Does Your Instruction Rate 9 Stars?
College Student Perceptions of Teaching and Learning Quality

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Overview

- Research question and background (Ted)
- Method (Pam)
- Demographics of respondents (Ying)
- Results
  - Descriptive and correlational (Rajat)
  - MAPSAT: Map & Analyze Patterns & Structures Across Time (Ted)
- Conclusions (Ted)

Problem

- As many as 71 different instructional design models or theories exist (Visscher-Voerman & Gustafson, 2004).
- Are any or all of these design theories or models effective?
- When a design theory or model is followed, does it result in student learning achievement?

Focus on *Ends* of Instructional Design or Theories

- Design theories or models are *means* to *ends*
- Clearly there is more than one means to an end, as evidenced by so many models and theories.
- Instead of focusing on the means, we chose to focus on the ends – student perceptions of teaching and learning quality

First Principles of Instruction
(Merrill, 2002)

- **Authentic Problems/Tasks**: students engage in real-word problems and tasks or activities
- **Activation**: student prior learning or experience is connected to what is to be newly learned
- **Demonstration**: students are exposed to examples of what they are expected to learn or do
- **Application**: students try out what they have learned with instructor coaching or feedback
- **Integration**: students incorporate what they have learned into their own personal lives

Research Question

- What is the relationship of these factors with First Principles of Instruction?
  - ALT (Academic Learning Time) (Berliner, 1990; Fisher *et al.*, 1978; Squires, Huitt & Segars, 1983)
  - Student Satisfaction (Kirkpatrick, 1994)
  - Student Learning Progress (Kirkpatrick, 1994)
  - Overall course and instructor quality (Cohen, 1981)
  - Mastery of course objectives (Mager, 1997)

Methodology

(Pam)

Instrument Development

- Paper version constructed and reviewed by colleagues, including Committee on Teaching
- Wording of ambiguous items modified based on feedback from faculty members in Education
- Paper survey converted to Web survey (now called the *TALQ – Teaching and Learning Quality Scales*) :

  http://education.indiana.edu/~edsurvey/evaluate

9 TALQ Scales

These are *self-reports* from students:

1. Academic Learning Time
2. Satisfaction with the Course
3. Learning Progress
4. Authentic Problems
5. Activation
6. Demonstration
7. Application
8. Integration
9. Overall course & instructor quality (BEST)

Data Collection Timeline

IRB Approval	Late April 2006
Request for participants	May – Dec. 2006
Data collection ended	January 25, 2007
– 156 total responses – 13 eliminated due to no data for 9 scales – 3 test cases eliminated (used to verify that Web survey was running OK) – 140 survey responses remained for analysis	

Demographics

(Ying)

Demographics: Gender

	Frequency	Percentage
Male	43	30.7
Female	93	66.4
Missing	4	2.9
Total	140	100

Demographics: Class Standing

	Frequency	Percentage
Freshman	23	16.4
Sophomore	19	13.6
Junior	23	16.4
Senior	19	13.6
Graduate	48	34.3
Other	7	5.0
Missing	1	0.7
Total	140	100

Courses (89 different)

- **Biology**
  - cell biology, biology, biology laboratory
- **Business**
  - business administration, organizational behavior/management, introduction to business, business law, business finance, business graphics application, business and society
- **Computers/Technology**
  - web development, PC applications, database management, graphics design
- **Cognitive Science**
  - human cognition and theories, systems theory in cognitive science
- **Education**
  - Educational technology, educational leadership, educational assessment, social studies education, bilingual education literacy, educational research, teaching and learning in higher education, curriculum and instruction, instructional design, managing students, comparative education, educational measurement, teaching language arts, research methodology, physical education, educational psychology
- **Mathematics/Statistics**
  - finite mathematics, mathematical statistics, intermediate statistics, algebra, fundamentals of mathematics
- **Medicine**
  - medical physiology, medical biochemistry, medical genetics, pathology, critical care medicine, pediatrics, internal medicine, human anatomy, anesthesiology, pharmacology, history of world epidemics
- **Psychology**
  - introduction to psychology, addictions counseling, social psychology
- **Others**
  - diversity and social work, spectroscopy, independent study, dance, professional writing, American politics, epistemology, music theory, writing, sociology, pharmacy technology, doctoral study, anthropology, graduate seminar, and instrumental/choral conducting in music

Demographics: Course Setting

	Frequency	Percentage
Face-to-face	97	69.3
Blended	8	5.7
Online	34	24.3
Missing	1	0.7
Total	140	100

Grades and Mastery

Grade	Frequency
A	92
B	30
Other (C, D, **Don't know**)	18
Total	140

Mastery	Frequency
Master	35
Partial Master	87
Nonmaster	17
Total	139

Results

(Rajat & Ted)

Statistical Significance

- $\alpha = 0.0005$ *a priori* for each statistical test
- Overall significance for C tests = $1 - (1 - \alpha)^C$ (Kirk, 1982, p.120)
- We did 100 statistical tests
- **$1 - (1 - 0.0005)^{100} = 0.0488$ = Type 1 error rate for whole study**

Scale Reliabilities: Academic Learning Time Scale

(α = 0.85)

Item No.	*Item Stem*
1-	~~I did not do very well on most of the tasks in this course, according to my instructor's judgment of the quality of my work.~~
12	I frequently did very good work on projects, assignments, problems and/or learning activities for this course.
14	I spent a lot of time doing tasks, projects and/or assignments, and my instructor judged my work as high quality.
24	I put a great deal of effort and time into this course, and it has paid off – I believe that I have done very well overall.
29-	~~I did a minimum amount of work and made little effort in this course.~~

Scale Reliabilities: Learning Progress Scale

(α = 0.97)

Item No.	*Item Stem*
4	Compared to what I knew before I took this course, I learned a lot.
10	I learned a lot in this course.
22	Looking back to when this course began, I have made a big improvement in my skills and knowledge in this subject.
27-	I learned very little in this course.
32-	I did not learn much as a result of taking this course.

Scale Reliabilities: Global items selected from BEST standard university form (Overall Quality)

(α = 0.92)

Item No.	*Item Stem*
8	Overall, I would rate the quality of this course as outstanding.
13	~~This course is one of the most difficult I have taken.~~
16	Overall, I would rate this instructor as outstanding.
18	~~This course increased my interest in the subject matter~~.
38	Overall, I would recommend this instructor to others.

Scale Reliabilities: Authentic Problems Scale

(α = 0.81)

Item No.	*Item Stem*
3	I performed a series of increasingly complex authentic tasks in this course.
19	~~My instructor directly compared problems or tasks that we did, so that I could see how they were similar or different.~~
25	I solved authentic problems or completed authentic tasks in this course.
31	In this course I solved a variety of authentic problems that were organized from simple to complex.
33	Assignments, tasks, or problems I did in this course are clearly relevant to my professional goals or field of work.

Scale Reliabilities: Activation Scale

α = 0.91

Item No.	*Item Stem*
9	I engaged in experiences that subsequently helped me learn ideas or skills that were new and unfamiliar to me.
21	In this course I was able to recall, describe or apply my past experience so that I could connect it to what I was expected to learn.
30	My instructor provided a learning structure that helped me to mentally organize new knowledge and skills.
39	In this course I was able to connect my past experience to new ideas and skills I was learning.
41-	In this course I was not able to draw upon my past experience nor relate it to new things I was learning.

Scale Reliabilities: Demonstration Scale

α = 0.88

Item No.	*Item Stem*
5	My instructor demonstrated skills I was expected to learn in this course.
15	~~Media used in this course (texts, illustrations, graphics, audio, video, computers) helped me to learn instead of distracting me.~~
17	My instructor gave examples and counter-examples of concepts that I was expected to learn.
35-	My instructor did not demonstrate skills I was expected to learn.
43	My instructor provided alternative ways of understanding the same ideas or skills.

Scale Reliabilities: Application Scale

α = 0.74

Item No.	*Item Stem*
7	My instructor detected and corrected errors I was making when solving problems, doing learning tasks or completing assignments.
23	My instructor gradually reduced coaching or feedback as my learning or performance improved during this course.
26-	~~Opportunities to practice what I learned during this course (e.~~g., ~~assignments, class activities, solving problems) were not consistent with how I was formally evaluated for my grade.~~
36	I had opportunities to practice or try out what I learned in this course.
42	My course instructor gave me personal feedback or appropriate coaching on what I was trying to learn.

Scale Reliabilities: Integration Scale

α = 0.81

Item No.	*Item Stem*
11	I had opportunities in this course to explore how I could personally use what I have learned.
28	I see how I can apply what I learned in this course to real life situations.
34	I was able to publicly demonstrate to others what I learned in this course.
37	In this course I was able to reflect on, discuss with others, and defend what I learned.
44-	I do not expect to apply what I learned in this course to my chosen profession or field of work.

Scale Reliabilities: Learner Satisfaction Scale

α = 0.94

Item No.	*Item Stem*
2	~~I am very satisfied with how my instructor taught this class.~~
6-	I am dissatisfied with this course.
20-	This course was a waste of time and money.
40	~~I enjoyed learning about this subject matter.~~
45	I am very satisfied with this course.

Scale Reliabilities: Summary

Scale	α
Academic Learning Time	0.85
Learning Progress	0.97
Global items from BEST form (Overall Quality)	0.92
Authentic Problems	0.81
Activation	0.91
Demonstration	0.88
Application	0.74
Integration	0.81
Learner Satisfaction	0.94

Range: 0.74 to 0.97

Scale Scores

Calculated by average across items for each scale:

- E.g., for a case for Learner Satisfaction:

  (3 + 4 + 5) / 3 = 4.0 = scale score

Correlations Between *First Principles* Scales

		Authentic Problems	Activation	Demonstra-tion	Application	Integration
Authentic Problems	ρ	1.000				
	N	137				
Activation	ρ	.738**	1.000			
	N	127	128			
Demonstration	ρ	.735**	.769**	1.000		
	N	123	118	124		
Application	ρ	.760**	.693**	.740**	1.000	
	N	136	127	123	138	
Integration	ρ	.812**	.813**	.737**	.714**	1.000
	N	133	125	122	134	135

** Correlation is significant ($p < 0.0005$, 2-tailed).

Correlations Between Scales

		First Principles	ALT	Learning Progress	Satisfac-tion	Mastery	Class Rating	Overall Quality
First Principles (Combined)	ρ	1.000						
	N	114						
ALT	ρ	.682**	1.000					
	N	111	137					
Learning Progress	ρ	.823**	.602**	1.000				
	N	110	128	131				
Satisfaction	ρ	.830**	.515**	.874**	1.000			
	N	112	132	128	135			
Mastery	ρ	.341**	.470**	.301**	.361**	1.000		
	N	113	136	130	134	139		
Class Rating	ρ	.735**	.496**	.760**	.853**	.319**	1.000	
	N	112	135	129	133	138	138	
Overall Quality	ρ	.867**	.605**	.759**	.859**	.386**	.799**	1.000
	N	112	134	128	132	135	134	136

** Correlation is significant ($p < 0.0005$, 2-tailed).

Pattern Analysis

- MAPSAT used successfully in studying temporal patterns (Map & Analyze Patterns & Structures Across Time):
  - Frick (1990): If direct instruction is occurring, then elementary mildly handicapped students are highly likely to be engaged (p = 0.97). If not, p = 0.57.
  - An (2003): If mode error is 'right action, wrong result' and source of error is 'unaffordance', then likelihood of 'can't find hidden function' or 'false success' = 0.67.

Patterns in This Study

If *ALT* and *First Principles*, then *Learner Mastery*?

- A. If ALT is Yes and First Principles is Yes, then Learner Mastery is Yes: 24/66 = 0.36
- B. If ALT is No and First Principles is No, then Learner Mastery is Yes: 1/25 = 0.04
- Odds of A to B = .36/.04 = 9 to 1

	ALT Agreement			
	No		Yes	
	First Principles Agreement		First Principles Agreement	
	No	Yes	No	Yes
	With respect to achievement of objectives of this course, I consider myself a:	With respect to achievement of objectives of this course, I consider myself a:	With respect to achievement of objectives of this course, I consider myself a:	With respect to achievement of objectives of this course, I consider myself a:
	Count	Count	Count	Count
Nonmaster	8		1	3
Partial Master	16	9	6	39
Master	1		3	24

Patterns in this Study

- Students were 3 times more likely to agree that they learned a lot when they also agreed that:
  - First Principles of Instruction were used, AND
  - Students were frequently engaged successfully (ALT).
- Students were 3 times more likely to agree that they were satisfied with courses when they also agreed that:
  - First Principles of Instruction were used, AND
  - Students were frequently engaged successfully (ALT).

Patterns in this Study (contd.)

- Students were 5 times more likely to agree that the instructor/course were outstanding when they also agreed that:
  - First Principles of Instruction were used, AND
  - Students were frequently engaged successfully (ALT).

Conclusions

Conclusion

- According to self-reports of 140 college students, we found very strong relationships between First Principles of Instruction AND
  - Academic Learning Time
  - Satisfaction
  - Learning Progress
  - Mastery of course objectives

Limitations

- This was a correlational study. Correlation does not imply causation.
- Students were volunteers.
- Data based on self-reports from participants.
- Courses rated ‘about average’ or ‘really awful’ may be underrepresented in our sample.

Implications

- Instructional Designers
  - Consider: First Principles & ALT during design process
  - TALQ for formative and summative evaluation of instructional products or prototypes
  - Measure learning achievement separately
- College Instructors
  - TALQ for course evaluation
  - Use results for improvement of teaching – e.g., use of First Principles, student ALT, etc.

Further Research

- Cross-validate independent external measures with *TALQ scales*
- Instructors can use the *TALQ scales* and conduct their own classroom experiments

Questions and Comments?