“You can see the computer age everywhere but in the productivity statistics.”
Robert Solow, Nobel Prize–winning economist.

SUMMARY

This chapter explores issues and challenges related to the collection of data about the use of information and communication technologies (ICTs) in education in East Asia. Despite widespread efforts across the region to introduce ICTs in education systems, little comparable data exist to help guide policy makers as they make important investment decisions. This knowledge gap complicates efforts of many Asian countries to benchmark their progress and to ensure that their ICT investments for schools are strategic, are cost-effective, and have an impact.

Background and Context

Across East Asia, enthusiasm for the use of computers and other information and communication technologies in education is undeniable and widespread. While the contexts for such use differ considerably—from the highly developed urban centers of Shanghai, China, and of Singapore to rural villages in Cambodia and in the Lao People’s Democratic Republic—the promise and potential of ICTs to help address a whole host of educational challenges are compelling. However, levels of actual ICT use in education systems in the region vary widely, not only between economies, but also within economies.

Attempts to answer many of the pressing policy questions we have about the use and potential impact of ICTs in education are complicated by the fact that we still do not have reliable data to compare across regions. As hard as it may be to believe, given the large investments being made in ICTs and their increasing economic importance, basic answers to many fundamental questions about the use of ICT in schools remain largely unanswered. Some of these pressing questions include the following: To what extent—and how—are computers being used within classrooms? How connected are schools? What do ICT-related initiatives in the education sector cost, and what is the related impact?

Many groups are trying to gather more data on ICT use in education, but until recently many of these efforts have been uncoordinated. Notably, the World Bank participates in the international Working Group on ICT Statistics in Education (WISE), which is led by the United Nations Educational, Scientific,
and Cultural Organization (UNESCO) Institute for Statistics (UIS). This effort is part of a larger international, multistakeholder initiative called the Partnership on Measuring ICT for Development, which aims to improve the availability and quality of ICT data and indicators, particularly in developing countries. The partnership is an important component of the World Bank’s education work and, in particular, its Benchmarking Education Systems for Results initiative.

Why Attempt to Benchmark ICT Use in Education?

Creative and innovative applications of ICTs have long been seen as important tools to enable educational reform processes, with the potential to improve both the access to and the quality of education. The Internet explosion that occurred in the 1990s, the emergence of a variety of low-cost computing devices, and the increased diffusion of computers throughout society ushered in a wave of ICT and education policies and projects around the world.

As an increasingly interconnected and digital world emerged—one which saw skills required by the industrial economy increasingly superseded by the demands of the knowledge economy—governments tried to adjust school curricula to equip their students with new, “21st-century” skills. In this regard, most education systems in Asia have generally been like their counterparts in other regions of the world—somewhat slow to adapt, tending to narrowly focus on technical ICT skills rather than the full range of skills needed. These programs require that students think creatively, be able to problem solve, effectively communicate, identify and analyze existing information, and create knowledge.

A range of pedagogical approaches have been proposed to help learners to develop those Information Age skills that are now in high demand. Based on research on how people learn, these methods include student-centered learning, active learning, project-based learning, and inquiry-based learning—to name just a few. Yet while the integration of ICTs into the learning process holds great potential to enhance these pedagogies, implementation to date has fallen short of this promise. In other words, ICTs are not yet transforming education, despite the high hopes of many reformers. That said, the increasing diffusion of a variety of ICTs throughout East Asian societies and education systems suggests that even if “transformation” has not yet occurred, many of the necessary preconditions that can help enable such a transformation are being put in place.

Given the general lack of regionally comparable data on the magnitude of ICT education investments and their effectiveness, the first step is to benchmark the basic enabling environment in each economy. This means gauging the level of physical infrastructure and human resources in schools and education systems, as well as measuring the degree of access to and use of basic ICT infrastructure and the presence of trained teachers and technical specialists to facilitate that use. Collecting and analyzing data about this first-stage enabling environment provides a foundation on which larger, more fundamental investigations of the impact of the use of such infrastructure can be built.
Measuring the Impact of ICT Investments

There is much we still do not know about the impact of investments in ICT use in education and the related overall costs. We do not have a good handle on how to measure the types of impacts we hope to bring about through the introduction of things like “one-to-one computing”—where each student has his or her own computing device. Such efforts require different measurement instruments from the traditional standardized learning assessments. With very few exceptions, very limited data have been published to help us understand the costs of such initiatives, especially those related to the total cost of operation over time, and the way such costs are calculated is often not very transparent. Hence, collectively, we are often unable to answer a basic question posed by finance ministries seeking to discriminate between numerous worthy projects and initiatives contending for investment: How much “impact” will this initiative get me, and what will this “impact” cost?

While there is much that we still do not know about the best or most effective models for the diffusion and use of ICTs to meet a variety of educational objectives, appropriate models and good practices are emerging. Knowledge about such models and practices is slowly diffusing, thanks in part to the use of ICTs themselves. Moreover, even when cost-benefit analysis is absent, policy makers are confronted with a further policy challenge: what is the cost of not investing in this area? If they delay, and do not invest now, many governments are afraid that they may be outpaced by other, more daring societies ready to make bold investments to compete in an increasingly technology-driven global economy. There is, regrettably, no simple answer to such questions. Some advocates for action recall the words of Nobel laureate in economics Robert Solow, who in 1987 remarked, “You can see the computer age everywhere but in the productivity statistics.”

The largely accepted economic imperatives for investment in ICTs, coupled with the perception of educational benefits, often result in sufficient political will for action in this area. Though educational reform is difficult, the purchase of computers for schools, for example, offers a tangible symbol of a government’s commitment to investment in change, and ICTs themselves can often be important vehicles to help bring about desired reforms. It is not just the government that can be held responsible for embracing the so-called ICT revolution; educational leaders, teachers, parents, and students can also help to achieve tangible results on the ground. These efforts should be aided by a strong commitment to evaluating the impact of various initiatives and practices and to learning from the results.
What Should—or Can—We Measure?

The UIS-led Working Group on ICT Statistics in Education has identified sets of more than 50 core and supplemental indicators that can be helpful in benchmarking the use of ICTs in East Asia. These indicators, summarized in figure 9.1, help address a number of key policy questions related to political commitment; infrastructure; teaching staff development; curriculum; usage; participation, skills, and output; and outcomes and impact. These factors should be understood within the context of a larger operational and conceptual framework for ICT integration in education (UIS 2009).

Figure 9.1. Benchmarking ICT Use in Schools

A subset of these indicators relates to the basic ICT infrastructure available in schools and within education systems more broadly. Specifically, these indicators are:

1. **Learners-to-computer ratio**
   *To explore the opportunities or limits for using computers in schools to promote or expand computer-assisted instruction.*

   This is the most requested data point on technology use in education around the world, and for that reason alone it is useful to collect regionally comparable data in this area. It is thought to be a useful simple proxy for the level of penetration of computers into schools.

2. **Proportion of schools with Internet access, by type**
   *To measure the overall level of access to the Internet in schools and the opportunities or limits for the use of computers in primary and secondary schools, by type of Internet access.*

   An important concern in East Asia relates to the use of the Internet as an access point to education materials.

3. **Proportion of learners who have access to the Internet at school**
   *To measure Internet accessibility among learners for educational purposes.*

   Anecdotal evidence suggests that where the Internet is available in schools, it may be used by only certain segments of the school population or for administrative purposes. By building on indicators 1 and 2, this indicator is meant to help provide additional granularity to investigations of how broad Internet access is for students.

4. **Proportion of ICT-qualified teachers in primary and secondary schools**
   *To measure the extent to which primary and secondary school teachers have the required ICT training to teach basic computer skills or computing classes.*

   The preponderance of evidence suggests that teachers need to be trained if investments in ICTs for schools have any chance of having an impact on educational practices at a classroom level. Imparting basic ICT literacy is thought to be an important first step in this process.

5. **Proportion of learners (by gender) enrolled at the postsecondary and tertiary level in ICT-related fields**
   *To measure the share of learners by gender in ICT-related fields of study in postsecondary and tertiary educational institutions.*

   It is widely believed the introduction of ICTs into educational settings may raise profound equity issues. One of the proxies often used to measure gender disparities in ICT use is how many students intend to major in computer-related fields. Any attempt to benchmark ICT use in education across East Asia, let alone the impact of such use, must begin with the collection and analysis of such basic data.
Benchmarking ICT Use in Education in East Asia

A recent pilot survey coordinated by UNESCO-Bangkok that attempted to collect the type of data outlined in the previous section for a select number of economies shows just how far we have to go. Of all the policy domains in the education sector surveyed as part of the recent World Bank–UNESCO System Assessment and Benchmarking Education for Results (SABER) study, the ICT domain had the lowest completion rate, and much of the data collected were not current. Why was this the case? Probably the most significant factor is that there are very few systematic and formal initiatives in the region to collect even basic ICT-use data. When information does exist, it invariably comes from data sources outside of the education sector itself and does not appear to be gathered according to common methodologies and definitions. These factors are complicating efforts in the region to have policy and investment decisions driven by data rather than by untested conventional wisdom, political calculation, or the basic intuition of key decision makers.

**Figure 9.2.** Percentage of Primary and Secondary Schools Connected to the Internet

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage Connected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea, Rep.</td>
<td>100%</td>
</tr>
<tr>
<td>Mongolia</td>
<td>80%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>20%</td>
</tr>
</tbody>
</table>

Source: Author’s compilation.

**Figure 9.3.** Nature of School Internet Access as Percentage of Schools Connected

- **Fixed broadband**
- **Fixed narrowband**

Source: Author’s compilation.
Across the region, as in the rest of the world, it is increasingly common to hear senior government officials call for “all schools to be connected to the Internet.” Of all the core indicators outlined by the UIS-led working group (WISE), progress toward the goal of “connecting schools” appears to be the easiest to measure, although defining what it means to be “connected” can often differ radically among countries. Let’s compare, for example, three countries: Indonesia, the Republic of Korea, and Mongolia. From one perspective, Indonesia is the outlier here, as only 11 percent of its schools are connected, compared to 87 percent in Mongolia and 100 percent in Korea.

Dig a little deeper, however, and a different picture emerges. In Korea, 100 percent of schools are connected to broadband Internet at some of the fastest speeds in the world. Of the schools connected to the Internet in Indonesia and Mongolia, almost all of them use fixed narrowband connections—less than 256 kilobits per second. So when one evaluates the state of school connectivity in Mongolia, the answer depends on the goal, which may, on the one hand, be enabling teachers and students to communicate via e-mail or, on the other hand, be facilitating real-time access to rich media learning resources online. For the latter, a fast Internet connection is what really matters.

Conclusions

Almost a decade ago, UNESCO’s landmark Meta-Survey on the Use of Technologies in Education in Asia and the Pacific attempted to analyze ICT access and use in education in the region (UNESCO-Bangkok 2004). Since that time, there has been no significant regional data collection effort. For a region generally considered by many in the rest of the world to be at the vanguard of technology use, this omission may strike some as rather puzzling—especially given that regular data collection efforts related to technology use in education are under way in Europe, North America, and—more recently—South America. Absent basic data about how ICTs are being used in the education systems in their countries and how this usage compares with usage in other countries—both in the region and in the rest of the world—educational policy makers in East Asia and Pacific may face fundamental disadvantages compared to many of their counterparts in other regions of the world as they seek to ensure that their investments in this area are cost-effective and impactful.
References


