

The Growth of Instructional Technology

Moursund, D.G. (1997) The growth of instructional technology. *Leading and Learning with Technology*. Eugene, OR: ISTE.

The S-shaped growth curve is an important tool for analyzing the future adoption and implementation of a technology. It is a graphical representation of adoption levels of a new product over time. Figure 1 shows an example S-shaped growth curve.

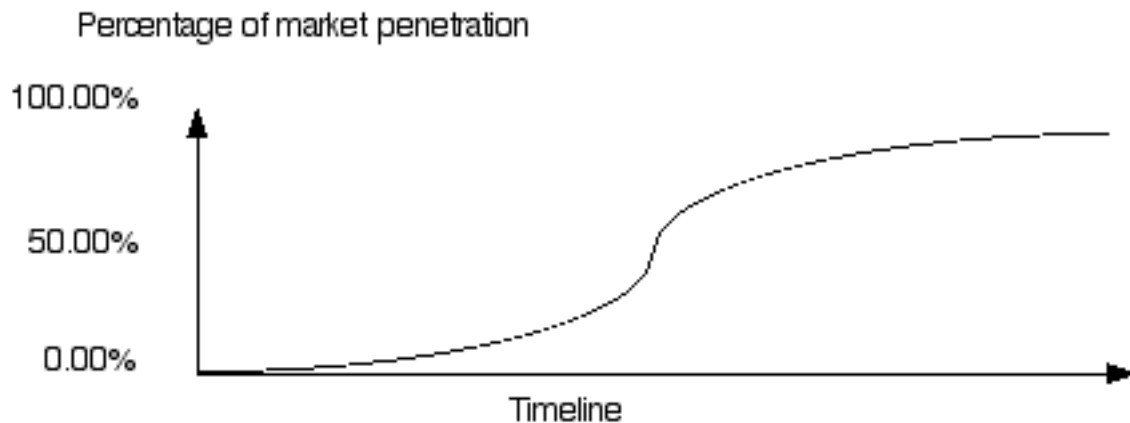


Figure 1. S-shaped growth curve.

Television provides a good example of this type of growth. When television was first invented there were no television stations, no televisions sets for sale in stores, and no television programs. It took quite a while for the infrastructure to be developed. In addition, the new product had to compete with radio, movies, live theater, and sporting events. Initially, its quality was low and its price was high. All of these things caused the initial rate of growth for the industry to be quite slow.

Gradually, the barriers to the development and growth of the television industry were overcome. More and more people decided to purchase television sets. The industry experienced rapid growth. The middle part of the S-shaped growth curve shows this type of rapid pace of adoption.

Eventually the market for television sets matured. The market became saturated, and growth in sales slowed. The television market became a replace-and-upgrade market.

Instructional Technology in Education

There are a number of different aspects of instructional technology (IT) in education that may be subject to the S-shaped growth curve, including the following practical and instructional concerns.

- Hardware. We are moving toward a learning environment in which students have access to appropriately powerful hardware whenever and wherever it is pedagogically appropriate.

- Connectivity. We are moving toward an environment in which students have access to high-bandwidth interactive connectivity whenever and wherever it is pedagogically appropriate.
- Software. In the future, students will have routine access to a very wide range of tool, computer-assisted learning, and self-assessment software, as well as distance education opportunities.
- Curriculum. We are moving toward full integration of IT as a routine component of the content of the everyday curriculum. Specifically, we are moving toward the integration of IT into all academic curriculum, rather than offering only basic “computer literacy” courses.
- Instruction. We are moving toward an instructional environment in which IT is a fully integrated routine component.
- Assessment. IT will be a routine component of the content of everyday assessment.
- Professional development. In the future, all teachers will be fully qualified to make effective educational use of IT, and they will continue to learn about advances in technology throughout their teaching careers.

Of course, each of these components can be broken into subcomponents. For example, hardware includes portable computers that students carry, powerful multimedia machines with larger display screens, printers, scanners, digital cameras, and so on. As another example, in a secondary school the curriculum is broken into a number of distinct courses. Definitions can be developed to describe what it really means to fully integrate IT into each of these courses.

Nationwide Progress Toward These Goals

For each of these components, we can look at implementation levels throughout the United States and how they might look in the future. In this type of analysis, the measure is the percentage of schools in the country that have achieved the goal. If the 20-year forecasts in the September editorial prove to be correct, the growth curve for a number of these components might look like Figure 2,

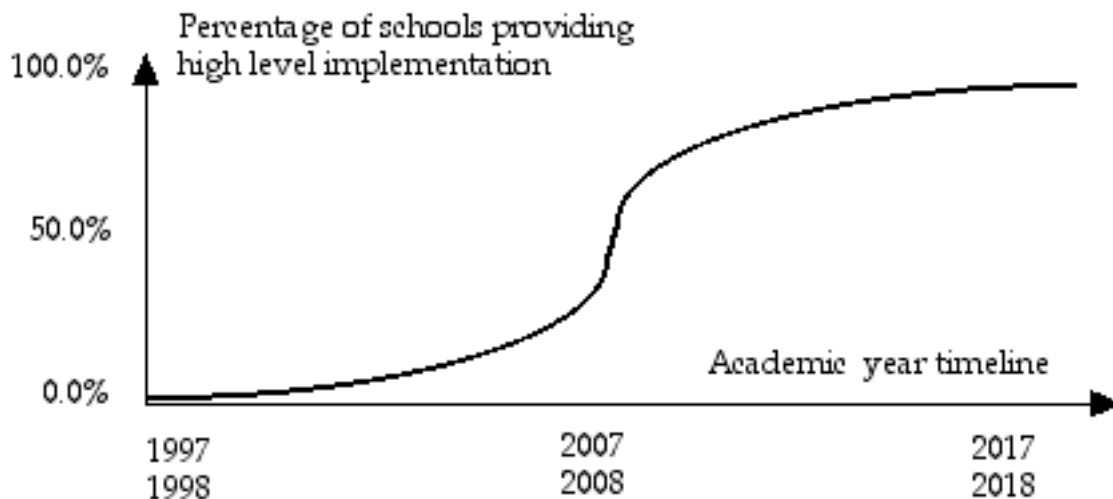


Figure 2. National adoption of IT in schools.

Figure 2 suggests that less than 1% of schools in the U.S. have currently achieved the specified goal.

The growth curves for each component will be somewhat different. The overall timeline, the time when the most rapid growth occurs, and the steepness of the growth curve at that time will all vary.

Measuring School-Level Implementation

For each of the components, one can also develop a Levels of Implementation scale that can be used by an individual school or school district. To do this, we need a more precise definition of the target goal for a component, and then we need clear definitions of intermediate steps toward that goal.

For example, consider the hardware component. A goal might be to provide every student with a portable computer with midrange capabilities. Progress toward this goal can be measured in terms of percentages achieved. Thus, a rating of 15% would indicate that 15% of the hardware specified in the goal was available.

Progress on many of the goals can be measured by use of a Likert scale. Of course, it is necessary to define the points on the scale. For example, a seven-point Likert scale (see Figure 3) to measure integration of IT into the curriculum might be based on the following points:

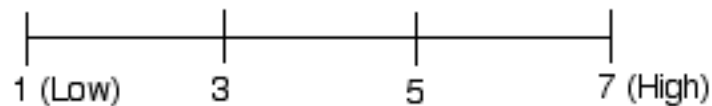


Figure 3. Likert scale.

1. Little or no use of IT in the content of the everyday curriculum.
3. IT is a significant part of the curriculum approximately once a week.
5. IT is a significant part of the curriculum approximately three times per week.
7. IT is fully integrated into the everyday curriculum.

Final Remarks

There are many political aspects of education, and recently education has become of increasing political importance at the state and federal levels. President Clinton (as cited in Applebome, 1996) talked about IT goals in education in his State of the Union speech nearly two years ago.

Every classroom in America must be connected to the information superhighway, with computers, good software, and well-trained teachers. We are working with the telecommunications industry, educators, and parents to connect 20% of the classrooms in California by this spring, and every classroom and library in America by the year 2000 (p. A9)

Applebome (1996) reviewed the costs associated with such goals.

The Department of Education's preliminary cost estimate for the proposal is about \$10 billion; a McKinsey & Co. consulting study completed last summer for the National Information Infrastructure Advisory Council estimated the cost for the kind of system proposed by the President (i.e., a computer for every four or five students) to be about \$47 billion (p. A9).

Schools and school districts may want to develop and publicize measures of their progress toward achieving the goals being discussed by politicians and educational leaders.

References

Applebome, P. (1996, January 25). Computer idea gets mixed response. *New York Times*, p. A9.

Moursund, D. (1997). *The future of information technology in education*. Eugene, OR: International Society for Technology in Education.