Group Project – Index (200 Points for Group Work, 50 Points for Individual Work)

Objectives: This assignment will help you learn to:

- Develop robust definitions of theoretical constructs
- Identify variables and items that researchers have used to represent theoretical constructs
- Apply the concepts of reliability, validity and discriminatory power to your decisions about how to create items to represent abstract concepts
- Employ various techniques to evaluate the reliability, validity and discriminatory power of the potential items you select and/or develop

Overview

- You will work in teams of four people. I assign the teams.
- Your task is to create **indices** that generate scores for **a multi-dimensional** construct – **one index per dimension of the construct, minimum of two indices** (e.g., two dimensions of the construct).
- I will assign a theory and the construct that you must operationalize and provide *all* of the materials about the theory you should need to complete this assignment. Do **not search for more materials about the theory and constructs.**
- The theoretical population for your study is **graduate students at major R1 (research) universities in the United States.**
- Complete the **7 steps described in the document Steps in Instrument Development**
- You will **NOT** collect any data, which is why we do not need IRB approval for this project. It is considered a learning activity, not research. Do **not** put any identifiers on any of the completed indices.

Table 1: Due Dates for Submissions on Group Project CONSULT THIS DOCUMENT FIRST

You will have some time in class to work on this project on three occasions. Submit your individual work on the assignment through Canvas. There is a discussion board for each group. I will not comment on these submissions. They are there to help your group stay on time and move forward efficiently. There are two occasions when each individual team member must make a submission (Wednesday, January 27 and Monday, February 01) – each submission potential 25 points.

Constructs

You cannot create an index that produces valid, reliable responses and scores if you do not have a clear definition of the abstract ideas that you want to capture. I will provide a list of reference materials where you can learn enough about the constructs to complete the assignment. **There is NO need to look up more literature about the theory or about the construct assigned to your group.**

Each team member will submit a list of potential definitions of the constructs and dimensions of each construct. Make a table like the one below for this submission. Your team will create a shared (common) set of definitions and submit them on Canvas. **Only ONE member of your group will submit a single document per the instructions that follow.** The document includes four components.

(1) The first is a table that shows the **definitions that you found in the literature**. The table includes a name for the construct, a name for each dimension in the construct, a statement of each definition you found, and the authors who provided each definition. Note that all constructs I have assigned are multi-dimensional. For example, academic procrastination as defined by the authors cited in the table below could be considered to have two dimensions: (1) the purposive or willing postponement of starting or completing tasks resulting in (2) psychological or emotional discomfort or anxiety. It is easier to create

research instruments when you can identify specific dimensions of a construct. It helps you understand what you need to ask people. For example, if I treat academic procrastination as a two-dimensional construct, I will know that I have to verify that people "voluntarily or purposefully, with thought" put off tasks *and* that they do so to the point of experiencing some sort of emotional pain. In this assignment, you will create an ***index for each dimension and then combine the individual index scores to get a variable score for the construct as a whole.*** Pay careful attention at this early step in creating your instrument that you do not use definitions of constructs that are so broad that they are impossible to operationalize. Use of several dimensions that are narrowly defined reduces effort throughout the instrument development process. The table should be like the one below.

Construct	Dimension	Definition	Author
Academic engagement	Effort	Student's belief that s/he works hard to complete academic tasks	Wu & Fan
	Persistence	Student's beliefs that they did complete academic tasks even when they were distracted or faced obstacles	Wolters in Wu & Fan
Academic Procrastination		Purposive delay in beginning or in completing an activity or act, usually accompanied by a feeling of discomfort	Ferrari
		Voluntarily delaying in completing a task even though one expects to be worse off for delaying	Steele
		Consistently putting off academic tasks the student intends to accomplish, to the point of experiencing emotional discomfort	Day, Mensink & O'Sullivan
		Tendency to delay completing academic tasks or miss deadlines for submission	Wu & Fan

(2) Make a table showing the **definition the group has decided to use** for each construct and dimension. This is **your definition, which may closely resemble one or more definitions you found in the literature or may include components of more than one definition you found in the literature.**

(3) **Make a list of *variables that you can use to represent each construct/dimension.*** Include both variables that others have used to capture the meaning of the construct and its respective dimensions and variables that your group thinks are needed. Be careful about how people use the terms variable and item and whether they distinguish between variables and items – many do not. Use the reports I provide. There is no need to review more literature. Identify which variables come from the literature and which are your own creations. Indicate which of the variables you plan to use in the assignment. You can do this as a list or in a table. Make sure you take *context* into account. Some variables (and items) that are widely used may not be appropriate for your target population – graduate students in a major R1 university. I will not grade the assignment based on whether I think your variables are "really great" or not, but rather on your ability to apply to distinguish between a construct (academic procrastination) and variables (delay in starting tasks, failure to set personal deadlines, delayed submission). Remember that constructs are the building blocks of theory while variables are specific to your study.

(4) End with a list of the full references for all materials used in completing this part of the assignment.

Initial Item Banks – Individual Work

- **Each of you will create a list of 15 potential items for each variable identified in the list of variables your team submitted.** I do **NOT** want you to spend time reviewing literature. Rely on the list of references I gave you for this assignment. If you do not find things that look useful, say that.

- **75% of all items must be ones that you create, not items "borrowed" from other instruments.** Put an (A) by items that you adapted or adopted from the literature. Most authors do not publish their items. Even if you do find some, authors can be very "sloppy". They may treat items as "variables," fail to do any testing, etc.

- **All of your items must use a scalar response format.** I do this mostly to make the entire assignment simpler. Testing becomes more difficult when you use multiple response modes for items.

- **Most, if not all, of your items should be questions, not statements.** For example, you might ask people: How often do you stay up far into the night to complete your class work? The response categories would be never, rarely, sometimes, often and always. You could also ask them: How important is it to you to complete all tasks on time? The response categories could be not important, of little importance, somewhat important, and very important. ***Do not use the Likert-type response format – a statement followed by some sort of scalar response format (often from strongly disagree to strongly agree) -- ask questions.***

- **Appropriately cite and reference any items taken from other authors.**

- **Use these resources to write good items:**

  Fowler, Floyd J. Jr. (2009) *Survey Research Methods*, 4th Edition. pp. 87-111, "Designing Questions to Be Good Measures." Sage Publications, Thousand Oaks, CA. ***e-reserve.***

  Fowler, F.J., Jr. (1995) *Improving survey questions. Design and evaluation.* Sage, Thousand Oaks, pp. 156-165 (Appendix A). ***e-reserve***. This is a list of "good" and "bad" formulations of items. Use the response categories he indicates – do not invent your own.

Combining Individual Item Banks into One Item Bank
Based on Group Consensus

- **Review the lists each of you submitted individually and combine them to create an item bank for each variable.** Copy and paste the definitions of constructs and dimensions at the top of the list (copy and paste from what you submitted individually). You will test the items in class. The people conducting the test for you must be able to see the definitions you are using and your items together. **Do not focus on eliminating items at this point -- r*edundancy is useful at this stage.*** If you have multiple versions of an item representing a given variable, you can test them and keep the best one.

- **Provide at least 20 items for each variable**. You will eliminate many of the items on this list in the testing process. Five or six items are usually considered the minimum number to general a reliable, valid index score for a variable. That is the number you should have after all testing is completed.

- **Include the instructions for responding to each variable.** This will be a self-administered (probably internet) study. Clear instructions about how to respond are therefore critical.

TESTING PROCEDURES

In "real life instrument development," you would revise your instrument after each procedure and possibly after each individual test. For example, I normally run one cognitive test, fix the major issues that emerge from that first test, and then test again with someone else and revise again. We will not do

that in this class. **Make revisions only once, after you complete the expert review and cognitive test.**

You will conduct the reviews individually. You need four people: (1) Conducts expert review. (2) Serves as expert reviewer for another team. (3) Conduct cognitive test. (4) Serves as cognitive tester for another team. See the document "Steps in Instrument Development" to understand the difference between expert review and cognitive testing. Use the materials in the document **Test Procedures for This Course** to complete the expert review.

Expert Review

- **This is a technical review only.** Normally, you would have more than one expert reviewer and you would probably have a mix of people expert in methods versus expert in the topic. Therefore, we are using one expert reviewer and the expertise is methodological, not content. This methodological review looks at issues like your scoring system, the way you have structured the instrument, and things like "double barreled" questions and questions that people cannot answer. Rely heavily on the Fowler readings for this review. The individual will base the review on the document you submitted to Canvas.

- **You want input about the degree to which the expert thinks your measurement will produce reliable, valid data with discriminatory power.** Create a written procedure you will use for the expert review. You will submit this procedure with the assignment, but do not post it to Canvas.

- **Take extensive notes during this procedure – you will need them for the reflection that is the core of this assignment.**

- **Limit the procedure to 30 minutes.**

Cognitive Test

Use the materials in the document **Test Procedures for This Course** to complete the cognitive test and the extensive other materials referenced at the course website.

- **Ask a different class member to conduct this test – not the same person who completed the expert review.**

- **Create a written procedure you will use for the cognitive test.** You will submit this procedure with the assignment, but do not post it to Canvas discussion board.

- **Do NOT ask your colleague to answer the questions.** Your objective is to ensure that your instructions and the items in the index convey what you want to the people who will complete your instrument.

- **You want to understand how people interpret the questions (what they think you are asking) and how they process information to arrive at an answer (how they create a response).** You are looking for systemic problems in your instrument.

- **Do NOT go through the instrument item-by-item.** In most cases, cognitive testing reveals problems that are tied to a specific concept (e.g., rarely every question).

- **Complete this procedure in 30 minutes**.

- **Take extensive notes. You will need them for the final assignment submission.**

We will **not** complete the procedures below. I usually work with each group individually to get this done, and that is problematic given the busy schedules we all have this semester due to the shortened semester. I honestly feel there just is not time for you to complete these final steps. We will discuss this in class. I will use an existing data set that I have to run some of these tests and show you how they work. Please do read about these in my cheat sheet on testing procedures and read what is below so that you know what this would entail.

Pilot Testing

The third procedure you will use is a test of the revised index with a broader set of testers – **in this case your colleagues in this class and any other graduate students who are interested and willing to test for you.** Some instruments require a large number of testers and some techniques for analyzing responses require a fairly large number of testers. For example, you would probably need 40 or 50 testers for a good test using item-total correlation. However, your time in this course is limited. My concern is that you know what procedures to use and how to use them. We are therefore going to use far too few testers. That is OK for this assignment – it will save you time and effort. Just be aware that in your own work, you would probably need at least 20 testers, more in many cases.

- **Revise the instrument in response to the expert review and cognitive test.**

- **Distribute the revised instrument (with instructions) to your colleagues.** I strongly encourage you to use on Qualtrics (best choice) or send an Excel spreadsheet to each respondent (in our class and other people who agree to test the instrument). However, you can provide paper copies for your colleagues, although this means you will have to enter the data manually later. If you want to use Qualtrics (my suggestion), here is the link that explains UF's policy for using Qualtrics https://lss.at.ufl.edu/public/UF_Qualtrics_Use_Policy.pdf. Here is how you get access to Qualtrics. It is available free of charge to all graduate students, but restricted to official University use https://training.it.ufl.edu/services/centrally-supported-tools/supported-service-items/qualtrics.html. Setting up an account is easy and Qualtrics is relatively easy to use.

- **Remind people that we are not collecting data. They should not feel they need to answer questions "honestly."** When I do this, I often put myself in a "persona" and try to answer the questions as I think I would if I were that person. For example, I might imagine myself to be a student who experiences low stress and try to answer the questionnaire about stress and academic performance from that perspective.

- **Your instrument should require no more than 30 minutes maximum, preferably 15, to complete.** In real life, people get tired at about 12 minutes and start dropping out of the study. One reason for this extensive testing is to get an instrument that is *short* – 6 or 7 items perhaps – and still provides high content, reliable evidence, and distinguishes among respondents.

- **Everyone will need to complete all instruments – even the ones your group made** – in order for you to have enough responses to complete the tests described below even in a sloppy fashion. Send me an e-mail after you have responded to all of the instruments so that I can remind people who are delaying response. Delay is a threat to your colleagues and you.

INCLUDE THE REPORTS WITH YOUR FINAL SUBMISSION AS SEPARATE DOCUMENTS PER THE INSTRUCTIONS BELOW

- **Apply statistical tests of reliability and validity of items and report the results. You will run each test twice only.** You can use the techniques in the document Test Procedures for this Course, Cronbach's alpha, item-total correlation, and inter-item correlation. These are simple procedures, easy to interpret and available on SPSS and Jmp in the computer labs on campus. However, there are other tests, such as factor analysis, that are free to use. If you use something other than the procedures in my document, explain which tests you used and what the purpose of the test was.

- **Report the (1) results of the test for reliability, explain (2) how you interpreted the results and and (3) the changes, if any, to your instrument made after the first test and why you made the changes. Run the test ONCE more to see how the changes affect the entire suite of items.** Be specific and demonstrate that you understand the key concepts and that you know how to take steps to enhance reliability. Use, cite and reference the research methods literature in your responses.

- **Report the (1) results of the test for validity, explain (2) how you interpreted the results, and (3) the changes, if any, to your instrument made after the first test and why you made the changes. Run the test ONCE more to see how the changes affect the entire suite of items.** Be specific and demonstrate that you understand the key concepts and that you know how to take steps to enhance validity. Use, cite and reference the research methods literature in your responses.

- **Apply a statistical test of discriminatory power. Do NOT run this test twice** I suggest the Mann Whitney U test using the quartile comparison discussed in class. There are other options and you are free to use them. If you use other procedures, explain the procedure used and the purpose of the procedure.

- **Report the (1) results of the test for discriminatory power, explain (2) how you interpreted the results and (3) the changes, if any, to your instrument made after the first test and why you made the changes.** Be specific and demonstrate that you understand the key concepts and that you know how to take steps to enhance discriminatory power. Use, cite and reference the research methods literature in your responses.

FINAL SUBMISSION

Documents to Include, file names for documents, instructions for type of documents allowed with spacing, etc.

Reflection
- Template for Final Submission of Index (course home page at website under Instructions for Small Group Project -- Index).
- File Name: Group members by last name only in alphabetical order_01Reflection (Jones_Swisher_Zavala_01Reflection)
- Single spaced Word document using the template provided

Constructs
- Group definitions of constructs and dimensions (posted to discussion board by January 24)
- File Name: Group members by last name only in alphabetical order_02Definitions (Jones_Swisher_Zavala_02Definitions)
- Single spaced Word document

First Version of Index

- Version of the index you used for the expert review and cognitive test with instructions for completion (posted to discussion board on February 05)
- File Name: GroupMembers_03FirstIndex
- Word or PDF file, single spaced

Expert Panel Review

- Guide you used to conduct the expert panel review (not posted to discussion board)
- File Name: GroupMembers_04ExpertGuide
- Word or PDF file, single spaced

Cognitive Test

- Guide you used to conduct the cognitive test (not posted to discussion board)
- File Name: GroupMembers_05CognitiveGuide
- Word or PDF file, single spaced

Reflection

This is in some ways the most important part of this assignment. It is your opportunity to think about what you have learned and how you can apply what you learned to your own work. **Consult the Assessment Criteria on the next page before you try to complete the reflection.** These criteria focus on the depth of your understanding, your ability to apply key concepts, your use of the research methods literature, and the degree to which you have synthesized what we have learned during the semester. There are two components in the reflection. **Use the Word document template for your report (course home page under instructions for submission). You do not need to write long paragraphs. I prefer bullet point responses.**

Challenges

- **Describe the major challenges that your team faced in the development process.**

- **Focus on the challenges that could affect the reliability, validity and discriminatory power of the scores produced by your research instrument.** The goal of the process of operationalization is to ensure that the scores (results) that your research results are reliable, valid and discriminate among units of analysis. I am sure you faced challenges with regard to time management, group dynamics, logistics and other facets of professional performance. Those are not the challenges of interest here.

- **I anticipate that you might have faced as many as four or five major challenges. Limit this exercise to the 5 most important challenges (e.g., biggest threats to the results).** I would be surprised if there were more than 5 and very surprised if there were none.

- **This is a reflective, retrospective exercise. Trace the effects of the challenge through the instrument development process, step by step. Focus on how the challenge affected the different steps in the process of operationalization.** Challenges can emerge at any point in the operationalization process. Some may appear at Step A, but others may not become obvious until you run tests for reliability or validity. For example, the definitions of constructs and dimensions that each team member produced (Step A) may have been very divergent – had little in common – even though you all consulted research reports relevant to the constructs of interest for your study. Perhaps this made it difficult to reach group consensus about the definitions of constructs (Step B), resulting in diverse sets of items contributed by team members (Step C) that made it hard to reach consensus about items to include (Step D) and so forth. [If you encountered no major challenges in a given step insert "***No challenge identified***."]

- **Provide an explanation of *why the challenge developed.*** Cite the research methods literature to try to explain why this challenge emerged and ***why it is a threat to the results of a study*** throughout this process. Here is an example submission for this challenge. A, B, C, etc. refer to the steps in the development process.

- **Conclude with ways to reduce the threats produced through this challenge.**

- **Use, cite and reference the research methods literature in your responses. Provide a list of references cited at the end of *each* challenge identified.**

This is an EXAMPLE. Use the template Final Submission of Group Project. It is a Word document available at the course website under Instructions for Submissions on the home page and also linked in the course schedule at home page (week 8, final submission due date).

Challenge 1: Disparate Construct Definitions

How the challenge developed in the process of operationalization

A. Team members' individual definitions of the construct self-efficacy had little in common. There were two basic views of self-efficacy. Self-efficacy as a general individual personality trait as represented in the psychology literature (reference a, reference b). Self-efficacy as a trait that is task-specific (reference c)
B. The team developed a definition of self-efficacy with two dimensions (reference c, reference d)
C. The items that we developed reflected a mix of the two definitions of self-efficacy (reference c, reference d).
D. This made group consensus very difficult and we created two variables, one to represent each definition of the construct. This proved confusing at every succeeding step in the process.
E. The expert reviewer suggested that we create a more "coherent" definition of the construct and suggested that the two dimensions we had identified were in fact really two almost completely different definitions of the construct of self-efficacy as a whole.
F. The cognitive tester was confused about the definition throughout our discussion. We never succeeded in developing a single definition, but the two definitions we did use are not distinct enough for people to understand the difference, which was clearly reflect in the cognitive test.
G. We attempted to revise the indices to eliminate the two dimensions, but we could not find a good way to do that (reference a, b and e)
H. No challenged identified
I. The differences persisted and re-emerged in the test for the inter-item correlation, which was well below the recommended cutoff of 0.70 (reference f, g).
J. No challenge identified

Origin of the challenge. A final group discussion revealed major epistemological differences in our group that were reflected in how each of us interpreted the material in the theoretical literature – in turn affecting the definitions of constructs. We failed to recognize the epistemological basis of these differences and therefore the problem persisted throughout the process of operationalization.

Ways to prevent or reduce the potential threats of this threat to reliability, validity and discriminatory power. We failed to pay enough attention to how epistemology affects the way a researcher conceives of the process of operationalization in general (reference h, i, j, and k) and how differences in epistemology could affect how one perceives of abstract concepts like constructs (reference j, k, and l). Closer attention to Adcock and Collier's discussion of how to apply key concepts of rigor in research methods could have been very important. When we reviewed our notes from the discussion of how to

define the constructs, it became clear that what we thought were two different dimensions of a single construct were actually two different definitions of self-efficacy.

Lessons Learned

1. I want you to reflect as a group on what you learned about developing research instruments. Focus on procedures or ideas that you will apply in the future to your own work. State the **three most important lessons learned**.

2. What changed (or perhaps did not) about your understanding of the key concepts of (1) reliability, (2) face validity, (3) and measurement validity, (4) congruent validity, (5) discriminant validity, and (6) discriminatory power changed (or not) as a result of this exercise? I am especially interested in your perspectives on how these concepts overlap and are mutually dependent or perhaps contradict each other. I do not want a rote "concept by concept" list that largely repeats what is in my cheat sheets and other course materials readings. Approach this task by whether and/or how your basic ideas about what is involved in creating research instruments has evolved so far in this class. **Show a robust understanding of key concepts and refer to the research methods literature.**

Assessment Criteria

Individual Work. I will assess individual contributions based on your submission to the Canvas Discussion Board. I will base my assessment on your completing the required tasks on time and on the degree to which your contribution shows that you followed the required procedures and ***used, cited and referenced*** the appropriate research methods literature as well as the appropriate content literature in developing the definition of constructs and the items that you submit. ***25 possible points*** for each required submission.

Group Work. I will assess the group work based on the quality of your submissions on the Discussion Board and the final submission. **Your use of the research methods literature is a major assessment criterion for every component of this assignment. Use, cite and reference the literature.**

	Possible	Your Points
Provided complete, specific answers to all questions ***in your own words*** Responses were specific to your instruments, not simply generic statements about the development of research instruments in general	10	
Construct (Group Submission) Differences (if there are any) in theoretical definitions are stated unambiguously Definitions selected to use in this project reflect ability to assess the different perspectives in the literature in the context of the specific theoretical population (graduate students) Clearly states the theoretical definitions selected for use in study Distinguishes between construct, dimensions of constructs, and variables Could identify multiple variables to represent a construct or dimension of a construct if appropriate	20	
Item Bank (Group Submission) Applied basic tenets of item development (wording, not double barreled, etc.) in creating a bank of items for testing Differentiated items to reflect the specific definitions of constructs and dimensions under study, create groups of items that represent *different* abstract concepts Knew how to create appropriate summative scores	20	

Expert Panel & Cognitive Test Differentiated between the objectives of expert panel versus cognitive testing Developed appropriate techniques for each procedure	50	
Reflection – Challenges & Lessons Learned Answers show a sophisticated understanding of the relationships among the key concepts of research rigor that we have discussed in the course Could explain how a challenge to validity, reliability and explanatory power develops and evolves as a researcher moves forward with instrument Moved able to move beyond describing the work completed in this assignment to discuss key lessons learned that you can ***apply to your own research*** Demonstrated advanced understanding of the concepts of rigor and responsibility in research Answers are holistic and reflect mastery and synthesis of key concepts of research methodology	50	
Research Methods Literature Consulted, cited and referenced the research methods literature in developing responses. Used materials that are relevant to developing multi-item measures such as indices, scales, tests, and questionnaires – was not just a "shopping list" of general materials Used materials that build upon, extend, or contrast to the concepts that we have discussed in this class. Used **many** resources other than Bernard and my "cheat sheets" Explained how each reference was used specifically – e.g., what did you "get out of" the material that you applied to respond to the assignment	50	
Total	**200**	