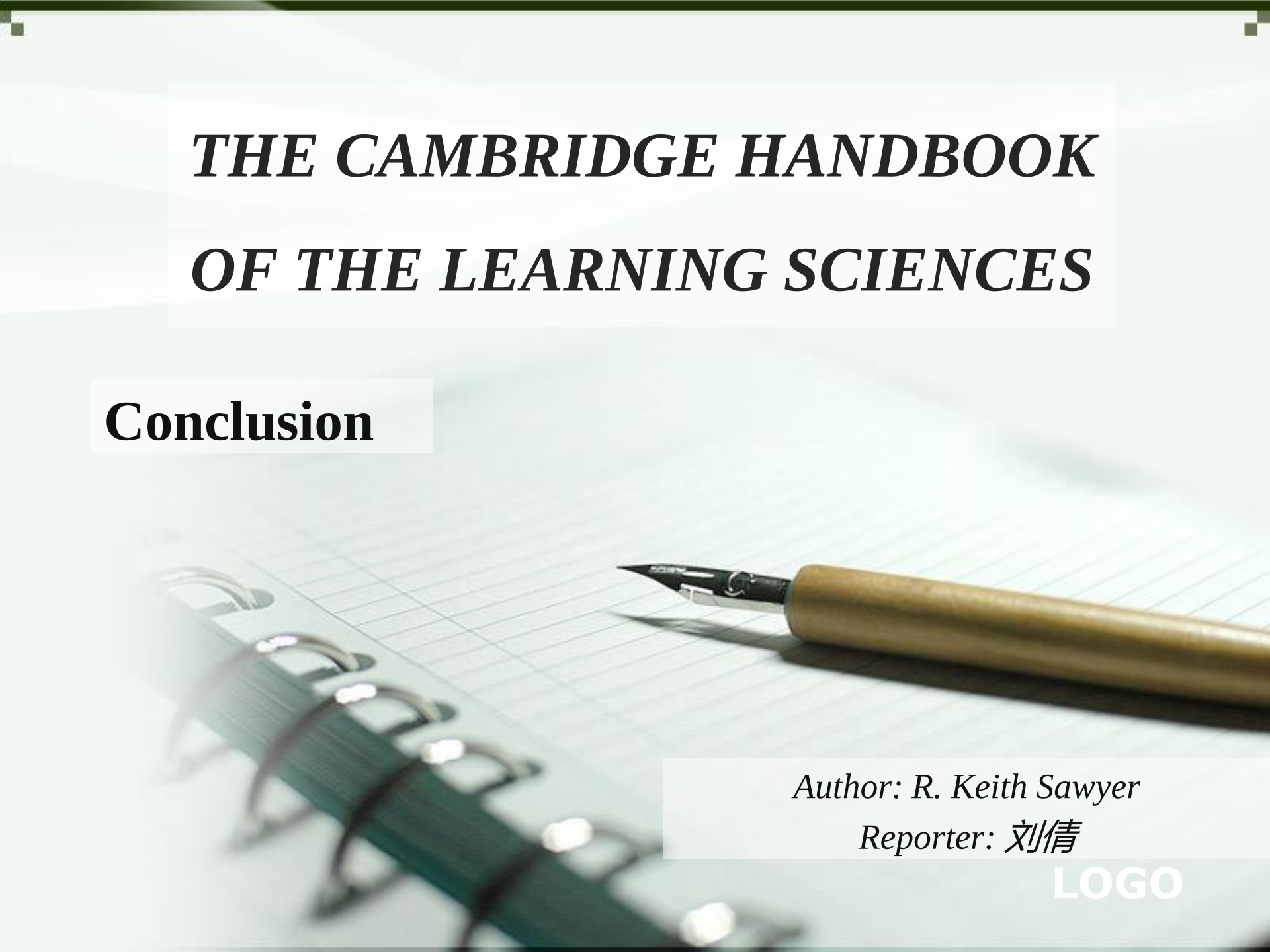
THE CAMBRIDGE HANDBOOK OF THE LEARNING SCIENCES

Conclusion



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LOGO

Content

The Future of Learning: Grounding Educational Innovation in the Learning Sciences

Today, each of them is poised to have a significant impact on education:

- Tablet computers
- Although smartphones
- The App store
- Inexpensive e-readers

The Future of Learning: Grounding Educational Innovation in the Learning Sciences

Furthermore, since 2006, the following Internet-based educational innovations have been widely disseminated, widely used, and widely discussed:

- Massive open online courses (MOOCs)
- Learning Management Systems (LMS)
- The flipped classroom
- Online college degrees

The Future of Learning: Grounding Educational Innovation in the Learning Sciences

Everyone seems to agree that education in the 21st century is in need of transformational innovation. But what sort of innovation? And what will the innovation process look like – how do we get there from here? Most policy makers and media stories tend to focus on two drivers of educational innovation:

- The application of market models to the education sector
- The increasing involvement of the private sector in education

The Future of Learning: Grounding Educational Innovation in the Learning Sciences

If we are to succeed in creating the schools of the future, educational innovation and technology must be grounded in the learning sciences. The learning sciences are showing us how to design the learning environments of the future – learning environments that teach the deep knowledge and adaptive expertise required in an innovation age.

Computers and the Schools of the Future

Learning scientists build learning environments that are based on scientific principles. As we've seen throughout this handbook, carefully designed computer software can play a critical role in these learning environments. However, learning scientists know that for 50 years, reformers have been claiming that computers will change schools – and these predictions have never come to pass.

The fundamental differences are that learning scientists begin by first developing a foundation in the basic sciences of learning, and their computer software is designed with the participation of practicing teachers and is grounded in how people learn.

The teacher of the Future

The learning sciences focuses on learning and learners. Many education researchers are instead focused on teachers and teaching.

The teachers of the future will be highly **trained professionals**, comfortable with technology, with a **deep pedagogical understanding** of the **subject matter**, able to respond improvisationally to the **uniquely emerging flow of each classroom** (Sawyer, 2004, 2011). They will lead teams of students, much like a manager of a business or the master in a workshop, preparing students to fully participate in the knowledge society.

The teacher of the Future and Computers and the Schools of the Future

www.youtube.com
A day made of glass2

Incompatibilities between Schools and the Learning Sciences

In an influential book, learning scientists **Allan Collins and Richard Halverson** *(2009)* identified several entrenched features of today's public schools that might make them resist the necessary changes emerging from the learning sciences:

- *Uniform learning versus customization*
- *Teacher as expert versus diverse knowledge sources*
- *Standardized assessment versus individualized assessment*
- *Knowledge in the head versus distributed knowledge*

New Methodologies

Experimental studies that randomly assign students to either a new educational intervention or a traditional classroom remain the gold standard for evaluating what works **best to improve learning**. This method is known as the randomized controlled trial (RCT) and is commonly used in medicine to evaluate new drugs and treatments. But medical research does not consist only of RCTs. Medical research proceeds in roughly five phases:

Preclinical	basic scientific research. A wide range of methodologies are used.
Phase 1:	Feasibility. How to administer the treatment; how much is appropriate. Again, a wide range of methodologies are used.
Phase 2:	Initial efficacy. How well does it work? Quasiexperimental methodologies are typically used.
Phase 3:	Randomized controlled trial (RCT). The gold standard, the controlled experiment is necessary to prove efficacy of the treatment.
Phase 4	Continuing evaluation and follow-on research.

New Methodologies

A typical learning sciences research project involves at least a year in the classroom; sometimes a year or more in advance to design new software and learner-centered interfaces; and a year or more afterward to analyze the huge volumes of videotape data, interviews, and assessments gathered from the classroom.

Many learning scientists have ***developed new technological tools*** to help with ***analyzing large masses of complex data*** *(Baker & Siemens, Chapter 13, this volume)*, and ***new tools for digital video*** ethnography are ***being developed*** *(Goldman, Zahn, & Derry, Chapter 11, this volume)*.

8. Building the Community

The large community of ***educational technologists*** and ***instructional system designers*** who develop computer software for instructional purposes. This community includes university researchers but also for-profit software companies developing a range of educational technologies for corporations and schools.

The large community of ***cognitive psychologists*** and ***cognitive neuroscientists*** who are studying basic brain functions that are related to learning.

The large community of ***educational psychologists*** that are studying a wide range of psychological functions related to learning. A subset of this group that will be particularly important to bring into the learning sciences will be assessment researchers, both in universities and at institutions like the Educational Testing Service (*the developer of many widely used tests in the United States, including the SAT, AP, and GRE).*

The Path to Educational Innovation

In the next 10 to 20 years, the task facing all knowledge societies will be to **translate learning** sciences research into **educational practice**.

The **relationship between the institution of school** and the rest of society **may need to change**, as network technologies allow learners to interact with adult professionals outside the school walls, and **as classroom activities** become **increasingly authentic** and **embedded in real-world practice.**

The Path to Educational Innovation

Standardized tests must be rewritten to assess **deep knowledge** as well as **surface knowledge**, and to **take into account the fact** that because of customization, different learners might learn different subject matter.

Teacher education programs must **prepare teachers for the schools of the future** – teachers who are **experts in disciplinary content**, knowledgeable about the latest research on how people learn, and able to respond creatively to support each student's optimal learning.

Thank you !