

Computers in Schools: Ten Points to Avoid Past Errors

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The path to the successful use of computers in schools is full of traps and pitfalls. Evidence suggests that the easiest uses of computers should be implemented at the early stages and gradual introduction of more sophisticated uses should be implemented only as the adequate experiences and skills are acquired. Measures that can be implemented to avoid past errors include providing adequate teacher training in computer use for education purposes, deciding whether to buy existing software or commission new software to meet local needs and solving financial and logistical problems of computer maintenance before the computers are shipped to the schools.

1. It is vital to ensure that in the initial stages people are not demoralized by weak or disastrous results. In the 1980s, the French program to put one hundred thousand computers in schools was a severe disappointment, demoralizing its proponents and making subsequent efforts more arduous. Other countries had similar disasters.

2. In the past, many attempts to bring computers to schools failed due to the shortcomings of the hardware. But this is no longer the case. Computers are far more reliable, and have relatively long lives without too many troubles. Yet, they do require maintenance. It is imperative to make provision for maintenance budgets or preferably to allocate maintenance funds from the same budgets paying for the purchase of the computers. Without maintenance, schools quickly become huge digital graveyards. Some American schools prefer to buy computers at a higher price but with longer maintenance contracts built in. This is because it is easier to obtain funds for the initial purchases than for the subsequent maintenance. Israelis go further and require that sales, maintenance and software be provided by the same vendor, to prevent one seller from blaming another and evading its obligations. Therefore, ***computers should not be shipped to schools until the financial and logistical problems of maintaining them have been solved.***

3. Once the hardware problems became less important, the next hurdle in using computers in school is the software. There are many superb pieces of software today, even though most are less than superb and there is much room for improvement. A dearth of software is no longer the bottleneck. The question, however, is their choice. ***Computers should not be shipped to schools without a minimum kit of software.*** Expecting schools to purchase software before they become used to having computers in classrooms is not realistic and will delay their introduction, with all the problems that creates. Bringing computers to schools is controversial enough without the added accusations that the computers remain idle. Newspapers will surely call attention to schools without chalk and blackboards while others spend fortunes on computers that are never used.

4. After hardware and software, the third great hurdle in the introduction of computers in schools is teacher training. ***Almost all evaluations indicate that lack of preparation of teachers is the number one difficulty.*** Conversely, all successful initiatives result from a serious and well-thought-out effort to train teachers to use them.

5. In order to ensure the political survival of the initiative, it is necessary to ensure the immediate utilization of computers. Therefore, a fail-safe strategy is required. In other words, a strategy is needed to ***get computers going immediately after their installation.*** From a political point of view, it does not matter if the initial uses are neither brilliant nor ultra-creative. The greatest enemy at this initial stage is the tyranny of the purists. If they have the upper hand, initial utilization will be delayed, giving ammunition for those who dislike computers in schools.

6. There are at least three schools of thought in the utilization of computers in schools. Each has its strengths and weaknesses. The first sees the computer as a *teaching machine*, be it for spelling and simple arithmetic or for tutoring the student along curricular lines. The second is to use the computer to *develop thinking skills* and to enrich education, deploying its potential to simulate problems and stimulate the intellect. The third is to use the *computer as a tool*, in the way that enterprises do. In this case, computers are used in school to prepare students to use computers at work. We could also mention a fourth use: games. There are many games that do have considerable potential for developing important cognitive skills, and there is evidence that even games that do not claim any educational consequences can bring some learning; playing with computers is in itself a learning of consequence. Somehow, schools will have to choose amongst these uses or a combination of them. Individual schools should have the freedom to find their own solutions, although they should not be forced to make such a difficult and controversial decision before they are familiar with computers.

7. The relative merits and shortcomings of each of the alternatives in point 6 are by now well known. Above all, *it is not permissible to ignore the mistakes of the past*. The most lofty and noble use of computers is to teach how to think. Those who saw a demonstration of LOGO have had a chance to glimpse the potential of computers to develop intellectual skills. Those who saw simulation programs such as Oregon Trail or Sim City might have become fascinated with the potential of simulations, the interdisciplinary explorations and the flights of imagination which are possible with high-speed computers with vast graphic capabilities. This is the most thrilling path from an intellectual perspective. Anybody concerned with quality education will not be untouched by the potential offered by those wonderful programs. And this is where the danger lies. The accumulated experience in the last fifteen years shows the difficulties of successful implementation of these programs. *The development of intellectual skills does not offer a viable rationale for the massive introduction of computers in the short run*. National programs to introduce computers are well advised not to start along these lines. It will not work. It requires a long period of preparation of teachers, while the public expectation is for immediate action. This is not to say that this alternative should be abandoned altogether. In fact, it may be a common goal for all in the long run and it should start immediately in some special programs, where conditions are from the start more favorable. These should be islands of experimentation and creativity.

8. The most pedestrian and unremarkable use of computers is to drill students in arithmetic operations, solving equations, correcting spelling and so on. But in actual fact, this is what has really worked in schools. The reason is simple; *Teachers are the ultimate arbiters of whether the computers are used or kept idle*. Unless computers help rather than hinder, they will remain turned off. Teachers will only use the computer if they find that it benefits them. Teachers simply will not use them if it takes too long to master the skills of using the machine and its software; if it takes longer to prepare classes; if there is the risk of an embarrassing situation where the computer gets stuck or crashes (with the even greater risk that some insolent kid will get it unstuck); if its proposed use does not follow the curriculum; or if the skills learned are not required in tests. Any of these situations will kill the use of computers. But experience shows that teachers appreciate the infinite patience of computers to drill again and again in multiplication or division or any other repetitive task. The reasons could not be more down to earth: drill and practice programs save time, energy and drudgery, and hence they are used. As an initial strategy, there are excellent reasons not to snub this use of computers. On the contrary, *it is necessary to provide schools with drill and practice programs and to prepare teachers to use them*. It is likewise necessary to sell this strategy intelligently, lest it acquires a negative connotation.

9. Along this line, some additional thoughts are in order. Gone are the days when it made sense to write drill and practice programs in Basic, in order to teach irregular verbs or to recall historical dates. Gone are the days in which authoring tools were offered to teachers in the hopes that they would translate their courses into tutorial programs. The big software houses killed the hopes for such amateurish approaches. Today, a run-of-the-mill educational software program will cost at least \$100,000 and the more sophisticated a lot more. Therefore, *national programs to introduce computers need to check existing software and decide whether there are exceptional cases where new software needs to be commissioned*.

10. *Teaching students how to use computers as a productive tool is a safe way to bring computers to schools.* If there are some applications that most enterprises use, it makes sense to teach students how to work with the most versatile of all tools existing at the end of the century. This is a constructive use of computers in schools and an easy path to embark on. In concrete terms, it means teaching students how to use a word processor (desktop publishing is the next step), a spreadsheet, a database and graphic tools. There is ample legitimacy for such uses and the software is immediately available. In addition, considering the widespread availability of computer courses teaching these skills, there is usually a good supply of instructors. ***Computers should not be shipped to schools without a complete package of productivity software.*** Installing the software is a task beyond the capabilities of schools. The next task is to develop appropriate strategies to use these productivity tools. To begin with, touch-typing is a most valuable skill. Keyboard training is a good way to start, even though not all proponents of computers in school share this view. It is also important to prepare teachers to give their students interesting and practical exercises for the productivity tools. We should not expect the teachers to invent creative examples or to develop templates that are interesting to the students. These examples should be close to the world of the students and, if possible, useful to them.