Impact of Intel Teach Essentials on Teachers' Instructional Practices and Uses of Technology (Abridged Version)

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Introduction

The research literature on educational technology has identified a number of important contextual factors that influence how technology is used in educational settings. Three of the most important of these factors are:

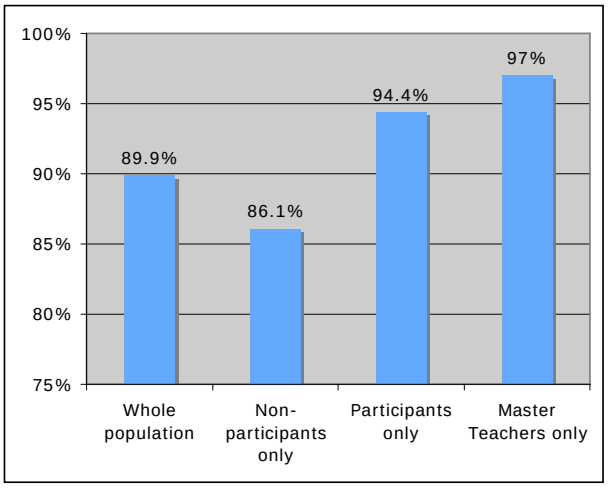
- Teachers' pedagogical beliefs
- Teachers' access to adequate technology resources, and
- Teachers' access to quality professional development in technology.

For six years, the Education Development Center (EDC) has been investigating the ways in which the Intel Teach Essentials professional development program interacts with these contextual factors to support effective integration of technology into K–12 classroom teaching. In May of 2006, EDC conducted a survey with over a thousand teachers, some of whom participated in Intel Teach Essentials and some of whom did not. We found that each of these factors alone had some impact on teachers' use of technology. But, we also found that interactions among the factors, both at the individual teacher level and the district level, often had even more pronounced influences on teacher behavior. Key findings from our survey analysis are presented below.

Program participants use technology in their teaching more than non-participants

While our analysis of the survey data indicated that most respondents were technology users (88.9 percent), we found that more program participants than non-participants used technology. When responses were broken down by program participation, 94.4 percent of participants reported using technology in their practice, while only 86.1 percent of non-participants did so. This difference is even more pronounced for Master Teachers; 97 percent report using technology in their practice (Figure 1). These data suggest that program participants, particularly Master Teachers, are somewhat more comfortable with technology than non-participant teachers, and that they are finding more ways to use technology in their day-to-day practice.

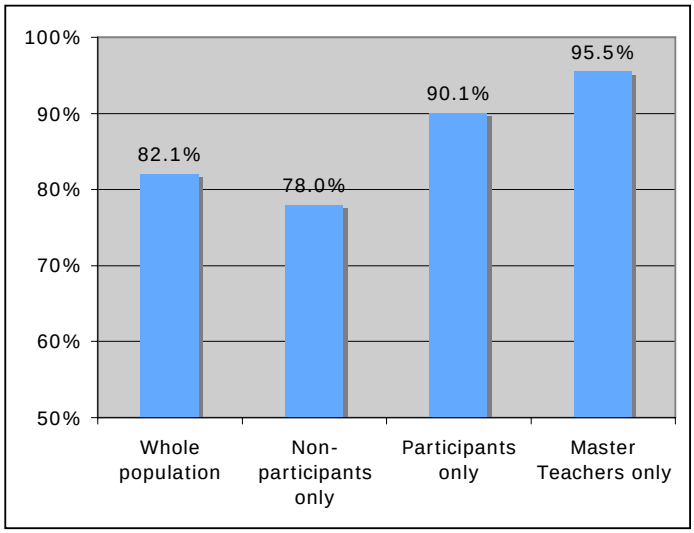
Figure 1. Percentage of respondents who use technology in their practice



Sample: ***Whole population*** *(n=948);* ***Non-participants*** *(n=627);* ***Participants only*** *(n=320);* ***Master Teachers only*** *(n=66)*

Although using technology to support one's teaching practice is an important step in the process of educational technology integration, the primary purpose of Essentials is to help teachers use technology in the classroom. Therefore, the survey asked teachers whether they used technology with their students. The majority of all teachers surveyed (82.1 percent) said that they did. Again, program participation appeared to support greater technology use. Participants (90.1 percent) were more likely to report using technology with students than non-participants (78 percent), and 95.5 percent of Master Teachers reported that they used technology with their students (Figure 2).

Figure 2. Percentage of respondents who use technology with their students



Sample: ***Whole population*** *(n=951);* ***Non-participants*** *(n=628);* ***Participants only*** *(n=323);* ***Master Teachers only*** *(n=66)*

Teachers use technology more if they have a Master Teacher on staff

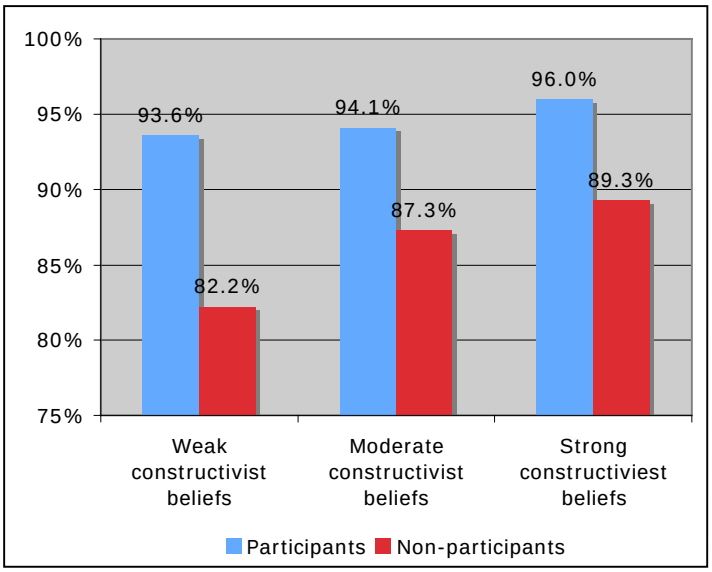
In addition to directly training teachers, the Essentials Course is designed to build school and district capacity by training Master Teachers within districts who can provide professional development and on-going support for all teachers in the use of technology. The survey data indicate that teachers' responses differ if they have Master Teachers working in their schools, whether or not the teachers themselves participated in the program. For example, a higher percentage of teachers who had Master Teachers in their schools reported using technology in their practices (93.4 percent) and with their students (88.2 percent) than those who did not have a Master Teacher in their building (86.9 percent and 79.7 percent, respectively). Having a Master Teacher also appears to impact collaborative activities among teachers. Respondents were more likely to report working with their colleagues on technology-integrated lessons (29.3 percent) than respondents without Master Teachers in their schools (20.3 percent). In addition, respondents who had a Master Teacher in their school were significantly *less* likely than those who did not to say that they lacked administrative, technical, and instructional support in their school.

The Essentials Course is particularly effective at encouraging "teacher-centered" educators to use technology

The research on effective technology integration shows that teachers' pedagogical beliefs impact their educational technology practices. In particular, teachers who hold student-centered or "constructivist" pedagogical beliefs tend to value technology integration more than those whose beliefs about teaching are more teacher-centered. EDC evaluators used data from survey questions asking respondents about their teaching beliefs to cluster respondents into three groups: teachers with strong constructivist beliefs (SCB), moderate constructivist beliefs (MCB), and weak constructivist beliefs (WCB). These groupings were then used to determine if there was a relationship between teachers' pedagogical beliefs and their responses to other survey questions.

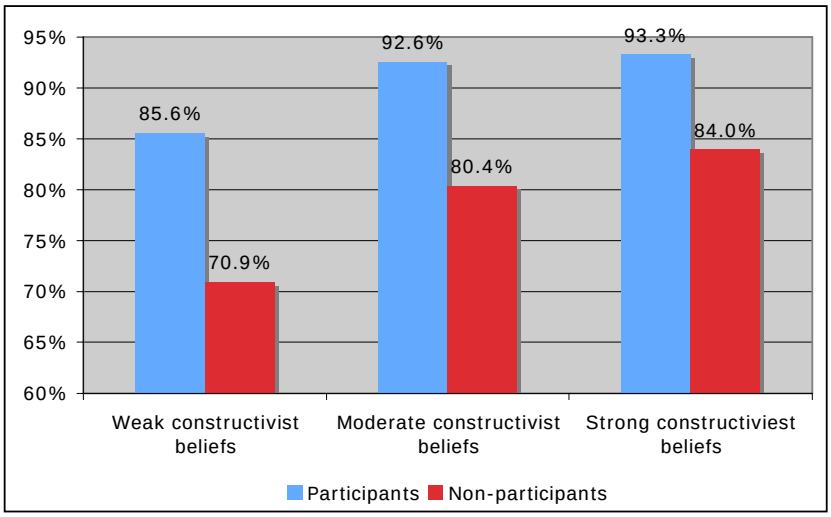
Our analysis showed that there was an interesting interaction between program participation, teachers' pedagogical beliefs, and what teachers do in their practice and with their students. While program participation seems to have an impact on teachers no matter what their beliefs, Essentials appears to facilitate greater changes among teachers with weak constructivist beliefs than on those with strong constructivist beliefs. For example, a comparison between participants and non-participants who use technology in their teaching practice, broken down by pedagogical beliefs, shows greater differences in the behavior of the two groups as they become less and less constructivist (Figure 3). The same is true when we examine the differences between participants and non-participants in their uses of technology with their students (Figure 4).

Figure 3. Percentage of participants and non-participants who use technology in their practice, by pedagogical beliefs



Sample: ***Weak constructivist beliefs:*** *Participants (n= 110) and Non-participants (n= 203);* ***Moderate constructivist beliefs:*** *Participants (n=135) and non-Participants (n=291);* ***Strong constructivist beliefs:*** *Participants (n=75) and Non-participants (n=131)*

Figure 4. Percentage of participants and non-participants who use technology with their students, by pedagogical beliefs



Sample: ***Weak constructivist beliefs:*** *Participants (n=111) and Non-participants (n=203);* ***Moderate constructivist beliefs:*** *Participants (n=136) and Non-participants (n=291);* ***Strong constructivist beliefs:*** *Participants (n=75) and Non-participants (n=131)*

Because teachers' pedagogical beliefs are often shaped by the policies and practices of environments in which they work, we decided to analyze the survey data by district as well as by individual teacher. The analysis showed that some districts had a much higher percentage of SCB teachers than others. The program appeared to have a different kind of impact in different districts, depending on how "constructivist" the district was. In all districts except the one with the highest percentage of SCB teachers, 5–10 percent more participants than non-participants reported using technology in their teaching practice. In addition, in the three districts with the least constructivist teachers, 5–8 percent more participants than non-participants reported using technology with their students.

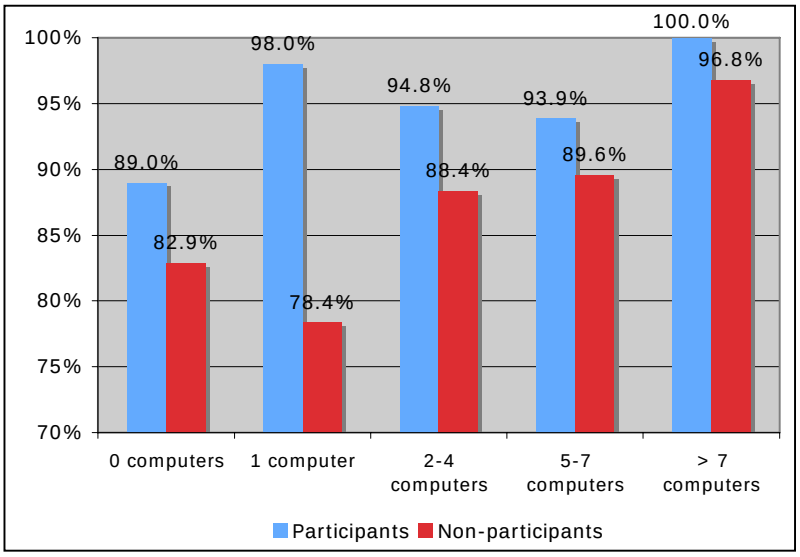
It is difficult for a single program to transform participants' belief systems. However, a program like Essentials can provide participants with concrete tools, resources, and strategies that they can implement in the classroom, perhaps leading teachers to try instructional practices they might not otherwise have used. These findings suggest that the program may bring about greater change among teachers whose pedagogical beliefs make them less inclined to use technology, and in those districts where constructivist pedagogy is not the norm. The data suggest that the Essentials Course may effectively influence teachers with weak constructivist beliefs to integrate technology in their practice and with their students.

The Essentials Course is particularly effective at encouraging teachers with poor technology access to use technology

We looked at the interactions between technology access and program participation and their impact on teachers' use of technology. We found greater differences in the use of technology between program participants and non-participants who had no computers or only a small number of computers in their classrooms (Figure 5). In particular, program participation seems to make the most dramatic difference for teachers with only one computer in the classroom. Almost every participant (98 percent) with one computer used

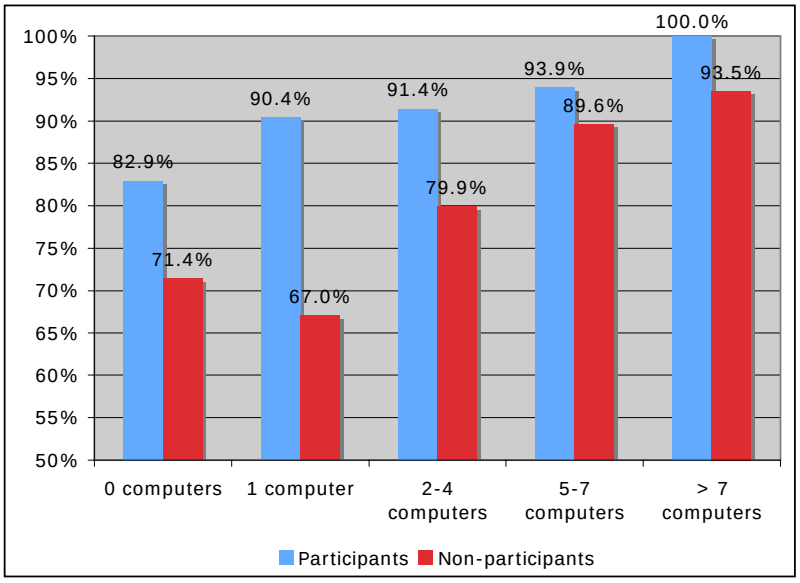
technology to support her or his practice, while only 78.4 percent of non-participants with one computer did so. There are also greater differences in the use of technology with students between participants and non-participants with 0, 1, or 2–4 classroom computers than between those who have 5 or more (Figure 6).

Figure 5. Percentage of participants and non-participants who used technology in their practice, by number of classroom computers



*Sample: **0 computers:** Participants (n=82) and Non-participants (n=140); **1 computer:** Participants (n=57) and Non-participants (n=88); **2-4 computers:** Participants (n=115) and Non-participants (n=259); **5-7 computers:** Participants (n=33) and Non-participants (n=48); > **7 computers:** Participants (n=34) and Non-participants (n=62)*

Figure 6. Percentage of participants and non-participants who used technology with their students, by number of classroom computers



*Sample: **0 computers:** Participants (n=82) and Non-participants (n=140); **1 computer:** Participants (n=51) and Non-participants (n=88); **2-4 computers:** Participants (n=116) and Non-participants (n=259); **5-7 computers:** Particip2nts (n=33) and Non-participants (n=48); > **7 computers:** Participants (n=34) and Non-participants (n=62)*

These data suggest that once teachers achieve a certain level of access (five computers), nearly all use technology with their students. However, when teachers do not work in technology-rich classrooms, a program like Essentials may be the catalyst some teachers need to begin integrating technology into their instruction.

Conclusion

The key findings from our survey analyses — that the program is most effective for teachers with the weakest constructivist beliefs and the poorest access to technology — is interesting because it is, perhaps, counter-intuitive. The program was initially designed for teachers who are already comfortable with technology and open to project-based pedagogy, teaching them to use technology most effectively. This would lead one to expect that those teachers with the best access to technology and the strongest constructivist beliefs would get the most out of the program. What these findings actually suggest, however, is that even though constructivist teachers with substantial access to technology can benefit from the training, the program offers *new* ideas and strategies to those teachers who are not working in the optimal conditions or whose existing beliefs do not lead them to engage in innovative practices. Previous research on the Essentials Course suggests that, because these new ideas are integrated into concrete instructional materials that teachers make themselves and take back to the classroom, program participation can actually lead to the kinds of differences in behavior that these survey results reflect.

It is important to note that over 90 percent of the survey population as a whole reported being involved in a wide range of technology professional development. This fact makes the differences between Intel Teach Essentials participants and non-participants that much more striking. If all technology professional development were the same, one would not expect differences between the two groups. This combination of findings suggests that Intel Teach Essentials is facilitating a moderate but real process of change toward more technology-rich, project-based instruction, in particular for those participants who might not otherwise have had the opportunity or inclination to make technology an integral part of their teaching practice.