Student Expectations in University Physics:
Using The Maryland Physics Expectations Survey

The Maryland Physics Expectation (MPEX) survey has been developed by the Maryland Physics Education Research Group as part of a project to study the attitudes, beliefs, and expectations of students that have an effect on what they learn in an introductory calculus-based physics course. Students are asked to agree or disagree on a five point scale with 34 statements about how they see physics and how they think they work in their physics course.

We have given our survey to a group of experienced university faculty committed to reforming their teaching to increase its effectiveness and have used this group's response as our definition of "expert". This group shows a strong consistency (>90%) on most of our survey items. We hypothesize that students who become effective scientists and life-long learners either have or will develop these attitudes.

The survey was constructed to illuminate student attitudes along six specific dimensions. These are described briefly in Table 1 below.

	Favorable	Unfavorable	MPEX Items
independance	learns independently, takes responsibility for constructing own understanding	takes what is given by authorities (teacher, text) without evaluation	8, 13, 14, 17, 27
coherence	believes physics needs to be considered as a connected, consistent framework	believes physics can be treated as separated facts or "pieces"	12, 15, 16, 21, 29
concepts	stresses understanding of the underlying ideas and concepts	focuses on memorizing and using formulas	4, 14, 19, 23, 26, 27
reality link	believes ideas learned in physics are relevant and useful in a wide variety of real contexts	believes ideas learned in physics are unrelated to experiences outside the class-room	10, 18, 22, 25
math link	considers mathematics as a convenient way of representing physical phenomena	views the physics and the math independently with no relationship between them	2, 8, 15, 16, 17, 20
effort	makes the effort to use information available and tries to make sense of it	does not attempt to use available information effectively	3, 6, 7, 24, 31

Table 1: Clusters for dimensions probed by the MPEX Survey.

We call the responses that are preferred by our experts and which are most commonly found in the dedicated, self-motivated learner as *favorable*. We call those responses that disagree with our experts and are often found in students more concerned with grades than with learning as *unfavorable*. We hypothesize that favorable attitudes are more likely to yield effective, life-long learners, and believe that it is part of the goal of a good introductory physics course to help students begin to develop these attitudes. The expert responses to our survey items are given in Table 2 below.

Note that the items of the effort cluster consistently show a strong decline arising from a comparison of "pre-course optimism" and "post-course reality checks". Many students intend the activities inquired about in our effort items but in the press of time do not actually carry them out. Although we find these items interesting and revealing, unless these are a primary focus of your course we do not recommend including them in the overall MPEX score.

Expert Responses									
1	D	8	D	15	D	22	D	29	D
2	D	9	(D)	16	D	23	D	30	A
3	A	10	D	17	D	24	D	31	A
4	D	11	A	18	A	25	A	32	A
5	A	12	D	19	D	26	A	33	D
6	A	13	D	20	D	27	D	34	(A)
7	(A)	14	D	21	D	28	D		

Table 2: Prevalent responses of our expert group.

The response "A" indicates agree or strongly agree -- a choice of numbers 4 or 5. The response "D" indicates disagree or strongly disagree -- a choice of numbers 1 or 2.

Where the respondents did not agree at the 85% level, the item is shown in parentheses and the majority response is shown. You should decide on your own whether these items are significant enough for you to include in your overall score. Even in those cases,* there was a strong plurality in favor of the answer indicated.

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* In our interviews, these items tended to draw favorable responses only from the most sophisticated students. The effect was, however, strong enough that we feel

that improvement or decline on these items represent significant changes in student expectations and are worth including in the overall score.

Product Warning Label:

Note that individual items from this survey should not be used to evaluate individual students. On any single item, students may have atypical interpretations or special circumstances which make the "non-expert" answer the best answer for that student. Furthermore, students often think that they function in one fashion and actually behave differently. For the diagnosis of the difficulties of individual students more detailed observation is required. This survey is primarily intended to evaluate the impact of one or more semesters of instruction on an overall class. It can be used to illuminate some of the student reactions to instruction of a class that are not observable using traditional evaluations. In this context, it, together with evaluations of student learning of content, can be used as a guide for improving instruction.

For more information on this survey, or the results of our studies, see our web page at http://www.physics.umd.edu/perg/expects/ex.htm or contact

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