

# Developing & Validating Survey Instruments

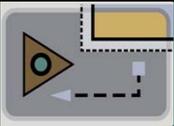
May 18, 2011

## Evaluat|e

EVALUATION RESOURCE CENTER *for* advanced technological education



This material is based upon work supported by the National Science Foundation under grant number. 0802245. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



## Introductions



Stephanie

<p>Stephanie Evergreen</p> 	<p>Arlen Gullickson</p> 	<p>Candiya Mann</p> 	<p>Wayne Welch</p> 
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**Evaluat|e @ WMIJ**  
EVALUATION RESOURCE CENTER *for* advanced technological education



**WASHINGTON STATE UNIVERSITY**



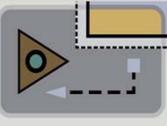
**UNIVERSITY OF MINNESOTA**  
*Driven to Discover*



**Mark Viquesney**



**MARICOPA COMMUNITY COLLEGES**



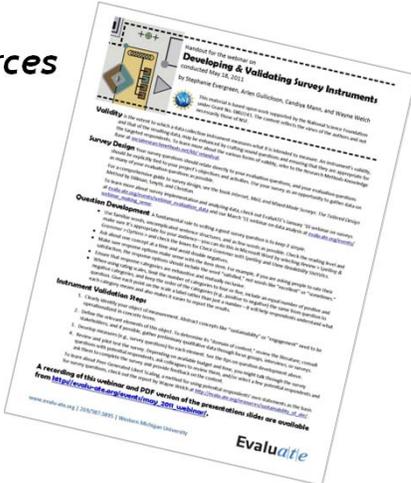
# Handout

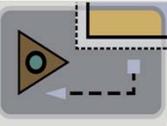


**Stephanie**

Available from  
[www.evalu-ate.org/resources](http://www.evalu-ate.org/resources)

Keyword search:  
*validating*



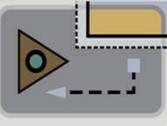


# Objectives



**Stephanie**

1. Take concrete steps to turn your evaluation question into survey questions
2. Strengthen weak survey questions
3. Establish a procedure for validating those survey questions



## Validity

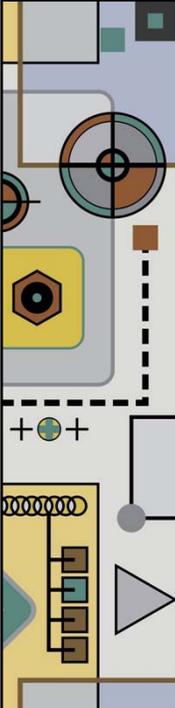


Stephanie

...is the degree to which a data collection instrument measures what it is **intended to measure**.

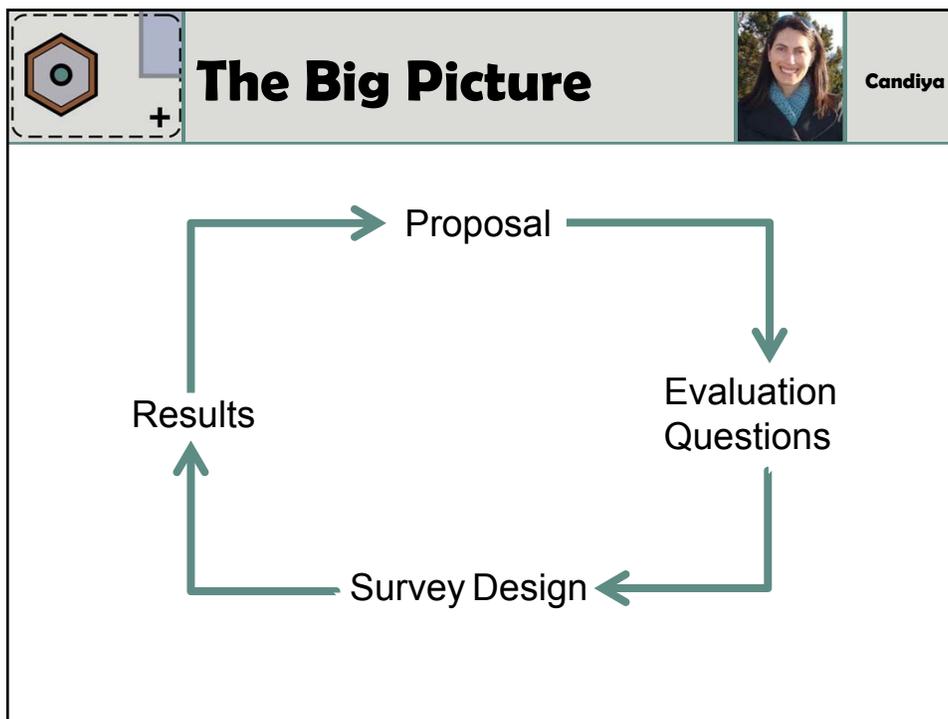
...is **context-dependent**, e.g., a questionnaire that yields valid results with college students may not work with adult learners.

...can be increased through **pilot testing** with the intended audience.



**Candiya**

## Designing Surveys



**Case Study**

Candiya

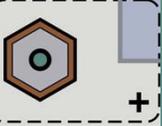
 **MATE**  
MARINE  
ADVANCED  
TECHNOLOGY  
EDUCATION  
CENTER

 **ROV**  
SOCIETY

Marine  
Advanced  
Technology  
Education Center  
ATE funded since 1997  
NSF ITEST grant 2009  
Remotely Operated  
Vehicles competitions



A photograph showing a group of students in a pool, celebrating with a trophy. One student is holding the trophy, while others are looking on. The photo is presented as a Polaroid print.



## ROV Competition

  
**Candiya**

Underwater missions,  
reports, presentations,  
& posters

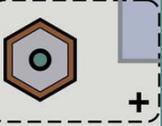
20 regional competitions  
lead to 1 international

3 competition classes

Participation: more than...

- 9,000 students,  
grades 5-16
- 1,200 faculty
- 1,000 working  
professionals



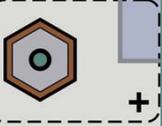


## Surveys

  
**Candiya**

At Start	Students & Faculty <ul style="list-style-type: none"><li>• Regional = "scannable" paper</li><li>• International = online</li><li>• Incentives</li></ul>
2010	Parents
2011	Judges & Volunteers
2012	Translations





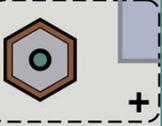
## MATE Proposal

  
**Candiya**

**Overarching Project Goal**  
Use the MATE ROV competition as an engaging platform to prepare middle and high school students for careers in the ocean STEM workforce

**Project Strategy 2**  
Support the development of the SCOUT (entry-level) ROV Class





## Evaluation Questions

  
**Candiya**

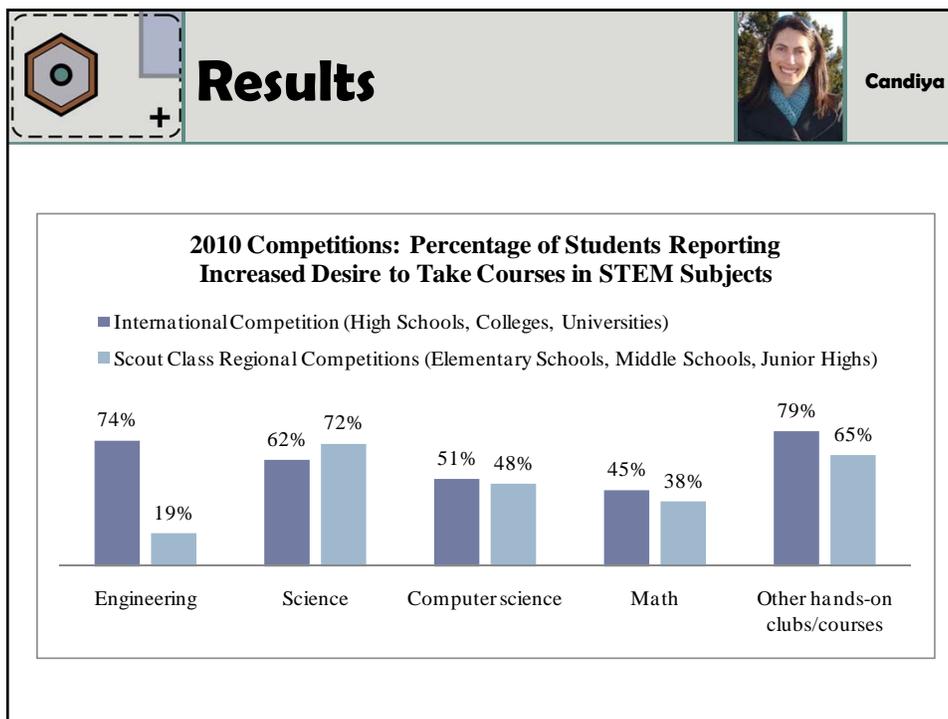
To what extent did participating in the ROV program lead to an increase in the students'...

- Awareness of STEM careers
- Intention to pursue a STEM career
- **Interest in studying STEM topics**
- STEM knowledge and skills
- SCANS skills



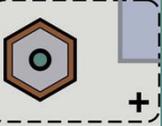
  <h2 style="display: inline;">Survey Design</h2>		 Candiya
Project Strategy	Evaluation Questions	Data Sources
2. Support the development of the SCOUT (entry-level) ROV Class	To what extent did participating in the ROV program lead to an increase in the students'...	
	Awareness of STEM careers	Student: Q4, 5 Faculty: None Parent: None
	Intention to pursue a STEM career	Student: Q7, 8, 9 Faculty: Q4a Parent: None
	Interest in studying STEM topics	Student: Q10, 11, 16 Faculty: Q4b Parent: Q2
	STEM knowledge and skills	Student: Q14, 15 Faculty: Q4c Parent: Q4a-e
	SCANS skills	Student: None Faculty: Q4d Parent: Q5

  <h2 style="display: inline;">Student Survey</h2>		 Candiya						
<p>Q11. Has your ROV project <u>increased</u> your desire to take any of these courses? (Mark ALL that apply.)</p> <table style="width: 100%; border: none;"> <tr> <td><input type="radio"/> Math</td> <td><input type="radio"/> Science (i.e., physics, chemistry, biology, earth science, etc.)</td> </tr> <tr> <td><input type="radio"/> Computer science</td> <td><input type="radio"/> Hands-on classes or club activities like robotics, electronics, shop courses</td> </tr> <tr> <td><input type="radio"/> Engineering</td> <td><input type="radio"/> None</td> </tr> </table>			<input type="radio"/> Math	<input type="radio"/> Science (i.e., physics, chemistry, biology, earth science, etc.)	<input type="radio"/> Computer science	<input type="radio"/> Hands-on classes or club activities like robotics, electronics, shop courses	<input type="radio"/> Engineering	<input type="radio"/> None
<input type="radio"/> Math	<input type="radio"/> Science (i.e., physics, chemistry, biology, earth science, etc.)							
<input type="radio"/> Computer science	<input type="radio"/> Hands-on classes or club activities like robotics, electronics, shop courses							
<input type="radio"/> Engineering	<input type="radio"/> None							



**Candiya**

**Question Development**



## First Determine...

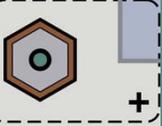
  
**Candiya**

What is the survey mode? (mail, web, phone, multi-mode)

Is the question repeated from another survey/compared to another data source?

Will respondents answer accurately?

- Be aware of sensitive questions like financial, embarrassing topics



## Open-Ended Items

  
**Candiya**

Strengths	Weaknesses
<ul style="list-style-type: none"><li>• Range of responses</li><li>• Rich responses</li><li>• Quotations</li></ul>	<ul style="list-style-type: none"><li>• Percentages difficult</li><li>• Time-consuming</li><li>• Burdensome</li></ul>

Q9. What career would you like to have when you finish school? *(Please print.)*



## Closed-Ended Items



Candiya

### Strengths

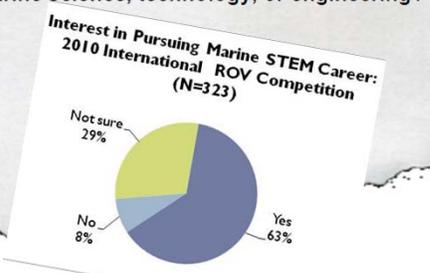
- Percentages
- Fast data entry
- Quick for respondents

### Weaknesses

- Influence and/or limit responses

**Q7. Are you interested in having a career in marine science, technology, or engineering?**

Yes  
 No  
 Not sure



Interest in Pursuing Marine STEM Career:  
2010 International ROV Competition  
(N=323)

Response	Percentage
Yes	63%
Not sure	29%
No	8%



## Partially Closed Items



Candiya

**Q12. Have you or your school received an award or honor as a result of your ROV project?**

Yes -- Please describe:   
 No

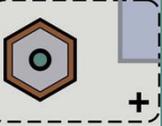
62% (N=330) received an award or honor as a result of their involvement in the ROV competition. Examples:

- Our mayor made March 31st Immanuel Lutheran ROV Day in Alpena
- Our team and ROV were on the front of last year's course catalogue
- Innovation and Rural Development award in Newfoundland

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10

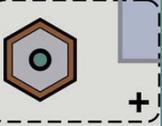
 **Keep It Simple**  **Candiya**

Use simple, familiar words

Use simple sentence structures

Use as few words as possible



 **Simplified Wording**  **Candiya**

**Before**  
13

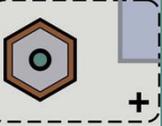
How did your level of interest in a marine-related career change as a result of your ROV project(s) and experience with competition(s)?

- More interest
- Same interest
- Less interest

**After**  
6

Has your ROV project made you more interested in a marine career? Less interested? No difference?

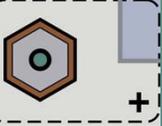
- More interested
- Less interested
- No difference

 **Specify Concepts**  Candiya

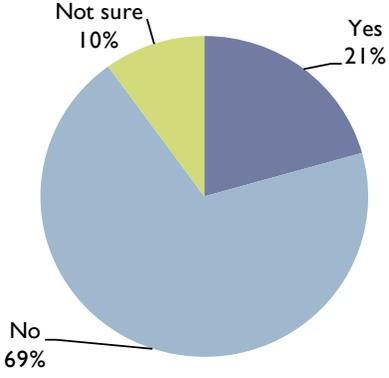
Tip: Survey questions don't have to be a single sentence. Sometimes a "staging" sentence can help ensure clarity.

Q19. At high school graduation, you probably had plans for the next year (college, job, military or something else). Since graduation, has your life followed your original plan, or did you make changes?

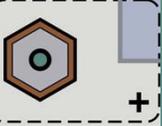
- Yes, I am following my original plan
- No, I made changes to my original plan
- Not sure

 **Specify Concepts**  Candiya

**"Were you required to take any courses for which you did not receive credit?"**

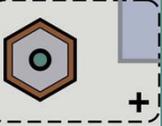


Response	Percentage
No	69%
Yes	21%
Not sure	10%

 **One at a Time**  **Candiya**

Are the cafeteria lunches hot and tasty?

- a) Yes
- b) No

 **Double Negatives**  **Candiya**

Tip: Make sure that "yes" means "yes" and "no" means "no"

Should the city manager not be directly responsible to the mayor?

- a) Yes
- b) No



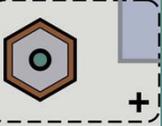
## Match the Question

Candiya

Rate your personal competency in...

4. *Development of new teaching units* that address the economic, political, and cultural history of Africa, and incorporating that information into language training and area studies.

5	4	3	2	1	0
Clearly Evident	Usually Evident	Partially Evident	Rarely Evident	Never Evident	No Basis to Judge



## Response Categories

Candiya

Exhaustive (include all reasonable answers)  
&  
Mutually exclusive (avoid overlapping response categories)

How long have you lived in Washington State?

- a) 0-1 years
- b) 1-2 years
- c) 3-4 years



## Tips on Scales



Candiya

Choose appropriate length (4-5 categories)

Provide balance (equal positive and negative categories)

Don't switch order (positive/negative) from question to question





## Your Turn



Candiya

11. On a scale of 1 to 10, please rate your satisfaction with the services you receive.

		1	2	3	4	5	6	7	8	9	10	Don't know
a. How promptly does the individual provider help you?	Very poor	<input type="checkbox"/>	Excellent	<input type="checkbox"/>								
b. How well does the individual provider communicate with you?	Very poor	<input type="checkbox"/>	Excellent	<input type="checkbox"/>								
c. Does the individual provider leave before she or he is supposed to?	No, never	<input type="checkbox"/>	Yes, always	<input type="checkbox"/>								

A. Too many categories

B. Switches response order

C. Options don't match question stem

D. All of the above



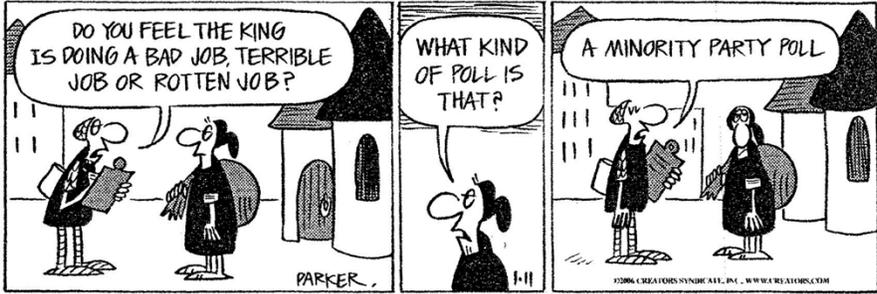
# Unbalanced Scale



Candiya

**WIZARD OF ID** | *Brant Parker and Johnny Hart*

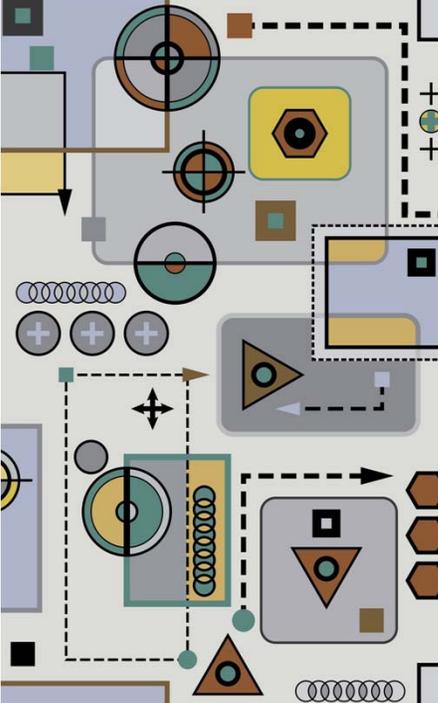


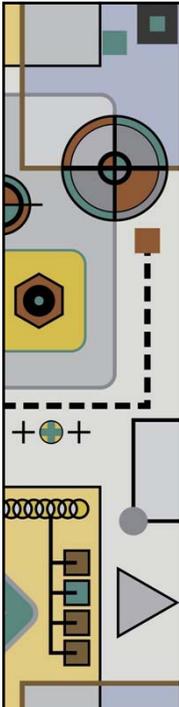
This "how to" guide provided by Parker and Hart at <http://www.creators.com/comics/wizard-of-id.html>



Wayne

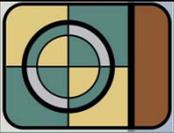
Comments





**Arlen**

# Validating Questions



## Steps

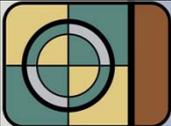


**Arlen**

1. Identify what is to be measured
2. Define the elements
3. Develop measures of the elements
4. Review and pilot test the survey
5. Select an appropriate population
6. Distribute the survey & conduct follow-up
7. Process and check data for accuracy
8. Analyze the data

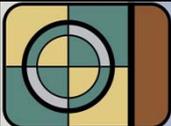
	<b>1. Identify</b> what is to be measured		Arlen
		<b>sustainability</b> of programs and activities implemented by institutions that received Advanced Technological Education grants	

	<b>2. Define</b> the elements of the object		Arlen
<p>What does <i>sustainability</i> really mean?</p>			

 **2. Define** the elements of the object  **Arlen**

What are the elements of an apple?

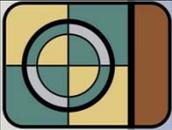
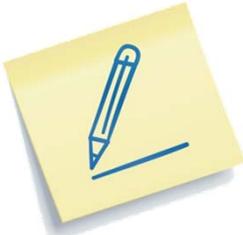


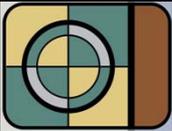
 **2. Define** the elements of the object  **Arlen**

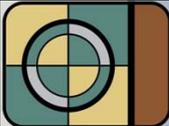
Sources

Literature Review      Advisory Committee      Interviews      Survey

	<b>2. Define</b> the elements of the object		Arlen
<p style="text-align: center;"><b>Open-ended Survey Question</b></p> <div></div> <p>Imagine your institution in the future, perhaps 3 years after the ATE grant has ended:</p> <p><i>What things started during the grant will be or are still in place?</i></p>			

	<b>2. Define</b> the elements of the object		Arlen
<p><b>//</b> Revenue earned from the sale of educational materials is used to provide scholarships for students.</p> <p>The new curriculum was created through the regular institutional approval process so all the new classes are in the regular college catalogue and are part of approved college degrees.</p> <p>The recruitment efforts developed through the grant will be incorporated into the college's general recruitment activities. <b>//</b></p>			



## 2. Define

the elements of the object



Arlen

*Colleges - Faculty - Students - Educational Materials*

*Business & Industry - Administration - ATE PIs*

*NSF - AACC - Communities - High Schools*



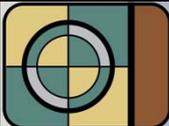
}

Analysis of  
survey &  
interview  
responses

*Programs*

*Collaborations - Materials - Faculty*

*Facilities - Students - Institutions - Revenue*



## 3. Develop

measures of the elements



Arlen

65  
items

- ✓ Clarity
- ✓ Match elements
- ✓ Nonduplication

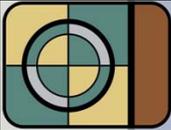
35  
items

- ✓ Relevance
- ✓ Understandability
- ✓ Effective indicators

28  
items

Researcher  
review

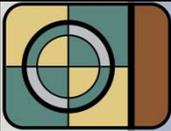
Expert review  
(3 survey experts & 3 ATE PIs)

 **3. Develop** measures of the elements  **Arlen**

Please indicate the extent to which you Disagree or Agree ...

*“Changes made in our technological education program will continue after our ATE grant has ended.”*

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Not Applicable
	<input type="radio"/>					

 **4. Review & Pilot**  **Arlen**

DRAFT ATE Grant Sustainability Survey Instrument

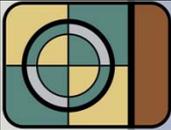
28 items

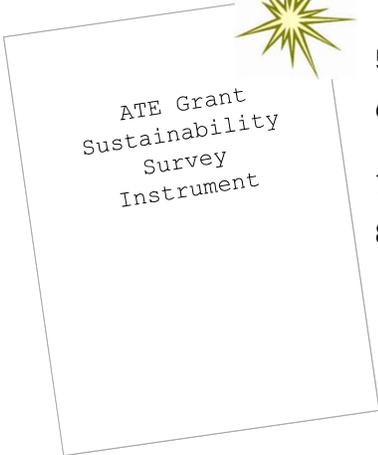
✓ Validity  
✓ Usability

23 items

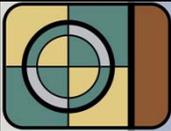
FINAL ATE Grant Sustainability Survey Instrument

Review by 3 ATE PIs

 **Steps 5-8**  **Arlen**

5. Select an appropriate population
6. Distribute the survey and conduct follow-up
7. Process and check data for accuracy
8. Analyze the data

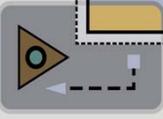
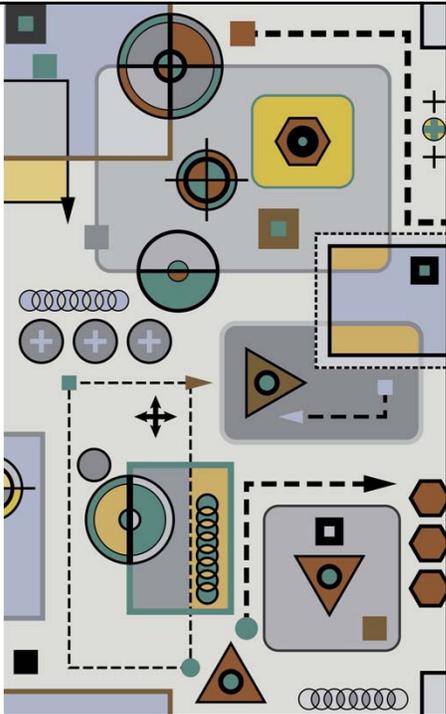
 **Alternatives**  **Arlen**

When resources are scarce...





**Wayne**  
**Comments**



### Coming Attractions



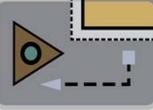
Stephanie

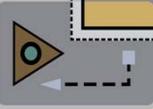


**July 20**  
Strong Evaluation Plans = Stronger Proposals

**September 21**  
Ready, Set, Evaluate!

Register at  
[www.evalu-ate.org/events](http://www.evalu-ate.org/events)

	<b>AEA</b>		Stephanie
<p>Coffee Break Webinar Series May 19 Effective Alternatives to a Final Report</p> <p>June 2 What Story Does your Model Tell?</p> <p>Annual Conference October 31-November 5 in Anaheim</p>		<p><b>AMERICAN EVALUATION ASSOCIATION</b></p> 	
<p>Get more information/join at <a href="http://www.eval.org">www.eval.org</a></p>			

	<b><a href="http://www.eval-ate.org">www.eval-ate.org</a></b>		Stephanie
	ATE Evaluation Listserv		
	<i>Conduit</i> Newsletters		
	ATE Evaluator Directory		
	Digital Resource Library		
	Events		

