Belief Drives Action: How Teaching Philosophy Affects Technology Use in the Classroom

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Paper Presented at the Annual Meeting of the New England Educational Research Organization, Northampton, MA
April 2005

Introduction

The initial phase of the Maine Learning Technology Initiative (MLTI) provided all 7th and 8th grade students and their teachers with laptop computers. Additionally, professional development was provided to teachers on integrating laptop technology into their curriculum, and schools were provided with technical support. The goal of Maine's laptop program was to prepare Maine's students for the 21st Century. In the words of the Task Force on Maine's Learning Technology Endowment:

> *We live in a world that is increasingly complex and where change is increasingly rampant. Driving much of this complexity and change are new concepts and a new economy based on powerful, ubiquitous computer technology linked to the internet.*
>
> *Our schools are challenged to prepare young people to navigate and prosper in this world, with technology as an ally rather than an obstacle. The challenge is familiar, but the imperative is new: we must prepare young people to thrive in a world that doesn't exist yet, to grapple with problems and construct new knowledge which is barely visible to us today. It is no longer adequate to prepare some of our young people to high levels of learning and technological literacy; we must prepare all for the demands of a world in which workers and citizens will be required to use and create knowledge, and embrace technology as a powerful tool to do so.*
>
> *If technology is a challenge for our educational system, it is also part of the solution. To move all students to high levels of learning and technological literacy, all students will need access to technology when and where it can be most effectively incorporated into learning.*
>
> (Task Force on Maine's Learning Technology Endowment, 2001, p.i.).

Thus, a major goal of Maine's laptop program was, and still is, to help students acquire 21st Century skills using technology. In the fall of 2003, a survey of all teachers involved with the program was administered by Maine Education Policy Research Institute to determine how and to what extent the technology was being used. An analysis of the surveys was completed to answer the following questions:

1. Can responses on teaching philosophy questions be used to predict the amount a teacher uses their laptop?
2. Can responses on teaching philosophy questions be used to predict the amount students use laptops in their classroom?
3. Do prior computer experience, content area, teaching experience, or education levels affect the philosophy-usage relationship?

Teacher responses were analyzed as a whole and also by content area with a focus on how math and science teachers use computers compared to teachers in the other content areas.

Methodology

For this report the responses from 402 teacher surveys were analyzed, which represents a response rate of 27% of all middle school teachers who received Teacher Survey Form B- Fall 2003 (Only Form B contained the teaching philosophies questions). Data analysis was done with SPSS v11.5 using the statistical tool of cross tabulation with chi-square analysis. The survey questions and items that were examined are listed below in tables 1, 2 and 3, and the full survey can be seen in the attached appendix.

Table 1. Teacher Use Questions

On average, how frequently do YOU perform the following tasks USING YOUR LAPTOP?
T1. Conducting research that contributes to lesson plans and curriculum design
T2. Developing instructional materials (handouts, tests, etc.)
T3. Producing homework assignments
T4. Assessing student work
T5. Managing student information
T6. Communicating with colleagues inside and outside the school
T7. Communicating with parents and students
T8. Using presentation software for instructional purposes
T9. Creating and/or maintaining website(s) for instructional purposes
T10. Providing classroom instruction

Table 2. Student Use Questions

How often do STUDENTS in your classroom USE THEIR LAPTOPS to do the following?
S1. Writing first drafts of papers
S2. Editing papers
S3. Working with spreadsheets / databases
S4. Taking notes on the computer
S5. Managing / analyzing information
S6. Researching information using the Internet or WorldBook
S7. Taking tests / quizzes
S8. Doing drills to increase their competency (educational drill software, online quizzes, FunBrain, etc.)
S9. Creating culminating projects to show what they have learned (web pages, multimedia projects, videos, etc.)
S10. Working on short-term assignments / worksheets
S11. Sending / receiving email

Teaching Philosophy Scale:
Different teachers have different teaching philosophies. For each of the following pairs of statements, check the box that best shows how closely your beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the box you check.

Table 3. Teaching Philosophy Questions

Whole Class Structured Model	Facilitator Model
P1. "Students really won't learn the subject unless you go over the material in a structured way. It's my job to explain, to show the students how to do the work, and to assign specific projects."	"I mainly see my role as a facilitator. I try to provide opportunities and resources for my students to discover or construct concepts for themselves."
P2. "The most important part of instruction is the content of the curriculum. That content is what children need to know and be able to do."	"The most important part of instruction is that it encourages 'sense-making' or thinking among students. Content is 'secondary'.
P3. "Students must learn basic skills before they can master complex content."	"Students can learn basic skills in the context of mastering complex content."
P4. "While student motivation is certainly useful, it should not drive what students study. It is more important that students learn history, science, math and language skills in their textbooks."	"It is critical for students to become interested in doing academic work – interest and efforts are more important than the particular subject matter they are working on."
P5. "It's more practical to give the whole class the same assignment, one that has clear directions, and one that can be done in short intervals that match student's attention spans and the daily class schedule."	"It is a good idea to have all sorts of activities going on in the classroom. Some students may produce a scene from a play they read. Others may create a version of the set. It's hard to organize, but the successes are so much more important than the failure."

Initial analysis was done on a question by question basis and then composite scores were generated for the teacher use items, student use items, teaching philosophy items, computer experience, teaching experience and highest degree earned. Next, the data was disaggregated on the basis of prior computer experience, content area taught, experience teaching and highest education level. Those results were then compared to responses on the whole. For the student and teacher use

items, the 6 possible responses were split into two categories: high and low computer usage. The cut off between groups was between once a week (low use) and a few times a week (high use).

Teachers were divided into three groups, those with a more whole-class structured teaching philosophy, those with a more progressive facilitator philosophy for teaching and those who answered neutrally. Teachers were also divided into three categories based on their responses to the question of their overall computer skill level; novice or beginner, intermediate, and advanced or expert. For the teacher experience items, the teachers were divided into 5 groups based on the number of years of teaching experience they had. (1-4, 5-9, 10-14, 15-19, 20+ years) Finally, teachers were divided into 3 groups based on degree earned bachelors, masters, or doctorate. Chi-Square analysis was used to examine the relationship between these groups of categorical data.

Results

As shown in Table 4 and 5 comparing teaching philosophy and use, Chi-Square analysis showed that four of the teaching philosophy questions had a significant relationship with at least one reported usage question. Philosophy questions 1, 3 and 5 were the best predictors for both teacher and student usage with between 7 and 9 corresponding usage questions with significant Chi-Square values for teacher use and between 4 and 6 corresponding usage questions with significant chi-square values for student use. When the teachers were categorized based on their general teaching philosophy and these 3 groups were analyzed to determine their relationship to the composite teacher use and the composite student use scores significant values were found.

Table 4: Teaching Philosophy and *Teacher* Use: Significance Values of Chi-Square Tests.

Teacher Use Item	P1	P2	P3	P4	P5	Composite Philosophy
T1	.032*	.073	.328	.911	.104	.090
T2	.010**	.310	.042*	.890	.014*	.021*
T3	.001***	.745	.018*	.709	.007**	.007**
T4	.029*	.796	.009**	.264	.015*	.020*
T5	.001***	.201	.023*	.809	.002**	.016*
T6	.000***	.063	.013*	.030*	.002**	.006**
T7	.000***	.560	.028*	.026*	.003**	.000***
T8	.008**	.158	.398	.353	.609	.217
T9	.252	.391	.796	.348	.505	.089
T10	.002**	.442	.030*	.267	.032*	.007**
Composite	.000***	.463	.007**	.273	.002**	.005**

Table 5: Teaching Philosophy and *Student* Use: Significance Values of Chi-Square Tests.

Student Use Item	P1	P2	P3	P4	P5	Composite Philosophy
S1	.004**	.130	.051	.299	.000***	.001***
S2	.012*	.884	.010**	.014*	.000***	.000***
S3	.444	.873	.719	.790	.425	.466
S4	.162	.904	.016*	.876	.093	.120
S5	.002**	.784	.068	.835	.195	.169
S6	.192	.677	.052	.793	.018*	.150
S7	.121	.989	.105	.825	.601	.419
S8	.147	.578	.124	.646	.042*	.400
S9	.001***	.242	.001***	.876	.014*	.001***
S10	.218	.764	.017*	.672	.004**	.023*
S11	.072	.167	.075	.238	.068	.024*
Composite	.034*	.561	.028*	.562	.000***	.029*

* Significant at the .05 level, ** Significant at the .01 level,
*** Significant at the .001 level

As can be seen in Table 6, based on composite scores, prior computer experience proved to be a reliable predictor of both student and teacher usage.

Table 6. Computer Experience and Use.

Composite Use	Computer Experience Composite
Teacher Use Composite	.000***
Student Use Composite	.000***

*** Significant at the .001 level

The effects of experience level (number of years teaching) and education level (highest degree earned) were also examined and as can be seen in Tables 7 and 8, are not good predictors of usage with only one significant result between the two factors. Again the categorical data was analyzed using the chi-square significance values.

Table 7. Relationship between Teacher Experience/Education and *Teacher* Computer Use: Significance Values of Chi-Square Tests.

Teacher Use Items	Teacher's Experience	Teacher's Education Level
T1	.690	.644
T2	.772	.333
T3	.411	.512
T4	.225	.781
T5	.324	.610
T6	.045*	.769
T7	.258	.555
T8	.412	.356
T9	.424	.445
T10	.114	.527
Composite	.691	.608

Table 8. Relationship between Teacher Experience/Education and *Student* Computer Use: Significance Values of Chi-Square Tests.

Student Use Items	Teacher's Experience	Teacher's Education Level
S1	.771	.380
S2	.575	.811
S3	.110	.661
S4	.598	.538
S5	.773	.868
S6	.899	.587
S7	.312	.337
S8	.280	.103
S9	.064	.759
S10	.492	.592
S11	.838	.868
Composite	.417	.662

* Significant at the .05 level

Table 6 shows that among science and math teachers the composite philosophy score was not significantly related to student or teacher usage patterns. Those teachers who teach subjects other than math or science had composite philosophy scores that significantly affected student usage pattern but not teacher use.

Table 6. Relationship between Content Area and Computer Use: Significance Values of Chi-Square tests.

Composite Use	Science Teachers	Math Teachers	Science and Math Teachers	Other Content Area Teachers
Composite Teacher Use	.563	.096	.657	.108
Composite Student Use	.583	.723	.814	.019*

* Significant at the .05 level

Discussion

The analysis of the survey responses shows that there is evidence that teaching philosophy does impact computer use both by the teachers themselves and by the students in their classrooms. Certain philosophy questions were more predictive than others and those that were more

predictive were also more polarizing in nature, separating whole-class structured teaching philosophies from facilitative teaching philosophies. The best predictor of computer use is prior computer experience. This may suggest a need for additional pre-service computer training and on-going professional development if computers are going to be used extensively in all classrooms. It may simply be that the more comfortable and knowledgeable a teacher is with computers the more likely they are to use a computer themselves and to utilize the laptops in their instruction. However, it could also be that teachers who like computers know how to use them, and are more apt to use the computers in their classrooms. In order to increase computer use across all categories it may be necessary to mandate some level of computer instruction in all content areas. Currently decisions on computer use are made at the district level and while some districts have pushed their teachers to integrate computers into instruction others have taken a more lassie-faire approach. If the goal of the program is to educate all of the youth of Maine with 21st century skills then there must be a way to ensure all students are receiving this education.

The next step is making sure that the computers are used to effectively facilitate learning across the curriculum. Teachers need to be provided with additional support and information to make this happen. Further research should focus on what types of professional development are most effective in both increasing a teacher's computer skills (possibly increasing the "likeability" of the computers) and shifting teacher's philosophies toward a more facilitator type of model. Then teachers will become more comfortable with their own use of computers and more likely to use them for instruction in their classrooms. Additional research should also be done to examine the differences in usage among teachers in different content areas. Exploration into the "best practice" ways to incorporate computer use into each subject areas will provide teachers

with concrete ways to increase technology use into their instruction and provide students with the skills necessary to be successful in the 21st century.

Reference

Department of Education, Task Force on the Maine Learning Technology Endowment, Augusta, Maine (2001). *Teaching and Learning for Tomorrow: A Learning Technology Plan for Maine's Future*.

Appendix.

This is a list of the items analyzed, as found on the Teacher Survey Form B- Fall 2003.

1. On average, how frequently do YOU perform the following tasks USING YOUR LAPTOP?	**Never**	**Less than once a week**	**Once a week**	**A few times a week**	**Once a day**	**Often during the day**
Conducting research that contributes to lesson plans and curriculum design	O	O	O	O	O	O
Developing instructional materials (handouts, tests, etc.)	O	O	O	O	O	O
Producing homework assignments	O	O	O	O	O	O
Assessing student work	O	O	O	O	O	O
Managing student information	O	O	O	O	O	O
Communicating with colleagues inside and outside the school	O	O	O	O	O	O
Communicating with parents and students	O	O	O	O	O	O
Using presentation software for instructional purposes	O	O	O	O	O	O
Creating and/or maintaining website(s) for instructional purposes	O	O	O	O	O	O
Providing classroom instruction	O	O	O	O	O	O
Other: _____	O	O	O	O	O	O
Other: _____	O	O	O	O	O	O

2. How often do STUDENTS in your classroom USE THEIR LAPTOPS to do the following?	**Never**	**Less than once a week**	**Once a week**	**A few times a week**	**Once a day**	**Often during the day**
Writing first drafts of papers	O	O	O	O	O	O
Editing papers	O	O	O	O	O	O
Working with spreadsheets / databases	O	O	O	O	O	O
Taking notes on the computer	O	O	O	O	O	O
Managing / analyzing information	O	O	O	O	O	O
Researching information using the Internet or WorldBook	O	O	O	O	O	O
Taking tests / quizzes	O	O	O	O	O	O
Doing drills to increase their competency (educational drill software, online quizzes, FunBrain, etc.)	O	O	O	O	O	O

2. How often do STUDENTS in your classroom USE THEIR LAPTOPS to do the following?	**Never**	**Less than once a week**	**Once a week**	**A few times a week**	**Once a day**	**Often during the day**
Creating culminating projects to show what they have learned (web pages, multimedia projects, videos, etc.)	O	O	O	O	O	O
Working on short-term assignments / worksheets	O	O	O	O	O	O
Sending / receiving email	O	O	O	O	O	O
Other: _____	O	O	O	O	O	O
Other: _____	O	O	O	O	O	O

3. Different teachers have different teaching philosophies. For each of the following pairs of statements, check the box that best shows how closely your beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the box you check.

"I mainly see my role as a facilitator. I try to provide opportunities and resources for my students to discover or construct concepts for themselves."						"Students really won't learn the subject unless you go over the material in a structured way. It's my job to explain, to show the students how to do the work, and to assign specific projects."
O	O	O	O	O	O	O
"The most important part of instruction is the content of the curriculum. That content is what children need to know and be able to do."						"The most important part of instruction is that it encourages 'sense-making' or thinking among students. Content is 'secondary'.
O	O	O	O	O	O	O
"Students must learn basic skills before they can master complex content."						"Students can learn basic skills in the context of mastering complex content."
O	O	O	O	O	O	O
"It is critical for students to become interested in doing academic work – interest and efforts are more important than the particular subject matter they are working on."						"While student motivation is certainly useful, it should not drive what students study. It is more important that students learn history, science, math and language skills in their textbooks."
O	O	O	O	O	O	O
"It's more practical to give the whole class the same assignment, one that has clear directions, and one that can be done in short intervals that match student's attention spans and the daily class schedule."						"It is a good idea to have all sorts of activities going on in the classroom. Some students may produce a scene from a play they read. Others may create a version of the set. It's hard to organize, but the successes are so much more important than the failure."
O	O	O	O	O	O	O

10. How would you rate your overall skill level in the use of the laptop for instruction? ***(Please check only one)***

_____ Novice
_____ Beginner (i.e. word processing, email)
_____ Intermediate (i.e. Spreadsheets, PowerPoint, etc.)
_____ Advanced (i.e. integrating technology into class work)
_____ Expert (i.e. can teach staff how to operate various programs/peripherals)

15. Concentration area in which you teach: **(C*heck all that apply*)**

_____ Science	_____ Foreign Languages	_____ Mathematics
_____ Language Arts	_____ Social Sciences	_____ Fine Arts
_____ Technology	_____ Special Education	_____ Physical Ed./Health
_____ Gifted/Enrichment	_____ Library Services	_____ Guidance

16. How many years have you been teaching? _____ years

17. Highest Level of Education Completed: (*please check one*)

_____ Bachelor's Degree	_____ Master's Degree plus credits
_____ Bachelor's Degree plus credits	_____ Certificate of Advanced Study
_____ Master's Degree	_____ Doctorate