide students to use appropriate resources to answer each question
 - An introduction to the article
 - Dictionaries
 - Bilingual dictionaries (translation)
 - Definitions of technical vocabulary
- VWG
 - Definitions of the technical vocabulary
 - Pictures and diagrams
 - Comprehension questions

Conclusion and Implications

- The interestingness and helpfulness may affect the participants' spontaneity to watch a video for academic learning.
 - The practicability of using videos for self-learning in academic settings.
- The lack of discussion in video watching may cause the participants to ask for more teacher intervention before watching.

Conclusions and Implications

Read hypertexts and decide what questions to discuss ↵

Express personal understanding of what is read ↵

Evaluate the information and draw a conclusion ↵

- Online discussion needs more explicit guidance than watching a video.
- Question types:
 - Comprehension
 - Analysis
 - Application
 - Synthesis
 - Evaluation

(Bloom, 1956)³⁴

Conclusions and Implications

- It is useful to provide a specialized corpus for looking up technical words and teaching vocabulary.
 - Disciplines and genres
 - Vocabulary instruction (Nation, 2001)
 - The word form appears rarely if at all outside the particular field
 - The word form is used both inside and outside the particular field but not with the same meaning
 - The word form is used both inside and outside the particular field, but the majority of its uses with a particular meaning are in the field
 - The word form is more common in this field than elsewhere

Future Research

- How the pre-reading questions help students discuss online by analyzing the trajectory of their online behaviors and their online conversation?
- Except for critiques, what else can be used to measure students' RC?

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Best Thanks to

- Dr. James Dean Brown
- Dr. Richard R. Day
- Dr. Thom Hudson
- Dr. Donping Zheng
- Mr. Kenny Harsch (ELI director)

Suggestions and comments?

Thank you ^^