

Advanced Survey Design: Expert Validation to Analysis

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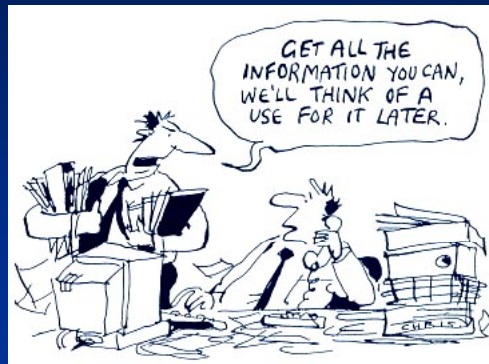


Basic Steps to Survey Design

- Develop a Construct
 - Literature Review
 - Interviews and Focus Groups
 - Synthesize and Develop Scales
 - Expert Validation
 - Cognitive Pre-Testing
 - Pilot Testing and Analysis
- } Our Focus



Survey Construct



Survey Construct

- Concept, Idea, Theory, etc...
- Often not directly measurable
- Abstract or latent concepts
 - Patient Satisfaction
 - Student Motivation
 - Factors Influencing Career Choice

Deconstructing the Construct

- Scales as units of the Construct
 - Groups of inter-related items/questions
 - Improves reliability and validity
 - Creates actionable items
- Patient Satisfaction as a Construct
 - Trust in Physician
 - Provider Communication
 - Clinic Access

Creation of a Scale

- What is previously known
 - Literature search and expertise
- What can be learned
 - Focus groups
- What do other experts believe
 - Expert validation
- Response of your intended audience
 - Cognitive pre-testing (qualitative feedback)

Expert Validation

- Clarity of the items
 - For both stem and response choices
- Relevance to the Construct
 - Do the items measure the Construct
- Difficulty of the item to endorse
 - Range and skew
- Representativeness
 - Fully represents the Construct
 - Multi-dimensional Constructs
 - Additional items within a Scale

Cognitive Pre-Testing

- Respondents on an ideal survey will...
 - Interpret all items similarly
 - Respond to all items accurately
- The real world example...
 - A poodle has 9 puppies and a collie has 5 puppies
 - How many more puppies does the poodle have... None??

Cognitive Pre-Testing

- May use a “think aloud” process
 - Stream of consciousness during the survey
- Anticipated and Unanticipated problems
 - Assumptions of questions or items
 - Misinterpretation of questions or items
 - May have otherwise been silent, or unnoticed
 - Cognitive issues
- Items should be understood as you intended
- Participants and the IRB

Pilot Testing

- Construct unity
- Reliability of Scales
- Inter-item correlations
- Inter-scale correlations
- Convergent and Discriminant Validity

You can't fix by analysis what you have bungled by design



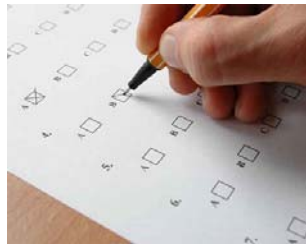
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Small Group Breakouts

- Expert Validation
- Cognitive Pre-testing
- Re-convene as a large group

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8 Tips for Analyzing Your Pilot Survey Data



Tip #1: Number your surveys

- This helps immensely...
 - If/when you drop them on floor
 - When you've found coding errors

Tip #2: Set up your data file

- Name your variables
 - Add labels if you'd like
- Create code(s) for missing values
 - e.g., 99 or 999 = not answered
- Add values for nominal/ordinal data
 - High school/GED = "1"
 - Some College = "2"
 - 4 year College Degree = "3"

Tip #3: Organize/screen your data

- Look for...
 - Data entry errors
 - Missing data
- Reverse-coded items
 - Your reliability won't look right if you don't
 - Your factor analysis will still work though

SE-2 I am confident I can successfully log in to an online course management system.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.5	.5	.5
	2	5	2.5	2.5	3.0
	3	15	7.4	7.5	10.5
	4	11	5.4	5.5	16.0
	5	20	9.9	10.0	26.0
	6	82	40.4	41.0	67.0
	7	65	32.0	32.5	99.5
	17	1	.5	.5	100.0
	Total	200	98.5	100.0	
Missing	99	1	.5		
	System	2	1.0		
	Total	3	1.5		
Total		203	100.0		

Tip #4: Get to know your descriptive statistics

- Explore individual item statistics
 - Means, SDs, ranges, histograms
- Questions to consider:
 - Are the variables skewed?
 - Is the entire response range used?

Tip #4: Get to know your descriptive statistics

- For all items selected

Statistics

	SE-1 I can perform well in a self-paced, online course.	SE-2 I am confident I can successfully log in to an online course management system.	SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	SE-4 I am confident I can learn without the presence of an instructor to assist me.	SE-5 I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)
N	203	200	202	203	203
Valid	203	200	202	203	203
Missing	0	3	1	0	0
Mean	5.84	5.76	5.37	5.73	2.91
Std. Deviation	1.164	1.341	1.306	1.231	1.545
Skewness	-1.372	-1.342	-1.003	-1.464	.735
Std. Error of Skewness	.171	.172	.171	.171	.171

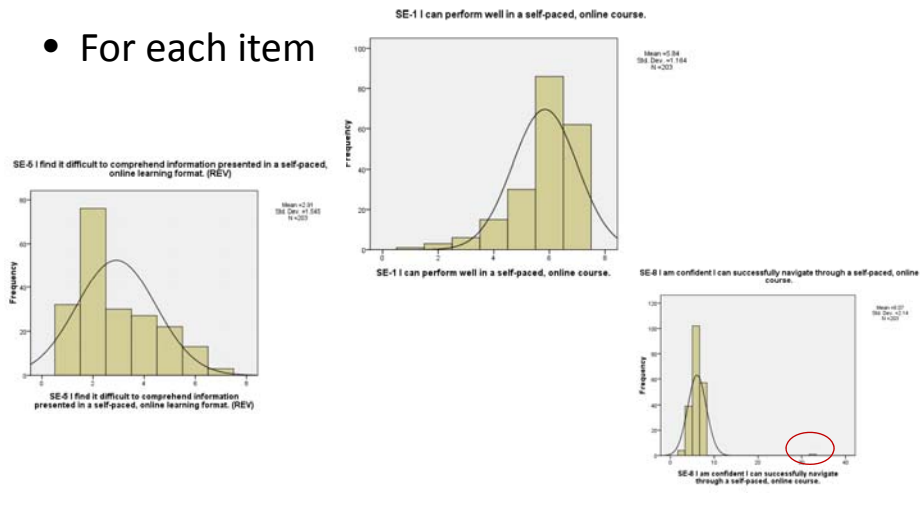
- For each item

SE-1 I can perform well in a self-paced, online course.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	1	.5	.5	.5
2	3	1.5	1.5	2.0
3	6	3.0	3.0	4.9
4	15	7.4	7.4	12.3
5	30	14.8	14.8	27.1
6	86	42.4	42.4	69.5
7	62	30.5	30.5	100.0
Total	203	100.0	100.0	

Tip #4: Get to know your descriptive statistics

- For each item



Tip #5: Conduct a reliability analysis

- Cronbach's alpha
 - A measure of the internal consistency or "degree of interrelatedness" among your items (Cortina, 1993, p. 100)
- More items often improve reliability
- Not a substitute for factor analysis

Tip #5: Conduct a reliability analysis

Inter-Item Correlation Matrix

	SE-1 I can perform well in a self-paced, online course.	SE-2 I am confident I can successfully log in to an online course management system.	SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	SE-4 I am confident I can learn without the presence of an instructor to assist me.	SE-5rev I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)	
Inter-item correlations range: .30-.70						.99
SE-1 I can perform well in a self-paced, online course.	1.000	.497	.591	.539	.432	.99
SE-2 I am confident I can successfully log in to an online course management system.	.497	1.000	.472	.353	.196	.99
SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	.591	.472	1.000	.595	.320	.99
SE-4 I am confident I can learn without the presence of an instructor to assist me.	.539	.353	.595	1.000	.418	.99
SE-5rev I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)	.432	.196	.320	.418	1.000	

Tip #5: Conduct a reliability analysis

- Item-total statistics

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SE-1 I can perform well in a self-paced, online course.	22.00	15.788	.696	.490	.710
SE-2 I am confident I can successfully log in to an online course management system.	22.09	16.634	.473	.298	.776
SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	22.46	15.371	.653	.486	.718
SE-4 I am confident I can learn without the presence of an instructor to assist me.	22.12	15.850	.632	.439	.726
SE-5rev I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)	22.73	16.015	.425	.237	.802

Tip #5: Conduct a reliability analysis

- Inter-item correlations

- Reverse coding
- Redundant items
- Wording effects
- Double-barreled items

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.417	.502	5

Inter-Item Correlation Matrix

	SE-1 I can perform well in a self-paced, online course.	SE-2 I am confident I can successfully log in to an online course management system.	SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	SE-4 I am confident I can learn without the presence of an instructor to assist me.	SE-5 I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)
SE-1 I can perform well in a self-paced, online course.	1.000	.497	.591	.539	-.432
SE-2 I am confident I can successfully log in to an online course management system.	.497	1.000	.472	.353	-.196
SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	.591	.472	1.000	.595	-.320
SE-4 I am confident I can learn without the presence of an instructor to assist me.	.539	.353	.595	1.000	-.418
SE-5 I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)	-.432	-.196	-.320	-.418	1.000

Tip #5: Conduct a reliability analysis

- Inter-item correlations

- Reverse coding
- Redundant items
- Wording effects
- Double-barreled items

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SE-1 I can perform well in a self-paced, online course.	19.77	8.421	.494	.490	.164
SE-2 I am confident I can successfully log in to an online course management system.	19.85	7.772	.476	.298	.141
SE-3 Even in the face of technical difficulties, I am certain I can learn the material presented in an online course.	20.23	7.431	.576	.486	.061
SE-4 I am confident I can learn without the presence of an instructor to assist me.	19.88	8.557	.420	.439	.209
SE-5 I find it difficult to comprehend information presented in a self-paced, online learning format. (REV)	22.73	16.015	-.425	.237	.802

Tip #5: Conduct a reliability analysis

- Redundant Items

Inter-Item Correlation Matrix

	TV-3 I will be able to use what I learned in this course in my job.	TV-6 In the long run, I will be able to use what I learned in this course.	TV-7 I really enjoyed completing this self-paced, online course.	TV-10 I was very interested in the content of this course.	TV-12 The material presented in this course is useful for me to know.	TV-14 This self-paced, online course included many interesting activities.	TV-15 It was important for me to learn the material in this course.	TV-17 I enjoyed learning the material presented in this online course.
TV-3 I will be able to use what I learned in this course in my job.	1.000	.755	.603	.647	.741	.511	.679	.632
TV-6 In the long run, I will be able to use what I learned in this course.	.755	1.000	.682	.689	.766	.564	.694	.718
TV-7 I really enjoyed completing this self-paced, online course.	.603	.682	1.000	.700	.607	.673	.563	.773
TV-10 I was very interested in the content of this course.	.647	.689	.700	1.000	.734	.586	.745	.803
TV-12 The material presented in this course is useful for me to know.	.741	.766	.607	.734	1.000	.520	.847	.692
TV-14 This self-paced, online course included many interesting activities.	.511	.564	.673	.586	.520	1.000	.508	.726
TV-15 It was important for me to learn the material in this course.	.679	.694	.563	.745	.847	.508	1.000	.701
TV-17 I enjoyed learning the material presented in this online course.	.632	.718	.773	.803	.692	.726	.701	1.000

Tip #5: Conduct a reliability analysis

- Double-barreled items

- Construct = *Elaboration*
- Cronbach = 0.546

Inter-Item Correlation Matrix

	Q2_A_30	Q2_A_36	Q2_A_37	Q2_A_40	Q2_A_41	Q2_A_50
Q2_A_30	1.000	.084	.439	-.271	.616	.297
Q2_A_36	.084	1.000	.741	-.255	.087	.727
Q2_A_37	.439	.741	1.000	-.217	.356	.683
Q2_A_40	-.271	-.255	-.217	1.000	.200	-.168
Q2_A_41	.616	.087	.356	.200	1.000	.445
Q2_A_50	.297	.727	.683	-.168	.445	1.000

- Item 40. When I study for this course, I write brief summaries of the main ideas from the readings and online discussions

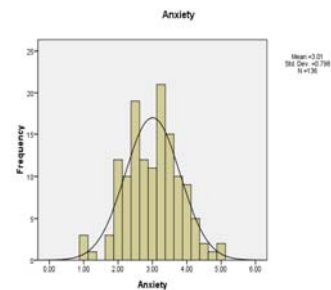
Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q2_A_30	25.68	15.180	.285	.623	.512
Q2_A_36	25.86	13.076	.379	.745	.461
Q2_A_37	25.36	12.814	.609	.704	.391
Q2_A_40	28.64	17.004	-.178	.373	.797
Q2_A_41	26.14	12.028	.558	.644	.380
Q2_A_50	26.50	10.643	.598	.686	.329

Tip #6: Create composite scores to begin assessing validity

- Create composite scores for each scale
- Means, SDs, ranges, histograms

	TaskValue	SelfEfficacy	Enjoyment	Anxiety	Boredom	Frustration
N Valid	109	109	136	136	136	136
Missing	27	27	0	0	0	0
Mean	4.4511	3.7706	3.7629	3.0055	2.6875	2.5368
Std. Deviation	.47899	.70063	.55887	.79784	.83628	.82169
Skewness	-.613	-.909	-.493	-.031	.658	.639
Std. Error of Skewness	.231	.231	.208	.208	.208	.208



Tip #6: Create composite scores to begin assessing validity

- Assess scale inter-correlations
 - Are scales positively/negatively related as conceptualized?
 - Are scales unrelated as conceptualized?
 - Do patterns match theory and/or published research?

Tip #6: Create composite scores to begin assessing validity

Correlations

		TaskValue	SelfEfficacy	Enjoyment	Anxiety	Boredom	Ave_Course Exams	NBME_Grade
TaskValue	Pearson Correlation	1.000	.389**	.506**	-.083	-.283**	.262**	.013
	Sig. (2-tailed)		.000	.000	.390	.003	.006	.893
	N	109.000	109	109	109	109	109	109
SelfEfficacy	Pearson Correlation	.389**	1.000	.265**	-.358**	-.229*	.174	.084
	Sig. (2-tailed)	.000		.005	.000	.017	.071	.385
	N	109	109.000	109	109	109	109	109
Enjoyment	Pearson Correlation	.506**	.265**	1.000	-.237**	-.300**	.164	.196*
	Sig. (2-tailed)	.000	.005		.005	.000	.057	.022
	N	109	109	136.000	136	136	136	136
Anxiety	Pearson Correlation	-.083	-.358**	-.237**	1.000	.026	-.248**	-.186*
	Sig. (2-tailed)	.390	.000	.005		.762	.004	.030
	N	109	109	136	136.000	136	136	136
Boredom	Pearson Correlation	-.283**	-.229*	-.300**	.026	1.000	-.255**	-.157
	Sig. (2-tailed)	.003	.017	.000	.762		.003	.068
	N	109	109	136	136	136.000	136	136
Ave_Course Exams	Pearson Correlation	.262**	.174	.164	-.248**	-.255**	1.000	.636**
	Sig. (2-tailed)	.006	.071	.057	.004	.003		.000
	N	109	109	136	136	136	136.000	136
NBME_Grade	Pearson Correlation	.013	.084	.196*	-.186*	-.157	.636**	1.000
	Sig. (2-tailed)	.893	.385	.022	.030	.068	.000	
	N	109	109	136	136	136	136	136.000

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Tip #7: Conduct an exploratory factor analysis

- Factor analysis is the best way to
 - Assess the dimensionality of your scales
 - A type of construct validity
- Do your items “load” onto hypothesized constructs?

Tip #7: Conduct an exploratory factor analysis

Scale Items	Factor 1	Factor 2	Factor 3
Task Value 1	0.775		
Task Value 2	0.695		
Task Value 3	0.764		
Self-Efficacy 1		0.709	
Self-Efficacy 2		0.862	
Self-Efficacy 3		0.876	
Boredom 1			0.765
Boredom 2			0.843
Boredom 3	-0.347		0.461

Boredom 3: I was uninterested in the course material

Tip #8: Miscellaneous suggestions

- Save (“paste”) your syntax for later analysis
- Always balance theory with empirical data!
 - You may need to sacrifice psychometrics to capture the theoretical construct of interest
 - By *not* doing so, you’re capitalizing on chance
 - Remember, your pilot data come from just one sample

Questions?

Survey Development References

Good General Textbooks & Articles:

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