An Expectancy Theory Based Instrument Assessing Relationships Between Faculty Dispositions and Use of Student-Centered Strategie-

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Abstract

We present the final instrument and results from a study initially presented as an ERM Division work-in-progress at ASEE 2016. To determine relationships between dispositions and reported use of student-centered strategies, the Value, Expectancy, and Cost of Testing Educational Reforms Survey (VECTERS) was developed based on expectancy theory and tested with 286 engineering faculty among the 20 largest colleges of engineering in the U.S. The student-centered practices examined were (a) using formative feedback to adjust instruction, (b) integrating real-world applications, and (c) facilitating student-to-student discussion.

Factor analyses led to determining construct groupings of items that were generally aligned with VECTERS' design. Faculty using strategies in their classroom more often were more inclined to perceive value (particularly for students) and had greater expectation of success. Furthermore, greater use of a student-centered strategy was inversely related to perception of cost – with low use associated with perception of greater cost.

Introduction

This study began with a team of researchers wanting to assess the effect of a National Science Foundation funded professional development program for engineering faculty. Beyond typical evaluation, a goal was to delve into faculty member mindsets about particular classroom strategies that were intended to be conveyed from professional development to the classrooms.

While there exists no shortage of instruments for measuring faculty attitudes and self-reported classroom practices, the intent here was to detect not just use of practices but the attitudes toward specific practices. What was found lacking in the research literature canon was an instrument detecting dispositions about specific strategies. Because it had been informally observed that faculty members may integrate one student-centered strategy but not another, it was preferred to evaluate dispositions per strategy. Attitudes are generally considered a precursor to implementation[1]; however, some literature points to how the use of classroom strategies is what drives attitudes[2]. The practical interest was to determine if the professional development was affecting faculty dispositions about specific classroom strategies. To achieve this goal, a new instrument was developed, the Value, Expectancy, and Cost of Testing Educational Reforms Survey (VECTERS).

Relevant Literature

Student-Centered Strategies

VECTERS solicits views about the implementation of student-centered learning strategies. While there are certainly other strategies that fall under this banner, the three selected are pedagogical points promoted within the professional development. The theoretical underpinnings of the pedagogy supported by the professional development relate to tenets laid out in *How Students Learn*.[3] In general, the professional development encouraged instructors to move their classrooms toward being environments where students have voice, instructors are responsive to varying student backgrounds, and relevancy between coursework and real-world applications become evident. An overview of related literature regarding the three strategies is provided.

Formative feedback. The iterative use of formal and informal assessments as a means to support a learner is valuable to the learning process.[4] The concept of learning from one's own attempts and integrating newly developed understandings to existing schema aligns to learners using formative feedback to construct and re-construct their knowledge and skills.[5] Much of the literature on formative feedback focuses on learners being the primary consumers of the feedback and using it to consciously improve their own understanding.[6] In higher education the activity of formative feedback often ends with the transmission of the feedback from instructor to student, with the onus on students to make improvements.[7]

VECTERS was designed to assess formative feedback that is two-way. This implies instructors adjusting instruction based on what they learn about students' comprehension. This may take the form of immediate adaptation of instruction based on responses from electronic response systems, aka "clickers."[8] Likewise, formative feedback may involve soliciting what students see as the "muddiest points" from a lesson followed by an instructor synthesizing these muddiest points and altering instruction for the next day.[9] This type of instructional responsiveness has been shown to positively affect classroom dynamics as well as persistence and achievement in undergraduate engineering courses.[10, 11]

Real-world applications. Many aspects of engineering courses can be viewed as relating to the real world. To narrow the definition, real-world applications was described as when an instructor deliberately demonstrates relevance through the integration of problems that are related to real-world problems and/or underscores connections to industry and design. Integration of pedagogy that emphasizes relevance and connections to the real-world has been shown to support student engagement, persistence, and comprehension.[12] Integration of real-world applications moves the responsibility to instructors to be explicit about the real-world application of what is being learned and to clarify how future careers integrate these skills.

Real-world connection can manifest on a large scale such as having students form design teams that address problems in the community[13] or more ordinarily occur as deliberate lesson planning that emphasizes real-world connections in the form of contextualized problems and workplace connections.[14] Real-world application can also involve demonstrating the connectedness among different disciplines or places students in the roles of collaborative problem solvers.[15]

Student to student discussion. When instructors attempt to make their classrooms and lecture halls more dynamic, prompting students to engage in discussion is one of the most popular strategies.[16] The term *discussion* in a college classroom context can have broad interpretations. Here *discussion* is defined as student-to-student discourse that is deliberate, occurring during class time, initiated by the instructor, and focused on furthering understanding of concepts.

Although research supports the efficacy of student-to-student discussion,[17] actual use of the strategy in college lecture halls has been slow to progress.[18] Facilitation of discussion that minimally requires providing students with questions that fit within the context of a lesson can be quite helpful in promoting comprehension of new concepts. If students are left to their own devices and merely encouraged to discuss with one another after class, they may not possess necessary linguistic and interactional skills needed to develop shared meaning as they would during facilitated classroom discussion.[19]

Expectancy Theory

From the perspective of instructors, expectancy theory frames the effort that will need to be expended in order to modify instruction. In this context, expectancy framework is based on an accounting of costs, considered value, and expectation of success.

Related to the *expectancy of success* is the *value* that individuals place on attainment of an end goal. Attainment value therefore predicts effort and determination.[20, 21] Value is sometimes equated as a combination of the value of the input (i.e., costs) *plus* the value of the output. This combines the cost of achieving a goal with the attraction of achieving the goal. We chose to separate these elements of value. The input values are considered costs and this price tag of what someone has to give up in order to achieve a task can significantly predict decisions to pursue a goal.[22]

Based on expectancy theory, implementation of an educational reform often meets limited success for one or more of three reasons: perception of low value, belief of likely to fail, and assessment of high cost. In many cases the reform is never even transferred from professional development to the classroom because an instructor believes the strategy will have little or no added value for students; or because instructors anticipate that instituting the strategy will lead to a less effective learning environment; or simply because instructors consider the expenditure of time and materials too great of a price tag to pay.

Purpose and Research Questions

The intent of this study was to pinpoint expectations and attitudes about specific teaching strategies and, in turn determine the relationship of those dispositions with the actual use of the strategies. VECTERS was constructed to enable achieving this goal and to address these research questions in the context of undergraduate engineering courses:

1. What is the relationship between the value placed on a student-centered teaching strategy and use of the strategy?

2. What is the relationship between the expectation of success with a student-centered teaching strategy and use of the strategy?

3. What is the relationship between the cost associated with implementing a student-centered teaching strategy and use of the strategy?

Expectancy theory predicts positive relations for the first two research questions. The third research question raised competing hypotheses. Expectancy theory predicts that there is a negative relationship between the use of a strategy and its cost; that is, perception of lower cost leads to greater use. A competing rationale is that those using a strategy more extensively incur greater costs, and in turn would report higher costs.

Design

VECTERS Framework

VECTERS was designed to be completed by instructors and its "topics" are these three student-centered strategies: formative feedback, real-world applications, student-to-student discussion. The constructs of VECTERS though are based on expectancy theory constructs of *value*, *expectation of success,* and *cost*.

Value. The construct of value is tied to benefit. In educational settings, the recipient of benefit is commonly seen as the students, but the beneficiary can also be instructors. Implementing a classroom strategy may be deemed as having potential benefits and negative consequences. VECTERS contains eleven value items. Eight of the value items address perceived value (negative and positive) for students; and three of the value items focus on how implementing a strategy may have direct value for the instructor.

Expectancy. The expectancy construct involves envisioning the learning environment when the strategy is implemented. These expectations are categorized by internal and external attribution types. That is, expectation of success, or lack thereof, might be attributed to students' ability to "handle" the strategy, or might be attributed to the instructor's view of their own ability to implement the strategy. Further, expectation of success can be externally attributed to the physical classroom environment – a lecture hall setting versus a small classroom, or hundreds of students versus a couple of dozen students. VECTERS contains ten expectancy items. Five of these items align with expectancy related to students, two items are focused on expectation of success due to the instructor's capacity, and three items associate expectancy of success with the physical environment or the actual content itself.

Cost. Cost items address the perceived expenditures of implementing a classroom strategy. VECTERS includes five cost items. Among these five items, three address time costs, one item addresses the cost of teaching assistants, and one addresses the cost of overall effort in implementing a strategy.

Overall Design

The 26 value, expectancy, and cost items are a mix of both negative and positive statements to which respondents indicate level of agreement on a Likert four-point scale. Participants respond to the 26 items for each of the three classroom strategies (formative feedback, real-world applications, and initiating student-to-student discussions), thus yielding 78 datum points. See the appendix for VECTERS layout. It is noted that this layout was influenced by the work of Abrami, Poulsen, and Chambers[23] who developed the cooperative learning implementation questionnaire (CLIQ) to assess relationships between K-12 teacher dispositions and use of cooperative learning.

VECTERS additionally contains questions to collect respondents' demographic information as well as general information about the courses respondents are reflecting upon. Instructor information includes information such as gender, ethnicity, and years of experience. Course information includes items to indicate the course-level (100 to 400), whether the course is required, and the number of students typically enrolled.

Method

Sample

An invitation to complete the survey was sent to 19 of the 20 largest colleges of engineering in the United States, as acknowledged by the American Society of Engineering Education.[24] (One of the 20 largest colleges is the authors' institution and was omitted since several of those faculty members would be requested to complete a subsequent version of VECTERS at a later date.

Engineering faculty members were invited via email to complete VECTERS online. The invitation was sent to the email addresses of approximately 6300 engineering faculty members. who taught undergraduate engineering courses. A total of 286 responses were received. While the total amount of responses received was suitable to conduct reliability and validity testing, the response rate was low. Unfortunately, it is not possible to determine the exact response rate because the request was sent to all available email addresses of engineering faculty members listed on college websites and many of those email addresses were associated with faculty who do not teach undergraduate courses.

Coding

VECTERS includes a mix of both positive and negative statements. Therefore, data received from the respondents were adjusted so that all values among the 78 items were aligned. That is, data from negatively worded value and expectancy items were adjusted so that a 4 on the 1 to 4 scales indicated perception of high value or high expectancy of success. Likewise, data from cost items that implied high expenditure (e.g., implementing this strategy takes too much preparation time) were adjusted so that a response of 4 indicated the respondent viewed cost as being high.

Internal Consistency

Reliability of VECTERS was assessed by calculating Cronbach's alpha coefficients. The Cronbach's alpha coefficient was first determined across all 26-items for all three strategies (i.e., 78 items collectively). However, VECTERS can be considered as three sub-instruments addressing the strategies of formative feedback, real-world applications, and student-to-student discussion. Therefore, Cronbach's alpha coefficient calculations were applied to each of the three sub-instruments. As recommended by DeVellis,[25] Cronbach's alpha levels of 0.7 or higher were desired.

Construct validity

VECTERS construct validity was evaluated by examining relationships between respondents' self-reports of extent to which the three strategies are (1) currently being implemented, and (2) are planned to be implemented. The supposition was that those scoring higher on VECTERS' value and expectancy items would be more likely to currently be integrating a classroom strategy and would be more likely to plan on using the strategy in the future (either initiating or continuing to use). Regarding costs, a cost-increases-with-usage hypothesis was supposed by some on the research team even though expectancy theory supported the cost-decreases-with-usage hypothesis.

Construct validity was further examined by applying orthogonal (varimax) rotation factor analysis. Analysis was applied to VECTERS' three sub-tests (formative feedback, real-world applications, and student-to-student discussion). This supported the item reduction analysis and the resulting final version of VECTERS (Appendix).

Relationships among Variables
A series of Pearson correlation tests were completed to determine relationships among the variables, as defined by the research questions. These were applied for each of the three classroom strategies between aggregate mean scores on VECTERS in the areas of value, expectation of success, and cost with the amount of time an instructor reported (a) currently using the strategy and (b) planned to use the strategy in the future.

Results

The internal consistency reliability for VECTERS items was high (Cronbach's $\alpha = .90$). Cronbach's alpha values for formative feedback, real-world applications, and student-to-student discussion (0.83, 0.76, 0.82, respectively) were all above 0.7 thus implying acceptable reliability.

Mean responses regarding the extent to which respondents used a particular strategy, now and in the future, were calculated. Faculty members indicated if they were using or planned to use each of the three strategies from "not at all" (value = 1) to "entirely" (value = 4). Results indicated real-world applications were used most often, with the other two strategies approximately equivalent in use (Table 1).

Table 1. Current and future use of specific classroom strategies.

	Formative Feedback		Real-world Applications		Student-to-student discussion	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Current use	2.45	.90	3.15	.80	2.58	1.1
Future use	2.69	.91	3.31	.73	2.83	1.0

Table 2 provides correlations between mean scores for the constructs of value, expectancy and cost, per each classroom strategy, with the reported level of implementation of the strategy – both now and planned for the future.

Table 2. Correlations (r-value): Implementation with VECTERS Constructs

		Value	Expectancy	Cost
Formative feedback	Current use	.60**	.53**	-.37**
	Future use	.62**	.50**	-.32**
Real world application	Current use	.44**	.34**	-.27**
	Future use	.40**	.25**	-.13*
Student to student discussion	Current use	.60**	.56**	-.45**
	Future use	.60**	.58**	-.40**

* significant at 0.05 level ** significant at 0.01 level

The relationships met predictions for value and expectancy. Among all three classroom strategies, instructors' reported use of the strategy was positively correlated to their dispositions regarding the value of the strategy and their expectation of success. The first of these positive relationships implies that instructors who believe a strategy has value for their students and for themselves uses that strategy more often. Similarly, instructors who expect successful implementation of a strategy are more inclined to use that strategy. The negative relationships found between cost and reported usage met expectations of expectancy theory. These negative relationships imply that higher use correlates with diminished view of the cost of integration.

Because the constructs of value and expectancy were comprised of items that could be further categorized, we conducted an exploratory correlation analysis. Bivariate analyses were examined between the sub-classifications with reported current implementation and with planned implementation. The subcategories and example items are provided in Table 3. Because there were only five cost items and these were considered cohesive, no cost subcategories were isolated.

Table 3. Subcategories of Value and Expectancy Items

<table>
<tr><th>Construct</th><th>Sub-category</th><th>n</th><th>Example item</th></tr>
<tr><td rowspan="2">Value</td><td>value for students</td><td>8</td><td>Using this strategy/tool fosters positive student attitudes towards learning.</td></tr>
<tr><td>value for self</td><td>3</td><td>Using this strategy/tool aids my career.</td></tr>
<tr><td rowspan="3">Expectation of success</td><td>based on students</td><td>6</td><td>My students lack the skills necessary to effectively use this strategy/tool.</td></tr>
<tr><td>based on instructor's ability</td><td>2</td><td>My knowledge of this strategy/tool is sufficient to implement it successfully.</td></tr>
<tr><td>based on the physical environment</td><td>2</td><td>The physical set-up of my classroom is an obstacle to using this strategy/tool.</td></tr>
</table>

Only correlations between subcategories and implementation (current use and planned use) that were as strong, or stronger than the correlations found among the complete categories, conveyed in Table 2, are reported here. The greatest predictor for current use ($r = 0.6$) and planned use ($r = 0.61$) of formative feedback was the subcategory of seeing value for students. Similarly, current use ($r = .48$) and planned use ($r = .46$) of real-world applications was best predicted by seeing it as valuable for students. This finding was consistent for facilitating student-to-student discussions which was also best predicted by seeing value for students (use now, $r = .61$; planned use, $r = .62$).

Exploratory factor analysis

Factor analysis was applied to VECTERS' three sub-tests. Based on guidelines[26] of retaining all factors with eigenvalues greater than 1, initial analysis of eigenvalues and the scree plots suggested retaining five factors for formative feedback, accounting for 59.5% of the variance; eight factors for real-world applications, accounting for 65.5% of the variance; and five factors for student-to-student discussion, accounting for 61.6% of the variance. Six factors were retained for real-world applications because the seventh and eighth factors did not contain at least two items loading at a level of 0.6 or above. The total variance accounted for by the six factors for real-world applications was 55.0%.

The strongest VECTERS items for each of the three sub-tests are provided in Tables 4, 5, and 6. The factors are presented across the three tests as A1, A2, A3 . . .B1, B2, . . C1 . . . etc. Items in the third columns are in order of descending relative strength. Because some, but not all, expectancy and value items were negatively worded and consequently reverse coded, where appropriate, phrases such as "disagrees that strategy . . .," have been included in Tables 4, 5, and 6 to indicate item direction.

Table 4. Formative Feedback, Factor Analysis

Factor	Cumulative Variance %	Items Loading Strongest on this Factor
A1	16.9%	Expectancy – *disagrees that strategy* will not work with my students Expectancy – *disagrees that strategy* interferes with actual learning Value – *disagrees that strategy* hinders ability to fairly assess students Expectancy – *disagrees that strategy* may make class too chaotic
A2	32.8	Value – motivates students Value – helps students obtain deeper understanding Value – increases student comprehension Value – promotes valuable collegiality among students
A3	44.2	Cost – takes too much prep time Cost – requires a lot of effort Cost – difficult to implement without specialized materials Cost – requires considerable use of TAs
A4	52.0	Expectancy – I understand this strategy well enough to implement successfully Expectancy – My knowledge of this strategy is sufficient to successfully implement
A5	59.5	Value – using this strategy aids my career Value – is aligned with goals of my college and university

Table 5. Real-world Applications, Factor Analysis

Factor	Cumulative Variance %	Items Loading Strongest on this Factor
B1	15.4%	Value – the strategy is a valuable instructional approach Expectancy – *disagree that strategy* interferes with actual learning Expectancy – *disagrees that strategy* will not work with my students Value – *disagrees that strategy* hinders learning of bright students
B2	25.9	Cost – takes too much prep time Cost – requires a lot of effort Cost – difficult to implement without specialized materials Cost – requires considerable use of TAs
B3	34.1	Value – increases student comprehension Value – motivates students
B4	41.7	Expectancy – My knowledge of this strategy is sufficient to successfully implement Expectancy – I understand this strategy well enough to implement successfully
B5	48.6	Value – using this strategy aids my career Value – is aligned with goals of my college and university
B6	55.0	Expectancy – *disagrees that* physical set-up of my classroom is an obstacle Expectancy – *disagrees that* there are too many students to implement successfully

Table 6. Student-to-Student Discussions, Factor Analysis

Factor	Cumulative Variance %	Items Loading Strongest on this Factor
C1	19.4%	Value – motivates students Value – increases student comprehension Value – fosters positive attitudes towards learning Value – promotes valuable collegiality among students
C2	35.2	Expectancy – *disagrees that strategy* will not work with my students Expectancy – *disagrees that strategy* interferes with actual learning Expectancy – *disagrees that strategy* inappropriate for the subject taught Expectancy – *disagrees that* students lack necessary skills to be effective
C3	47.4	Cost – takes too much prep time Cost – difficult to implement without specialized materials Cost – requires considerable use of TAs Cost – requires a lot of effort
C4	55.2	Expectancy – My knowledge of this strategy is sufficient to successfully implement Expectancy – I understand this strategy well enough to implement successfully
C5	61.6	Expectancy – *disagrees that* physical set-up of my classroom is an obstacle Expectancy – *disagrees that* there are too many students to implement successfully

Examination of the factor analyses led to themes becoming evident. A dimension termed “functionality” is represented in factors A1, B1, and C2. These three factors share many items that point toward a belief that the strategy simply will work with students and a dismissal of the notion that the strategy somehow interferes with learning.

Also cutting across all three strategies is a dimension referred to as “expense.” The expense dimension is represented by factors A3, B2, and C3. The only cost item that did not load heavily in the expense dimension was the statement that “there is too little time available during class to implement this strategy effectively." This statement had a loading factor of approximately 0.4; however, the other four items had consistent loading factors of 0.7 to 0.8. The implication here is that the commodity of class time is viewed differently than the cost of out-of-class expenditures such as teaching assistants (TAs), materials, and preparation time.

A third dimension across all three strategies is termed "student benefit." This is represented by factors A2, B3, and C1. This dimension corresponds to the sentiment that using a strategy will aid student comprehension and motivate students. The variance explained by the student benefit dimension ranges considerably from 8.2% for real-world applications to 19.4% for student-to-student discussion. This range may be due to relative strengths of other dimensions or that the use of formative feedback and student-to-student discussion are seen as having more immediate benefit for students than integration of real-world applications. Also, the more common use of real-world applications may be diluting and demoting the relative view of its benefit for students.

A dimension of "personal ability" also cut across all three strategies and is represented by factors A4, B4, and C4. Finally, other dimensions that cut across at least two of the strategies but accounting for comparatively less of the variance than those listed above are the following. Factors A5 and B5 represent a dimension of "job expectation" and factors B6 and C5 represent a dimension of "physical environment."

Conclusion

In this study strong relationships were found between the use of a student-centered strategy and a faculty member's disposition about that strategy. This supports the theoretical framework of expectancy theory and underscore how attitudes and perceptions can act as gatekeepers. An implication here is that effective professional development must address not just the logistics and mechanics of integrating classroom lessons, but must tackle the difficulty of affecting attitude.

The relationship between implementation and perception of cost was aligned with the cost-decreases-with-usage hypothesis. The relationship indicates that using a strategy is negatively related to perception of high cost. This finding aligns to research indicating that when people perceive a reform to have first-order barriers (i.e., external cost) they are less likely to implement; however users of a reform tend to minimize first-order barriers and focus on more important second-order barriers such as views about effectiveness and potential for success.

VECTERS is seen has having two useful future roles. First, as a diagnostic tool for faculty members. This need not be limited to engineering faculty since the three classroom strategies (formative feedback, real-world applications, and student-to-student discussion) are supported across multiple disciplines. Researchers adapting the instrument for their needs may choose to reduce and/or interchange the topics and then evaluate if the new instrument persists with sufficient reliability and validity strength.

A second useful role for VECTERS may be as a tool to facilitate discussion about teaching. Having meaningful discourse about the specifics of value, expectation, and cost, enriches dialogue. This type of deeper discussion aids instructors in developing introspection regarding their own beliefs and perceived obstacles of implementation.

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Appendix

VECTERS 2.0, (items after factor analysis reduction)

Contact authors for a complete version including demographic questions and for an electronic version.

1 = Strongly Disagree **2 = Disagree** **3 = Agree** **4 = Strongly Agree**

	Formative Feedback (collecting ongoing feedback from students and altering instruction throughout the semester based on feedback)				**Real-world Applications (demonstrate relevance, integrate real-world problems, underscore connections to industry and design)**				**Instructor initiated student-to-student discussions during class (focused on furthering understanding)**			
2. I understand this strategy/tool well enough to implement it successfully. (E)	1	2	3	4	1	2	3	4	1	2	3	4
3. My knowledge of this strategy/tool is sufficient to implement it successfully. (E)	1	2	3	4	1	2	3	4	1	2	3	4
4. My students lack the skills necessary to effectively use this strategy/tool. (E)	1	2	3	4	1	2	3	4	1	2	3	4
5. Using this strategy/tool may make class too chaotic. (E)	1	2	3	4	1	2	3	4	1	2	3	4
6. There are too many students in my class to implement this strategy/tool effectively. (E)	1	2	3	4	1	2	3	4	1	2	3	4
7. Using this strategy/tool interferes with actual learning. (E)	1	2	3	4	1	2	3	4	1	2	3	4
8. This strategy/tool is inappropriate for the subject I teach. (E)	1	2	3	4	1	2	3	4	1	2	3	4
9. This strategy/tool will not work with my students. (E)	1	2	3	4	1	2	3	4	1	2	3	4
10. The physical set-up of my classroom is an obstacle to using this strategy/tool. (E)	1	2	3	4	1	2	3	4	1	2	3	4
11. Use of this tool/strategy hinders learning of bright students (V)	1	2	3	4	1	2	3	4	1	2	3	4
13. Using this strategy/tool aids my career. (V)	1	2	3	4	1	2	3	4	1	2	3	4
14. This strategy/tool is a valuable instructional approach. (V)	1	2	3	4	1	2	3	4	1	2	3	4
15. Use of the strategy/tool helps students obtain a deeper understanding of the material. (V)	1	2	3	4	1	2	3	4	1	2	3	4
16. Use of this strategy/tool hinders my ability to fairly assess students. (V)	1	2	3	4	1	2	3	4	1	2	3	4
17. Using this strategy/tool promotes valuable collegiality among students. (V)	1	2	3	4	1	2	3	4	1	2	3	4
18. This strategy/tool is aligned with goals of my college and university. (V)	1	2	3	4	1	2	3	4	1	2	3	4
19. Using this strategy/tool fosters positive student attitudes towards learning. (V)	1	2	3	4	1	2	3	4	1	2	3	4
20. Using this strategy/tool increases students' comprehension and achievement. (V)	1	2	3	4	1	2	3	4	1	2	3	4
21. Using this strategy/tool motivates students. (V)	1	2	3	4	1	2	3	4	1	2	3	4
22. The effort involved in implementing this strategy/tool is great. (C)	1	2	3	4	1	2	3	4	1	2	3	4
23. It is very difficult to implement this strategy/tool without specialized materials. (C)	1	2	3	4	1	2	3	4	1	2	3	4
24. Implementing this strategy/tool requires considerable use of TA's. (C)	1	2	3	4	1	2	3	4	1	2	3	4
26. Implementing this strategy/tool takes too much preparation time. (C)	1	2	3	4	1	2	3	4	1	2	3	4