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Book Reviews

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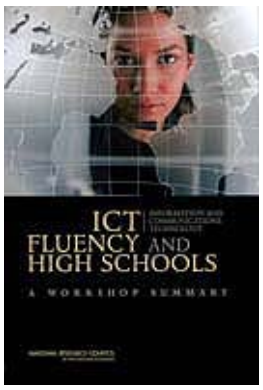
ICT FLUENCY AND HIGH SCHOOLS: A WORKSHOP SUMMARY



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High speed improvements which have appeared in recent twenty years in information and communication technologies (ICT) which have marked our era require each individual who will constitute societies of the future to have at least the basic skills relevant to the use of ICT. For this end, it is inevitable that the ICT has great importance especially in secondary education and takes place in the many curricula starting from elementary school years. Because it should be expected from an undergraduate-level student to be able to show certain abilities on using ICT, and to be able to learn new concepts on her/his own by taking advantage of this knowledge accumulation that s/he has acquired. This will be also a significant step for the "life-long learning" mission stressed in the book.

It is no doubt that adaptation of the ICT to curricula will bring many challenges along. For instance, a standard ICT integration practice in schools that differ a lot from one another in terms of both their curricula and the social environments in which they are situated, will it enable obtaining equally successful results from all of these schools? (Tearle, 2003). Additionally, practices implemented have demonstrated that in order to be able to improve the efficiency of ICT integration and to enhance the expectations from this concept, it is necessary to conduct many research studies before initiating a new modernization which may be considered as a reform in this field (Reynolds, Treharne and Tripp, 2003).

Adaptation of ICT to curricula has become one of the most important issues that were particularly addressed by states' ministries of education. China, for example, rendered an information technology course compulsory for all high school students. Likewise, Australia is encouraging the use of ICT in schools and preparing various programs regarding this subject. Finland in Europe, on the other hand, is working on diverse education programs aiming at developing teachers' and students' knowledge-building skills. Moreover, it is conducting various studies related with bringing down ICT integration which it takes for the most significant key of becoming an information-society to pre-primary education level (Sinko and Lehtinen, 1999). As for the United Kingdom, which adopts a more innovative and enthusiastic approach, a programme called *Key Stage ICT Literacy Assessment* that was developed for ICT literacy of 12-13 year-old children has been put into force.

This book, which is of report nature, summarizing topics of a workshop which was held in October 2005 in the United States and which targeted generalizing use of information and communication technologies among high school students, has been edited in such a way that each session of the workshop is covered by one chapter. The main objective of the Workshop was to enhance "Being Fluent with Information Technology" report published by the National Research Council in 1999. Presentations of speakers have been generally shaped

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around capabilities relevant to information technology concept which may be grouped under three main levels as follows:

1. Ability to use up-to-date computer practices.
2. Adoption of fundamental principles which are computing, networking and information science.
3. Possessing the ability of benefiting from experience and knowledge accumulation acquired on ICT in bringing solutions to complex situations and problems.

In addition, capabilities that one should have under each level are given in detail under 10 items.

The given workshop which was held in 2005 commits to enhance "being fluent with information technology" phenomenon which takes place in the report published in 1999 in three ways; which are firstly setting the requirements for updating the report of 1999, secondly revealing promising efforts for developing high school students' ICT skills and finally putting forth new approaches for assessment of these skills, which is, in our opinion, the most important of all.

The workshop organization committee requested all participants to take into consideration the following four critical questions in their presentations:

- Do developments in the field of ICT require the renewal of qualities necessary for being fluent in this field?
- In high school students' field of ICT, what may be the necessary elements that may enable them to be functional in the society now and in the future?
- To what extent are the courses in practice to promote students' ICT information accumulation effective?
- What may be advanced level researches to constitute the base for the reform necessary for students to acquire formerly-mentioned capabilities on three levels?

Major topics and some attention-drawing points addressed by the participants may be listed as follows:

Rather than the importance of ICT themselves, how they would be taught was underlined and it was stressed that change in this regard was inevitable. Social effects of developments that have appeared in recent 50 years generally in the field of technology and specifically in the field of ICT are undeniable. It was expressed that particularly between 1950-1990 where computers were through a development process, including people in important positions in those years, none could imagine the progress achieved as of today. Bill Gates' statement in mid-80s in this respect which implied that nobody would need a computer RAM of more than 640 kb was referred to. Parallel to this rapid progress, it was emphasized that the ICT related skills that are supposed to be held by individuals forming up the society need to be continuously updated.

It was noted that it was necessary for a teacher to have ICT fluency in order to make a preference as for which ICT s/he has to use while teaching a lesson. In more general terms, attention was drawn to the fact that another meaning of ICT fluency possession was the ability to decide on cases in which ICT were to be used.

It was expressed that use of technology by students were quite broad but also shallow at the same time, and as an example to this, it was told that children playing with Sims software were observed to be interested in 3D construction techniques in the game, rather than the mathematical model which took place in the background of the game and which would ensure a more profound learning. It was mentioned that it was necessary to adapt ICT especially to the field of science and mathematics education so that a more profound ICT learning could be ensured; and furthermore, it was stated that one of the important points in ICT learning was the necessity to support teachers' professional development.

It was emphasized that as much as it was for making students obtain ICT skills, it was also important to encourage students' willingness to acquire these information and skills. Tom Friedman's ascertainment in this regard, quoted by Eric Klopfer, is interesting: "Youth's Britney Spears in Japan is Bill Gates. However, in this country, youth's Britney Spears is Britney Spears" (Friedman, 2005).

High school students are more familiar with today's computer and information technologies than their teachers, because unlike their teachers, these students were directly born into this technology. Hence, it was underlined that teachers, too, would be obliged to change their attitudes and approaches in the face of their students as a result of studies to be conducted in order to promote ICT fluency of their students. Thus, ICT education for teachers is also important, which is the first one of the facts relevant to this issue. A second fact is the problem of financial source that would be necessary for schools to adapt themselves to ICT. The third fact in this respect is noted to be the necessity to keep the bar as high as possible while preparing ICT programs. Because it has been argued that the more students are expected to perform, the higher is their success in terms of ICT fluency.

In conclusion, consensus has been reached on the view that the rapid development appeared in recent twenty years in ICT and effects of this development on social structure of the society as well as changes probable to occur in curricula in coming years are inevitable. It would not be so correct to call 21st century as the era of technology or specifically the era of computers. It is observed that topics standing out in this century are improving individuals' and as a natural result

of this, primarily high school students' ability of thinking, problem solving and self-learning by ICT literacy and applying lifelong learning principle to these concepts. Consequently, it was stated that teachers' missions concerning ICT was not only to make students acquire formerly-set skills, but also to improve their skills and to access on their own new and more advanced information related to ICT. Since information learning in literal sense will not be realized unless it is also used by the individual her/himself. Moreover, it was stressed that ICT education had to be introduced through integration to current courses, not as a separate module in curricula, and some components were proposed to be included in science, mathematics and some others in social courses.

I believe that forming the platform which will constitute a base for several scientific studies needed in this field and putting forth realistic problems and concrete proposals to solve these problems; this work makes up for an important gap.

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THE ART OF TEACHING SCIENCE: INQUIRY AND INNOVATIONS IN MIDDLE AND SECONDARY SCHOOLS

by Jack Hassard
Oxford University Press, New York.
2005
xix+476 pp.
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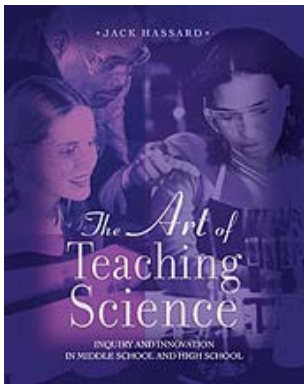

The title of Hassard's *The Art of Teaching Science* indicates that the book was written for the reader who is concerned with pedagogy. Beyond the need to know science content, it appears that Hassard's primary preoccupation in this book is for the science pedagogue to see the artistry of science teaching. Therefore, the book is written in a hybridized handbook-methods tone, yielding a welcome innovation.

Reminiscent of his earlier books, such as *Science as Inquiry* and *Minds on Science,* Hassard's *The Art of Teaching Science* captures both tradition and innovation. Each chapter includes two sections. The first section deals with traditional treatments of the topics, similar to that found in traditional textbooks. However, in a very Hassardian fashion, there are departures from the conventional through the inclusion of what he calls "Invitations to inquiry." These are sets of questions which pose, not only as harbingers of things to come, but as potential discussion questions. The second section combines such elements as case studies,

"science-teaching literature," and "science teacher gazettes" to situate the previous and forthcoming information for better understanding. There are also "minds-on" strategies which are meant to be corollaries to the "hands-on" components of teaching and learning.

The book is broadly divided into four parts: 1) The art of teaching science, 2) The goals and the curriculum of school science, 3) Connecting theory and practice in science teaching, and 4) Strategies of science teaching. The topical treatments harmonize with the inherent, natural progression in science methods courses.

In part one, "The art of teaching science," Hassard explains the "artistry of teaching" (p. 4), noting that the imagination and creativity of the artist is no different from that of the effective teacher. In the tradition of conventional methods texts, he provides a fundamental view of the nature of science, science and human values, science and inquiry, and different modes of instruction. He then raises some philosophical questions for the reader's contemplation. He leaves no stone unturned in this matter. Therefore, even a reading of chapter one alone provides the reader with a historical network of knowledge as if he were weaving knowledge with a thread; the thread of inquiry. By chapter 2, Hassard would have impressed the reader with a solid, comprehensive platform from which to thrust the reader into deeper waters.

In chapter 2, captioned, "Science for all," Hassard treats about global issues at length, and then tackles the issue of multicultural science teaching, gender issues, and exceptional learners of science firmly. These issues are brought to life by the inclusion of multiple case studies of real classroom experiences.

In part two of the book; "The goals and the curriculum of school science," Hassard provides a historical account of science teaching in the United States, including a historicized account of science in the school curricula. These kinds of accounts are generally insipid to the palates of many students. However, Hassard manages to make this information more palatable by relating the information as if he were a historian-story-teller. For example, on p. 92, one reads the following: "Now, let's shift our attention away from the content of the early science and take a look at the nature of inquiry in science teaching. What were its roots? When did it emerge in science teaching?" Whereas some avoid the historical and may think that Hassard offers too much history, others may find the blend of historical information, coupled with a strong reference base a treasure trove from which to do further probing on specific points of interest.

In part three, "Connecting theory and practice in science teaching," Hassard confesses that he is a reversalist who prefers going from "practice to theory" because of his own professional experiences (p. 171). He believes that experience and reflection are more powerful ways to learn about the art of teaching. However, Hassard apparently realizes other preferred orientations. Therefore, he includes comprehensive contents for understanding the learning of science—from the most generic constructs to the most specific concepts of learning and cognition—with illustrations, thus mitigating any possible deficiencies his personal preference may pose for his readers.

By part three of this book, Hassard's strength and veteranship in metacognition are apparent. For the methods teacher, the names to know and the concepts and theories about learning to understand are explained and illustrated in scientific terms. For the lover of metacognition-pedagogy, vertical and lateral connections are made in order to foster understanding. It appears that Hassard sets this part up in order to usher the reader into the next part of the book, where the connections between "how students learn science" (p. 167) ultimately translates into "strategies fostering thinking in the science classroom" (p. 331).

In Part IV, "Strategies of science teaching," Hassard really struts his stuff as a master strategist, and takes on the reader with him. In chapter 9, he talks of strategies for fostering thinking in the science classroom, followed by how to facilitate learning in the science classroom (chapter 10). One aspect; the art of questioning, is particularly interesting. This is so, because many of the issues raised in science education literature are fluidly translated into practice. For example, on pages 335-6, Hassard discusses the concepts of low-inquiry and high-inquiry questioning and "wait time," and provides ideas to accommodate them. Vygotsky's language-related concepts are translated into the sociology of teaching science, thereby connecting "talking science" (p, 341) with the art of questioning. In this section of the book, Hassard's inclination to classroom practice becomes obvious when he devotes pages to issues such as room arrangements (p. 380), student misbehavior in the lab (p. 395), and parent-teacher conferences (p. 395).

At the end of Part IV, Hassard appears to get into his element as a leading technologist in science education. He treats Science, Technology, and Society with excellent fluidity that will be very difficult to rival—especially through the topics and ideas provided for engaging students through the use of technology. Throughout the chapter—and indeed throughout the book—Hassard offers simple, yet elegant ideas for teaching the topics.

This is the last of Hassard string of science textbooks. The print is smaller and looks serious. However, he mitigates this with a friendly writing style, thus making the whole text more inviting. A causal, perusal of the detailed table of contents would reveal that Hassard wanted this book to become his compendium for science teachers: It contains an encyclopedic caliber of knowledge base, thus making it

not only a comprehensive textbook, but also a strong reference book. Given this observation, it comes as no surprise that he calls it a "handbook" (p. xv). In terms of content, this book was written with authority and confidence—as a master would teach his students. However, the tone of inquiry leaves open doors for reader reflection and questioning. This intermingling offers a sense of comforting finality to the contents, yet with the voice of invitation. Ultimately, this open-boundedness grants the reader the permission to wander within tangible, cognitive boundaries—yet knowing that there awaits solid, research-based, teacher-attested information.

Another impression Hassard leaves his readers is that he is a collector—of knowledge. From the very start to the end of the book, he includes real-life teachers' experiences to suit every chapter or oftentimes topics. There are ideas scattered throughout the book for not only the new teacher, but also for veterans to refine their skills. This kind of teacher-originated information could only be executed in several years of active collection.

For instructors of lateral entry teachers; teachers who are obsessed with the everyday, practical challenges of teaching, Hassard's "practice to theory" approach is a very good fit. Incidentally, it is for this reason that veteran teachers may also find this book useful. Interesting, however, it appears that Hassard is in luck, for this "practice to theory" approach is actually a multi-edged sword in practice: whereas the in-service professional may read the book from a practical standpoint, the pre-service student may benefit all the same, since the book is replete with practical applications of the theory. Concomitantly, for instructors who are concerned with bringing real-life teachers' voices into their science methods courses, Hassard's book becomes an attractive option.

In summary, Hassard's *The Art of Teaching Science* is a compendium of science education knowledge base that all readers—from pre-service and in-service teachers through science educators—will find a handbook to keep on hand.

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