MATH TEACHING STYLE SURVEY RESULTS

William Bricken
November 2008

The LWTC Math Department began a pilot program of teaching math classes in the Math Lab in Spring 2008. In Autumn 2008, we began fully using the Math Lab as a teaching environment. To determine the expected student demand for Math Lab courses, we conducted a survey of student preferences for different types of math teaching styles. The one page survey describes four different teaching styles and asks students to rank order their preferences. This form is included as Appendix A. This report contains the results of the survey.

CONTENTS

EXECUTIVE SUMMARY

Over 400 students currently enrolled in LWTC math classes ranked their preferences for four different mathematics teaching styles: Traditional classroom, MathLab, Hybrid, and Online. MathLab courses teach content via online computer-assisted coursework, but with the continuous presence of a live teacher to provide instruction and guidance. Hybrid courses divide classes into one-half Traditional (in a classroom with a teacher) and one-half Online without the presence of a teacher. Online courses conduct all teaching without the physical presence of a teacher.

Results

Two out of three LWTC students identify Traditional classroom math teaching as their first preference. Two out of three strongly dislike Online math teaching. Student dislike for the Online style increases as they take more math courses, being replaced by a preference for the MathLab style. Taking a MathLab course also increases a student's preference for the MathLab style.

Recommendations

Recommendations are based on student satisfaction only; administrative convenience is not considered.

At least three of every four math courses should be offered in the Traditional classroom format. The remaining one-in-four should be MathLab classes, with increasing frequency as coursework becomes more mathematically complex.

To serve its students, at least in mathematics, LWTC should emphasize personalized classroom interaction as its marketable advantage, while providing a small number of MathLab courses to satisfy the students who do not prefer the conventional classroom. LWTC should not offer online math courses, other than those offered through WAOL.

From an educational perspective, LWTC students want and need human interaction while learning math. Computer-based teaching programs do not exhibit many teaching skills that satisfy the needs of learners, including informed diagnosis, immediate and compassionate interaction, personalized feedback, enforced structure, peer discussion, comprehension of steps taken while problem solving, the convenience of paper and pencil jotting, flexible input and recording, and warmth. Necessarily, computer-assisted math focuses on symbol manipulation rather than on comprehension and problem-solving.

CONTEXT

Computer-Aided Coursework

As an aspect of our ongoing departmental assessment of the quality of teaching, the Math faculty obtained permission to open a math teaching lab. The MathLab includes classroom teaching space and 24 online computers. In 2007, we evaluated several online math teaching programs, and settled on the Pearson product, MyMathLab. The Department also standardized its textbook selections on Pearson products, so that potentially all math courses could be offered in two teaching styles, traditional classroom and computer-assisted.

Computer-assisted courses are commercial software products that provide a diversity of functions for instructional support, centermost of which is a structured rendition of the conventional textbook. The program provides organizational support (automated rolls, attendance, grading, tracking, etc.), online student assistance (webpages, online help, and chat rooms), and a customizable curriculum. The online student experience provides instructional videos, animations, and practice problems, all focussed on manipulation of mathematical symbol structures. Students work their way through a sequence of problems, take practice tests, receive right/wrong feedback, and pass online exams in order to move on to following chapters. Progress is self-paced.

The Math faculty expended considerable effort (hundreds of hours collectively) setting up the MathLab, learning the MyMathLab product, and hand selecting every math problem presented to students for several courses. Customizing the product for a course must be repeated for each different course; once a course is designed, it remains relatively maintenance free.

Although computer-assisted math programs have been researched and developed for over two decades, these products are still quite immature. The software development skills of book publishers are wanting, and publishers are not particularly wise about quality teaching. However the main drawback is that software itself embodies limitations that are counter-productive to learning. In addition to the obvious absence of human warmth and understanding, software imposes rigid and unfamiliar restrictions on content and interaction. Typographical errors are treated the same as conceptual errors. The convenience and flexibility of paper and pencil is completely lacking. Students cannot search for ideas and methods, explore techniques, skip over content, experiment with diverse styles, make intentional errors to see where they lead, talk over ideas with friends, and in general interact as human beings. Worst, though, is that these systems teach a very narrow interpretation of what math is, they fail to develop conceptual understanding and problem-solving skills.

These inadequacies are not limited to computer-assisted teaching, they are also prevalent in computer-assisted placement and skill evaluation.

Computer-assisted coursework does offer several distinct advantages, most of which can be seen as administrative conveniences. Computers, as well, are the dominant media that people use to do mathematics in the workplace.

Diversity of Teaching Styles

The original purpose of the survey was organizational, to provide estimates of expected course enrollment in both traditional and computer-based classes. We were aware that students had preferences for teaching styles, that our faculty had preferences for how they taught, and that facilities for each type of teaching needed to be scheduled well in advance.

The Math faculty also participated in various training seminars, site visits, and other activities addressing computer-based teaching. We learned that purely online courses do not work well, and that students need a combination of both human and computer-assisted teaching for computer-assisted approaches to achieve quality learning.

We also learned that LWTC students are not well informed about the teaching style of math classes they are enrolling in. We wanted to make sure that each student knew on the first day of class that their class was either conventional or computer-assisted. Accompanying the survey was a listing of Winter 2009 math courses, categorized by teaching style. All but the Hybrid style are available to students, although the diversity of styles are not available over all courses. Another question we are trying to answer is which courses should be diversified by providing alternative teaching styles.

DATA AND RESULTS

The survey was distributed to all Autumn 2008 math classes. Results were collected from 31 classes, covering 10 different courses, and taught by 15 different instructors. The 415 students who responded represent about three-quarters of currently enrolled math students. The size and diversity of the sample assures that the result accurately represents the opinions of the student body as a whole.

Each student provided a rank ordering of the four different teaching styles. 53 students (13%) provided additional written comments. 39 students (9%) did not conform with the instructions to make a rank ordering.

The analysis is presented top-down, beginning with results aggregated over all responding students, and then subdivided by preferences for different styles, by enrollment in different courses, and by student emphasis. No analysis of different instructors was conducted, and data across instructors was intentionally not collected.

Data analysis is usually presented with some form of evaluation of statistical significance. This report takes a slightly different approach since the sample size represents about 3/4 of the entire population. When a sample includes most of the population, statistical generalization is not necessary.

Technical note: With a sample size of 400, sampling distributions of rankings approach the assumed underlying normal distribution. If a fair coin were flipped 100 times, it would be quite unusual for it to come up heads on 60 of the flips. Analogously, if we assume that students do not have a preference, then about half would choose one style of teaching and the other half would choose the other style. If 60% of students choose one teaching method and 40% choose the other, then it is statistically assured that this is an actual preference, rather than a random event. As well, here we emphasize only large differences in percentages of students with particular ranking preferences. Percentage spreads of more than 20 points are statistically powerful, they provide overwhelming evidence. Here we focus only on overwhelming evidence.

The Main Result

To provide the simplest perspective, rankings for all students in all courses are collapsed into two preference groups (First choice and Not First choice). Teaching style is also collapsed into two groups (Traditional vs Computer-assisted), with the computer-assisted category including MathLab, Hybrid, and Online styles. The resulting choices convey a clear message:

Prefer Traditional classroom	69%
Prefer Computer-assisted	31%

This result underestimates student preference for traditional classrooms, because the distinguishing quality of the Hybrid style is that it is one-half traditional classroom, while the distinguishing quality of the MathLab style is that a traditional teacher is available at all times during computer-assisted work.

There are several ways to see the degree to which students dislike the Online style of content delivery. By eliminating MathLab and Hybrid styles, we can compare First choice rankings for Traditional and Online teaching (N=321):

First-choice Traditional	93%
First-choice Online	7%

Alternatively, we can count First or Second choice of Traditional classrooms:

First or Second choice Traditional	83%
Third or Fourth choice Traditional	17%

Or we can view Fourth choice as a kind of veto:

Most disliked Computer-assisted	92%
Most disliked Traditional	8%

The most disliked style is Online:

Most disliked Online	67%
Most disliked other than Online	33%

The main result is that LWTC students strongly prefer conventional classrooms. Since we have the option to provide a diversity of teaching styles, LWTC should offer at least three out of every four math courses in the Traditional format, while providing a few classes to accommodate students who dislike Traditional.

Washington State provides a State-wide online program of coursework (WAOL). These courses are not limited by enrollment, and entail little overhead. LWTC can continue to make these courses available, but should expect no more than 20 to 30 students to enroll in them quarterly (this projection was adjusted to reflect enrollment in those courses offered by WAOL, since WAOL does not offer every type of math course). LWTC should not consider offering College administered online coursework in mathematics. The danger of WAOL courses is that they may end up alienating students who take them. We next examine the MathLab and Hybrid styles that combine online with conventional teaching.

MathLab and Hybrid Styles

The Math faculty is interested in whether or not students would prefer MathLab or Hybrid styles of mixed traditional and computer-assisted learning. With both the explicit preference for Traditional and the explicit dislike of Online styles, it is difficult to determine whether or not the mixed styles were preferred at all. Perhaps they were liked because they included a Traditional component, or perhaps they were disliked because they included an Online component. To tease this information from the data, it is necessary to look at covariation, that is, what happens when some aspect of the data is held constant.

We can eliminate the effect of First choice of Traditional by considering the Second choice of all students who chose Traditional first. Given Traditional as First choice (N=286), there is equal preference for MathLab and Hybrid, while Online is least preferred:

MathLab	45%
Hybrid	44%
Online	11%

We can also look only at First choices other than Traditional (N=129), with similar results:

First choice MathLab	43%
First choice Hybrid	40%
First choice Online	17%

From the veto perspective, the most disliked Fourth choices are:

Traditional	8%
MathLab	15%
Hybrid	10%
Online	67%

From this perspective, MathLab and Hybrid are again equivalent. Most disliked is dominated by the Online style.

Is it reasonable to conclude that students like MathLab or Hybrid styles because of their similarity to Traditional, while students dislike MathLab or Hybrid styles because of their similarity to Online? We could explore this idea further by holding Online constant, but there are not sufficient students who prefer Online for this approach to be useful.

An alternative is to ask: How many students chose MathLab and Hybrid both, specifically as their First and Second choices? A random result would predict 17% would rank the two as first choices.

MathLab/Hybrid preferred	8%
Otherwise	92%

Similarly, how many students placed both MathLab and Hybrid styles as Third and Fourth choices (that is, how many students choose the pure Traditional and Online styles as their top preferences)? A random result would predict 17% would rank the two as last choices.

Anything but MathLab/Hybrid	9%
Otherwise	91%

This comparison shows that MathLab/Hybrid are neither liked nor disliked. The results of this section suggest nothing to differentiate MathLab and Hybrid styles. Since both styles are relatively unfamiliar to students, it may be that there is no dominant impression in students' minds about the mixed mode styles. Both are less preferred than Traditional and more preferred than Online, but offer no intrinsic advantage as options.

The Ranking Matrix

The four-by-four matrix below shows rankings of the four proposed teaching styles. All entries are in percentages, with rows and columns adding to 100%. Rows show the teaching style, and the distribution of rankings for each style. Columns show the proportional share of First (Second, Third, and Fourth) place votes received by each style. On the far right, the data is aggregated to show gross likes and dislikes by adding First/Second choices into Liked styles, and Third/Fourth choices into Disliked styles.

RANKING	1st	2nd	3rd	4th	Like	Dislike
Traditional	69	14	9	8	83	17
MathLab	13	36	36	15	49	51
Hybrid	13	37	40	10	50	50
Online	5	13	15	67	18	72

This matrix simply confirms that the aggregated data hides no interactions. We next look at sub-samples of students enrolled in various math courses. The technique again is to first examine aggregated sub-samples, then to look in more detail at trends.

STUDENTS ENROLLED IN DIFFERENT MATH COURSES

The data can be subdivided into groups of students enrolled in different math courses (and by inference into groups of differing levels of math ability):

Course	Content	Number of Respondents
Math 70	Basic Arithmetic,	55
Math 80	Prealgebra	85
Math 90	Introductory Algebra	125
Math 99	Intermediate Algebra	39
Math 102	Quantitative Reasoning	39
100-level	Various, college-level	72
Total		415

An initial aggregation was examined:

	N	
Beginning Math	265	(Math 70, 80, 90)
Continuing Math	150	(all other courses)

Beginning and Continuing Math

The four-by-four ranking matrices for these subgroups and the Like/Dislike aggregations follow. In terms of the main results presented above, any interesting differences in the two subgroups would show up as interactions, that is, one subgroup would contribute disproportionately to the main result. All data is presented in percentages.

RANKING	1st	2nd	3rd	4th	Like	Dislike
Beginning						
Traditional	67	14	9	10	81	19
MathLab	15	30	38	17	45	55
Hybrid	12	40	36	12	52	48
Online	6	16	17	61	22	78
Continuing						
Traditional	72	16	8	4	88	12
MathLab	11	45	33	11	56	44
Hybrid	13	32	47	8	45	55
Online	4	7	12	77	11	89

Considering the Like/Dislike aggregate data, beginning students like Traditional and dislike Online less extremely than Continuing students, while the preference for MathLab over Hybrid is greater for Continuing students. The 7% swing in Traditional is not significant, while the 11% difference for Online is significant. The 11% change in support of MathLab is also significant. Consistently, Continuing math students dislike both the Online style and the Hybrid style that is 50% Online more than the other two styles. This result suggests that MathLab classes for higher-level math courses are more appropriate when Traditional classrooms are not possible, perhaps due to low enrollment.

Subdividing the main result into the two subgroups provides additional perspective on this interaction:

	Beginning	Continuing
First choice		
Traditional classroom	67%	72%
Omitting MathLab and Hybrid, First choice		
Traditional	86%	95%
First or Second Choice		
Traditional	80%	88%
Most disliked		
Computer-assisted (vs Traditional)	89%	96%
Most disliked		
Online (vs Any Other)	61%	77%

The primary result of the sub-sample analysis is that more mature students dislike Online teaching more than beginning students. What "mature" means is ambiguous, it could be more mathematically mature, or more experienced taking math classes, or simply older. In any event, it is safe to say that preference for Traditional over Online classes grows with experience. Student rankings suggest an increasing dislike of Online rather than a growing fondness of Traditional (Online changes from 61% to 77% of Fourth place choices).

MathLab and Hybrid Styles Across Math Education

Again we isolate rankings for MathLab and Hybrid styles, this time across the different sub-samples of Beginning and Continuing math students.

Given Traditional as First choice (N=286), MathLab is the preferred alternative:

Second Choice	Beginning N=178	Continuing N=108
MathLab	38%	56%
Hybrid	49%	38%
Online	13%	6%

First choices that are not Traditional (N=129) show no differential preference across sub-samples:

First Choice	Beginning N=87	Continuing N=42
MathLab	44%	40%
Hybrid	39%	43%
Online	17%	17%

From the veto perspective, Fourth choices confirm that Online is least preferred by more mature students:

Most Disliked	Beginning	Continuing
Traditional	11%	4%
MathLab	17%	11%
Hybrid	11%	8%
Online	61%	77%

MathLab and Hybrid selected specifically as First and Second choices shows no sub-sample difference, nor does their specific selection as Third and Fourth choices:

Preferred	Beginning	Continuing
MathLab/Hybrid	8%	8%
Anything But		
MathLab/Hybrid	10%	8%

Continuing math students who rank Traditional as their First choice have a significant preference for the MathLab style. MathLab is preferred over Hybrid by mature students possibly because Hybrid is 50% Online. This is an interaction in the data, indicating two different populations. Interactions are of primary importance when considering policies that include options. Students who begin in Traditional classrooms are more likely to prefer either MathLab or Hybrid coursework as their math becomes more sophisticated. Those who begin with computer-assisted coursework are more likely to prefer Hybrid coursework later in their math education. No one likes Online.

One possible source of bias in this data is that three of the classes in the survey were MathLab classes (the rest were Traditional). Ten of the 25 MathLab students are in a Beginning course (Math 90), the rest are in advanced courses. The MathLab sub-sample is examined later.

Trends Across Levels of Math Education

If the above differences between Beginning and Continuing math students are valid, then the interaction should show up as a trend when maturity is examined in finer detail. The absence of such trends would indicate that something more complex is going on, perhaps involving individual courses, instructors, program requirements, or random variation.

Four groups of math ability were further distinguished for trend analysis:

	N	
Arithmetic	140	(Math 70, 80)
Algebra I	125	(Math 90)
Algebra II	78	(Math 99, 102)
College-level	72	(Math 107, 146, 141, 142, 151)

Trends in the Main Result

	Arithmetic	Algebra I	Algebra II	College
Prefer Traditional	67	67	72	72
Traditional vs Online	93	91	91	95
First/Second Traditional	80	81	90	86
Last choice Computer-assisted	93	86	95	96
Last choice Online	54	69	74	79

The only trend in the main result (that students like Traditional and dislike Online) is that the distaste for Online increases with math maturity (going from 54% for beginners to 79% for students taking collage level courses).

Trends in Preferred Styles

Here, First or Second preference is aggregated for each specific style.

	Arithmetic	Algebra I	Algebra II	College
Traditional	80	81	90	86
MathLab	40	51	50	62
Hybrid	47	48	45	45
Online	23	20	15	7

Maturity is associated with decreasing preference with Online (from 23% to 7%), not necessarily with increasing preference for Traditional style. Here, the decrease in preference for Online is compensated by an increase in preference for MathLab (from 40% to 62%). The attractiveness of the MathLab style may be associated with more students in the sample having experience with MathLab teaching.

Trends in MathLab and Hybrid Styles

Given Traditional as First choice, increasing preference for MathLab is a confirmed trend:

	N=94	N=84	N=56	N=52
Second Choice	Arithmetic	Algebra I	Algebra II	College
MathLab	35	42	54	58
Hybrid	47	50	39	37
Online	18	8	7	5

Both Hybrid and Online show decreasing preference for students whose First choice is Traditional. This change occurs between Algebra I and Algebra II for those with an initial preference for Hybrid, and between Arithmetic and Algebra I for those with an initial preference for Online.

First choices that were not Traditional shows no consistent trends:

	N=46	N=41	N=22	N=20
First Choice	Arithmetic	Algebra I	Algebra II	College
MathLab	33	56	36	45
Hybrid	52	24	41	45
Online	15	20	23	10

From the veto perspective, dislike of Online increases steadily with mathematical maturity, while dislike of MathLab and Hybrid decreases sharply between Arithmetic and Algebra I:

Most Disliked	Arithmetic	Algebra I	Algebra II	College
Traditional	7	14	5	4
MathLab	22	11	13	10
Hybrid	17	6	8	7
Online	54	69	74	79

Selecting MathLab and Hybrid specifically as First and Second choices, or specifically as Third and fourth choices both show no trends:

Preferred	Arithmetic	Algebra I	Algebra II	College
Hybrid/MathLab	10	6	4	12
Anything But Hybrid/MathLab	13	6	10	6

The dominant effect exposed by trend analysis is the growing dislike for Online as students take more math courses.

ANALYSIS OF SPECIAL CASES

Special cases are events that highlight the numerical data collection strategy. They have particular value, since they can represent strongly held or well-informed opinions. For this survey, special cases include current MathLab students, voluntary written comments, and non-conformance to the ranking scale.

Current MathLab Students

The sample of current MathLab students is small, consisting of 25 students in three courses (Math 90, Math 99 and Math 151/152). Results from this sub-sample should be interpreted cautiously. Since the sample was somewhat self-selected, results cannot be seen to be causal.

In terms of the main result, MathLab students more frequently choose MathLab as their First choice. For the entire sample, 13% chose MathLab as First choice, while 28% of MathLab students chose MathLab first. Fourth choices show no differences from the whole sample:

	First Choice	Last Choice
Traditional	44	16
MathLab	28	8
Hybrid	16	12
Online	12	64

Experience in MathLab appears to favorably influence preference for MathLab. The shift comes primarily from students initially preferring Traditional. This result suggests that the MathLab option is a good idea.

Non-conforming Ranks

Non-conformance to the ranking task includes two subgroups, those who did not understand the task, and those whose opinions were sufficiently strong that they felt compelled to provide additional information through the ranking process. A rank-ordering such as 2-3-4-2 may indicate a slip or a misunderstanding, but a rank-ordering of 1-4-4-4 indicates a very strong preference. Despite being contaminated by data generated out of confusion, non-conforming ranks are a valuable source of strong opinions.

39 students (9%) provided non-conforming rankings. Strong statements of preference are of interest. Data is in percentage of all non-conforming rankings.

EMPHASIS ON	First Choice	Last Choice
Traditional	29	13
MathLab	15	5
Hybrid	5	5
Online	3	5
No first choice		20

Interpretation of this data is somewhat subjective. Non-conforming students wanted to emphasize their strong preference for or against Traditional, and to a lesser extent, in favor of MathLab. An expected emphasis on the dislike of Online is not in evidence.

Written Comments

Written comments in particular provide a detailed viewpoint of student opinions. 53 students (13% of the sample) provided written comments. All written comments are included as Appendix B.

The numerical results should at least be supported in written comments. A subjective categorization of written comments confirms this:

Prefer Traditional classroom:	more than one-half of all comments
Interact with a live instructor:	about a third of the comments
Dislike Online:	about a quarter of the comments
Need personalized help:	half-a-dozen comments
Know personal learning style:	half-a-dozen comments
Like Online/MathLab/Hybrid:	a couple for each

In their written comments students express a desire to learn, and seem to have already engaged in the meta-cognitive skills of learning how they learn best. Written comments support the non-conforming rankings, emphasizing a preference for Traditional classrooms. The message is that LWTC should not consider moving math coursework to a computer-based system. Of course, the primary value of written comments is the direct expressions of opinion themselves. Excerpts from Appendix B follow (spelling has been corrected here).

On Traditional classrooms:

"Traditional classrooms provide more interactive and interesting techniques."

"I would like class to be entertaining like the first paragraph of an essay."

"In traditional classroom you get the best knowledge."

On the need to interact with live instructors:

"Nothing beats human interaction."

"I love the classroom because it's so interactive."

"I learn best when interacting with another human."

"I want teacher grade me, but not computer."

On Online learning:

"Online is hard cause you don't have anyone to ask questions and its at your own pace."

"I think LWTC should offer more computer assisted and online classes."

"the computer often confuses me so please continue classes with instructors."

"I will avoid any online classes of any kind."

"If I wanted a cyborg teaching me I would buy a vacuum."

On knowledge of personal learning style:

"I can learn better being taught visually and being able to listen to instructions."

"I need the physical interaction of coming to a classroom"

"I need the structure of in class lectures to understand & retain info from the course."

"I do much better with a structured class setting with due dates & other 'goals'"

"The easiest way for me to learn is to work at my own pace with instructor helping me whenever I need help."

On particular teaching methods:

"Computer based math lab may be the best because it adapts to different learning methods."

"I like the idea of the Hybrid - I still have the self paced work, but only need to attend class once a week."

SUMMARY OF RESULTS

- Students strongly prefer the Traditional classroom style.
- Students dislike Online courses (WAOL).
- Dislike of Online increases as students take more math courses.
- MathLab and Hybrid styles are equally viable alternatives.
- MathLab increases in preference more than does Hybrid as students take more math courses. An interpretation is that Hybrid is not preferable since it includes a 50% Online component.
- MathLab experience positively influences preference for the MathLab style.
- LWTC should teach 3 out of every four math classes in Traditional style, and the other one in four in the MathLab style, with increasing frequency of MathLab options as math content becomes more complex.
- LWTC should not move its math courses to the Online style.

APPENDICES

A: The Math Teaching Style Survey Form

B: All written comments from the sample (53 students provided comments)

MATH TEACHING STYLE SURVEY AUTUMN 2008

The LWTC Math Department might be offering four different types of math instruction for the Winter quarter 2009. To better meet student needs, we would like to know which types you prefer.

TRADITIONAL CLASSROOM

This is the classroom lecture, discussion, and problem solving that you are most familiar with.

Students meet in a classroom at regularly scheduled times for five hours per week of instruction and testing.

COMPUTER-BASED MATH LAB

Classes meet in the Math Lab at regularly scheduled times for five hours per week. Instruction is primarily through online videos, animations, interactive problems, and an online textbook. The math instructor is always present, offering mini-lectures and helping students individually.

Students can work at their own pace, and students who are successful working independently can work at home for some of the class hours. Homework and tests are mainly online, with some written assignments and tests.

HYBRID (both CLASSROOM and ONLINE)

Class time is divided between online and traditional classroom. Instruction is both through online interactive activities, and for two or three hours per week of regularly scheduled classroom activities. The math instructor is available in person only during the classroom hours.

Students can work at their own pace. Homework and tests are mainly online, with some written assignments and tests.

ONLINE

Classes meet online, regularly scheduled hours are decided by the online instructor. Students do assignments online and interact with the online instructor and with other online students.

Students can work at their own pace. Students do not have to come to a classroom at a given time, but do have to take tests in a proctored environment.

WHICH TYPE OF MATH INSTRUCTION DO YOU PREFER?

PLEASE RANK THE FOUR TEACHING STYLES IN ORDER OF YOUR PREFERENCE.
Put a "1" for the style you most like, "2" for the next, "3" for the next, and "4" for the style you least like.

TRADITIONAL CLASSROOM _____

COMPUTER-BASED MATH LAB _____

HYBRID _____

ONLINE _____

Please write any comments you may have on the back of this sheet. THANK YOU!

APPENDIX B WRITTEN COMMENTS FROM STUDENTS

The four digit code in front of each comment is that student's ranking preferenes, with digit places sequentially standing in place of Traditional, MathLab, Hybrid, and Online teaching styles. 53 of the the sample of 415 students (13%) provided written commentary. Spelling and grammar have been directly transcribed, with no corrections.

Math 70

- 1234: I prefer being [in] the classroom for all classes.

Math 80

- 4231: Classes should have more individual help available to prep for tests. Tests are way too high of a percentage of the final grade. Notes should be available as guides. Computer based math lab may be the best because it adapts to different learning methods.

- 1234: People shouldn't be so lazy and come to school.

Math 90

- 1234: Having a traditional classroom enviornment is the best for me because I don't have internet and that would be hard for me. But with a traditional classroom I can ask the teacher questions and see them explain it, with online I wouldn't be able to follow the explanation. So its the best for me to be put into a traditional classroom enviorment.

- 1234: I like the traditional the best. I haven't tried the computer-based but I think I'll try it next quarter.

- 1342: Personally I work better by learning mostly through examples in the book. I have never got a better understanding by doing busy work in the class. I would perfer to do homework and review it the next day and then be dismissed. This way works much better for me.

- 1324: Online is hard cause you don't have anyone to ask questions and its at your own pace. I like traditional classes.

- 1342: I prefer traditional math class, because I can learn better being taught visually and being able to listen to instructions.

- 1234: I need the physical interaction of coming to a classroom, having specific times and deadlines, and having a teacher teach me and be able to ask any questions I need to. Online courses are too disconnected for me to learn very easily or as well.

- 1342: Math is one of the most difficult subjects for me. I really benifit from watching a teacher work out problems. I find that math books are often written in a way that can be confusing.

- 4321: I like to work on my own pace, and want to concentrate on my weaknesses.

- 1234: I found that the computer based math lab made it so that I could depend on guessing the right answer because on the HW you could select an answer until you get it right but on the tests it was one chance to get it right. Plus there wasn't any transitioning lectures we just move on to the next subject. I prefer traditional to any style because the whole class is involved and if one person doesn't get it then more than likely someone else won't get it and ask a question and the teacher will answer it for everyone in the class even for those too embarrassed or shy to ask.

- 1234: I learn best when I can visually see the instructor. It's hard to learn online...

- 1234: I prefer to have an instructor on hand in case I need help. I also learn better by hearing an instructor lecture, and not just reading myself.

- 1324: Traditional classrooms provide more interactive and interesting tecniques. When you have a question you can ask & get an immediate response rather than waiting.

- 1324: Traditional Classroom. Because I like to be able to listen & see what we're learning. And that way I can have a teacher show me what I'm doing wrong & right.

- 1324: I preferred hands-on daily assignments to keep pace with the course. Structured class and assignments/tests.

- 1324: Nothing beats human interaction.

- 1423: I would like if the traditional was more move at your own pace because I often will finish my homework for the night in class and be stuck listening to the teacher talk about what to do for the homework for an average of 30 min.

- 4132: I think LWTC should offer more computer assisted and online classes. Especially in today's tech world, people like me in there 20's are more comfortable on a computer and tend to have an easier time learning that way.

- 2134: I would like class to be intertanting like the first paragraph of an essay. And to move at our own pace.

- 2134: A computer based math lab would provide the students with as many tools as they need. The teacher would be there to answer questions that the computer programs may not explain adequately enough.

- 1324: I only register for traditional classes. I will avoid any online classes of any kind. I learn best being in the classroom daily.

- 1324 (MathLab): I think that you should have deadlines for each section so that people don't forget and get behind.

- 4312 (MathLab): Problem with computers - very easy to make typo errors, and there is no partial credit. Advantage - can work at own pace which is a huge +!

Math 99

- 2314: I have struggled with math since junior high. Having a self-paced program where I have contact with a teacher, I have thrived. William Bricken has made math less frightening to me, and I feel I would do terribly with an on-line only math class. I like the idea of the Hybrid - I still have the selfed paced work, but only need to attend class once a week.

- 1244: In traditional classroom you get the best knowledge.

- 1234: The traditional style class is one that works best for me for the math setting, other classes I like different styles.

- 1423: Early in day, 2 hour length is preferable - 2 days per wk. too late at night is harder to learn math concepts.

- 3421: I wish Math099 was offered online to fit my schedule better.

Math 102

- 1234: I like the interaction with instructor and classmates.

- 1432: I love the classroom because it's so interactive. I also took an online class during h.s. and loved the ability to lay in bed and work. Thats why those are my favs.

- 1324: classrooms are an important part of the learning process for myself, being able to come in and discuss w/ other ppl helps sort out any learning issues.

- 1324: the text book is too brief, and the answer book does not have all the answers. So learn with teacher step by step is the best choice.

- 1324: I like live teachers.. they make me more accountable to do my work, when with online classes I procrastinate until the very last minute, lowering the quality. It's also easier to get questions answered in person, than to wait until your instructor is able to check his/her email to get back to you. I'm just a procrastinator. I need the structure of in class lectures to understand & retain info from the course.

- 1432: traditional classroom has always worked and will always work. Online, depends on the kind of math. But it is a good idea.

- 1234: I <u>need</u> the help one on one w/ an instructor sometimes. And the computer often confusses me so <u>please</u> continue classes with instructors. finding the time to work w/ a computer for me is almost impossible.

- 1234: I learn best when interacting with another human. If "discovery learning" was a choice, it would be my #1.

Math 146

- 4213: I would love to do online but I feel there is no time to meet w/ the instructor, it would be helpful to have "online class time", a time when you know that the teacher would be on to help you.

- 1243: Traditional method of teaching is the best, because, it gives students sense of responsibility to be regular, report on time, pay attention in the class, interact with other students, doing homework sincerely and handing it out on time. The class taken by "William" is excellent. He is a very good instructor, & a very cooperative person. I believe that he should be continued to taking statistics & other math courses. I think the computer lab math class would make a very good idea for working in the math-lab. It could serve as a good option to the traditional method, but I would recommend traditional method to be the best as it puts efforts to improve students performance drastically.

- 1---: I don't like others math classes. I prefer only traditional classroom. I want teacher grade me, but not computer.

- 1234: I do much better with a structured class setting with due dates & other "goals" as opposed to "work at your own pace".

- 1234: While other classes such as pyschology or sciences may be effective as traditional classroom, I feel that math is most effectively learned w/ traditional classroom lecture. I have taken online classes, hybrid classes and traditional classroom. I have found by this experience that I learn math most effectively by traditional classroom instruction.

Math 141

- 4231: I do prefer an instructor be readily present for walking through the new material.

- 2134: The easiest way for me to learn is to work at my own pace with instructor helping me whenever I need help. This way I won't slow the whole class down. we worked in a similar way in my Math 099 class and it was the easyest way for me to deal with math. The instructor was there for me every time I needed help -- almost 2, 3 times every class.

- 1324: Math should be held earlier in the day and only for an hour 2x weekly with Quizes not HW.

- 1234: Computers aren't people. If I wanted a cyborg teaching me I would buy a vacuum.

- 1432: I think traditional classrooms are important to have because it's nice to be able to interact with the teacher in person, especially for students who need some extra help. However, I also think online classes are important to have too because sometimes students need more flexibility and cannot always attend classes at the same time. I believe students should be given a choice.

- 1234: Traditional class is better to ask questions than others.

- 1324: Traditional classes when dealing with math is way easier to understand.

- 2134: I find that when it comes to a math class an online class, or portion of a class, might not be the best idea because math is difficult for some people to understand so having a teacher you can ask questions to directly is important.

- 1243: I like the 2x a week style of math class, works well with HW volume and work schedule.

Math 142

- 1224: I like the classes that are think w/ other people. Online class are only for write, reading classes. Math is the class that if I don't understand and I can ask/ discuss w/ teacher or other students and I + helps more than read/try to understand from textbook.