Using expectancy violation to investigate student dissatisfaction in studio physics

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Refining the PEVA[1] for more reliable analysis

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Expectancy Violation (EV) can capture *what features* of a reformed class are most surprising to students. Such surprises may be good or bad, depending on how students interpret the violations, and may have an impact on whether students resist or endorse instructional innovations.

Understanding EV in reformed classes should help instructors who want to frame their classes and effectively prepare their students for instruction.

Goals

1. Identify what aspects of students' expectations and experiences correlate with course satisfaction.

2. Identify themes in PEVA items that would allow for analysis of clusters of activities rather than individual items.

At two time points, we administered a modified PEVA[1] to two sections of an algebra-based studio physics 1 course at EKU (N = 61)[2] and followed up with validation interviews (N = 4). We included a measure of course satisfaction and gathered information about class performance.

Participants were given a list of class-related activities and asked:
"How often did you (expect/experience)[3] the following?" ("EV")
"How pleased are you with the time spent doing the following?" ("Valence")

Findings

Course satisfaction was correlated with performance ($p < .01$).

	r
Exam score	0.39
Expected final grade	0.38

Course satisfaction was correlated with the number of positive or negative EVs ($p < .01$) but not with the total number of EVs.

	r	**mean**
Total Valence	0.66	18.5
# of Neg. EVs	-0.56	2.2
# of Pos. EVs	0.57	7.6
Total EVs	*n.s.*	12.4

Students' satisfaction with the course may be tied to performance and their ultimate opinion of the amount of time they spent on various activities.

However, valence and EV are not independent, and it is still unclear how they are related. More robust results may come from examining **themes** rather than individual activities.

Themes

We used a factor analysis of students' reported experiences (A-D, below) to begin identifying themes.

Based on the results and validation interviews, we (1) looked for patterns in EV responses to those themes, (2) honed in on the "main idea" for each theme, (3) deleted irrelevant items, (4) rephrased items that were confusing or double-barreled, and (5) checked that we had fully captured the main idea of each theme. We will administer the PEVA with the revised items in Fall 2013.

Key

* Item only partially loads onto this factor

<u>Underline</u>: Item valence predicts course satisfaction ($p<0.01$)

Significantly different from initial expectations ($p<0.05$)

→ Valence *not* correlated with course satisfaction ($p>0.05$)

A
3 <u>Solve physics problems, individually</u>
12 Work on ungraded problems from worksheets
13 Work on ungraded problems from the textbook
14 Read the textbook

Item	Initial Expect.	Shifted Expect.	Exper.	Valence
3	5.2	4.7#	4.3#	0.95
12	3.9	4.3#	4.0	0.79
13	3.6	3.5	1.4#	-0.14
14	4.1	4.3	1.6#	-0.17

Individual effort
Solve problems individually during class
Do unstructured hands-on investigations
Practice making sense of physical concepts
Introduce yourself to concepts before class by reading, watching videos, etc.

B
2 Discuss physics with classmates
4 Solve problems, in a group
10 <u>Do "hands-on" physics activities (labs)</u>*
16 Discuss coursework with instructors or tutors*
17 Discuss coursework with peers
18 Discuss work w/peers not in the course

Item	Initial Expect.	Shifted Expect.	Exper.	Valence
2	4.3	5.4#	4.7	1.69
4	3.9	5.4#	4.7#	1.64
10	4.6	5.2#	5.4#	1.28
16	3.8	4.4#	3.4	0.71
17	4.1	4.8#	4.2	1.20
18	2.2	2.5	2.2	0.41

Interactions with classmates
Solve problems in groups during class
Discuss physics concepts with classmates during class
Discuss clicker responses with classmates
Study with classmates outside of class

C
1 <u>Pay attention to lectures</u>
7 Answer "clicker" questions
9 Take graded assessments
10 <u>Do "hands-on" physics activities (labs)</u>*
11 Complete graded homework assignments
15 Review notes from class

Item	Initial Expect.	Shifted Expect.	Exper.	Valence
1	5.7	5.8	5.3#	1.94
7	4.3	5.6#	5.9#	1.73
9	4.6	4.4	4.6	1.27
10	4.6	5.2#	5.4#	1.28
11	5.1	5.3	5.1	1.12
15	4.8	5.0	4.4#	1.47

Instructor-focused coursework
Instructor introducing material to the whole class
Instructor demonstrating how to solve physics problems to the whole class
Do structured laboratory activities
Work on graded assignments outside of class

D
5 Ask questions of instructors
6 Answer questions from instructors
8 Engage in off-topic activities
16 Discuss coursework with instructors or tutors*

Item	Initial Expect.	Shifted Expect.	Exper.	Valence
5	4.2	4.6#	3.9	0.88
6	3.7	4.4#	3.6	0.94
8	2.1	2.4	2.4	0.77
16	3.8	4.4#	3.4	0.71

Personal relationship with instructors
Discuss physics concepts directly with instructors during class
Get individual feedback from instructors
Get encouragement and support from instructors
Seek help from instructors outside of class