

# The Case for History in the Information Technology Curriculum

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## ABSTRACT

Often, Information Technology (IT) curricula omit addressing historical context of technological developments. When they occur, these omissions often are defended with one of three justifications: 1) IT can be taught, understood, and applied without benefit of any historical context; 2) IT instructors are not professional historians and, therefore, are not qualified to teach history; or 3) There is not enough time in a typical IT curriculum to teach history as well as technological applications. Rejoinders to each of these justifications educe a roadmap for including the study of historical context at all levels of study in the typical IT curriculum.

## Categories and Subject Descriptors

A.1 [Introductory and Survey]; A.2 [Reference]: – *Encyclopedias*; H.5.3 [Group and Organizational Interfaces]: – *Theory and Models*.

## General Terms

Design, Human Factors, Management, Theory.

## Keywords

History, Curriculum.

## 1. INTRODUCTION

Even if we could convince students that the things we teach are indeed useful, why should that make it interesting to them? We have sold Information Technology (IT) short by presenting it only as "the art of science," since the mere utility of a subject does not necessarily generate any excitement for it. For many the excitement comes from the creative, artistic aspect of the subject, and its intellectual fascination.

Another serious drawback to the traditional IT approach is that it deprives students of the sense that Information Technology is a process. On a small scale, modern textbooks and typical methods of instruction fail to illustrate the way the pioneers and inventors

actually struggled as they thought out and worked on technological devices and ideas. On a larger scale, IT students are deprived of the long-term process by which a theory/device emerges from struggling with one or more central problems, often over many centuries.

These processes, however, are the very things that IT students need to understand. No wonder that so many people, even those who have had a fair amount of Information Technology in college, are incredulous when one tells them that, yes indeed, there is a lot of research going on in present day Information Technology, and that this is what really makes Information Technology tick. They have only seen a seemingly petrified structure, with no remaining trace of its creative human origins, and all at least 100 years old.

Too often, IT curricula do not include information on and discussions of the historical contexts that influenced—and were influenced by—information technology development. During June 2003, a random look at 100 IT curricula accessible through the Internet, revealed only 31 IT curricula included a specific course in the history of Information Technology.

Significantly, The SITE Curriculum Committee's "Draft Accreditation Criteria Baccalaureate programs in Information Technology" specifically states "Graduates of baccalaureate programs in Information Technology must have the ability to . . . analyze the impact of technology on individuals, organizations and society, including ethical, legal policy issues . . . [and] Recognize the need for continued learning throughout their career . . . [Also] The curriculum must stress underlying principles upon which the core technologies are based." [24]

Interestingly, the SITE Curriculum Committee's "IT Curriculum Proposal – Four-Year Degrees" nowhere explicitly addresses where in the IT curriculum students will acquire the background to meet the standards cited in the previous paragraph. We propose that such cultural background belongs in a required History of Information Technology course in the IT curriculum. [25]

Arguments offered in defense of omitting history from the IT curriculum can be summarized in three broad reason categories: No Relevance (IT can be taught, understood, and applied without benefit of any historical context.); No Competence (IT instructors are not professional historians and, therefore, are not qualified to teach history.); No Time (There is not enough time in a typical IT curriculum to teach history as well as technological applications.). Thoughtful analysis leads to the conclusion that none of these broad reasons should justify omitting historical context from the IT curriculum.

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## 2. THE “NO RELEVANCE ARGUMENT

Why does technology change? Simple: a need arises that cannot be met by current technology.

What need did *Apollo 11* and Neil Armstrong’s “one small step for mankind” answer on July 20, 1969? Ultimately, they were answering the October 4, 1957, challenge of *Sputnik I*.

What need did embedded journalists and live coverage of the U.S. military’s invasion of Iraq answer this spring, 2003? Journalists from the European Union and the League of Arab States were already providing onsite, eyewitness accounts of activities in Iraq before the U.S. invasion, and, presumably, would continue to report during the invasion. The U.S. government wanted “our side of the story” told.

Additionally, IT owes much to the work of predecessors, not just in the obvious way, but as an ongoing source of inspiration for contemporary research: There are still many insights to be found in the work Turing, and even as far back as Abacus.

For novelists, poets, painters, or philosophers such observations would be old news, since their disciplines have long recognized the importance of studying the original work, techniques and perspectives of classical masters. And in so doing, they are never removed from an understanding of how people have struggled, and have created works of art. Young artists thus see themselves as part of a creative tradition.

Unfortunately, too many IT educators have lost this sense of tradition in the discipline. Ironically, much of this loss can be blamed on the dazzling explosion of Information Technology in this century. It is time to step back from our accomplishments and recapture a historical perspective.

In the last century, remarkable developments in IT illustrate the inextricable interweaving of technology and social structure. From Marconi at the beginning of the 20<sup>th</sup> Century to “chads” at the end of the 20<sup>th</sup> Century, to live broadcasting of the attacks on Iraq, understanding information technology requires understanding social order, and vice versa.

Marconi said of his wireless communication experiment of December 12, 1901, “The result meant much more to me than the mere successful realization of an experiment. . . . I now felt for the first time absolutely certain that the day would come when mankind would be able to send messages without wires not only across the Atlantic but between the farthestmost ends of the earth.” [19]

Steve Erwin of Judicial Amendment Coalition, Inc. says of the 2000 presidential election, “The 2000 Presidential Election in Florida was a major disaster that made us the laughing stock of the entire world, almost created a Constitutional crisis, still has many questioning the legitimacy of Bush’s presidency, and has others claiming that the election was decided by a Republican Supreme Court.” [5]

And, Walt Zwirko of The Freedom of Information Center notes that journalists embedded with troops during the U.S. attack on Iraq have changed world perception dramatically: “. . . the reporters, photographers and cameramen, far from the Central Command briefing center in Qatar, provide an element that was absent in coverage of Operation Desert Storm in 1991, when war reporting was subject to strict military censorship and the

Pentagon limited the images of conflict to successful attacks on enemy targets.” [27]

Alternative forms of information technology hang in relational vacuum without an understanding of their progressive development and historical contexts.

## 3. THE “NO COMPETENCE” ARGUMENT

The SITE Curriculum Committee’s “Draft Accreditation Criteria” wisely couch the standards for faculty in broad terms precluding a requirement that only people with degrees in history are qualified to teach the history of IT. Standard III-1, in particular, indicates that “the interests, qualifications, and scholarly contributions of the faculty members must be sufficient to teach the courses, [to] plan and modify the courses and curriculum, and to remain abreast of current developments in information technology.” In other words, competence in an area of the IT curriculum is not premised exclusively on academic coursework.

If it were just a matter of informing our students that “all this comes from somewhere,” then the usual remedy of requiring a course in Modern American History (taken sometime, somewhere) might at first thought seem enough. But such courses tend to marginalize and eviscerate the very subject matter we want to champion. General history classes—if they mention Information Technology at all—do so out of context. Students need to understand the cause-and-effect relationship of historical happenings and technological development.

Stealth technology, for example, has played—and continues to play—an important role in U.S. Military design. The U.S. Air Force F-117 is estimated to have a radar cross section of less than one square meter—the size of a large bird. This antidetection technology has been developed in response to the need to “trick” enemy radar detection. Twenty-five years ago, antidetection was accomplished primarily through surface coatings.

Neither will it suffice simply to add historical biography or commentary to an occasional Information Technology course since, while such add-ons may provide a human dimension to the subject matter, they shed very little light on Information Technology.

Instead, it is necessary to integrate firmly the study of original pioneers and inventors/inventions into all IT courses, presenting these sources to motivate the modern technologies they have spawned.

Study of original inventions of the past is essential in order to understand where the subject came from, how it is currently evolving, and where it might go. As the mathematician Abel noted, “It appears to me that if one wants to make progress in Information Technology, one should study the masters and not the pupils.” [2]

According to the staff of the History News Network (HNN), the majority of people responsible for studying and writing history are not trained historians [10]. Indeed, HNN argues, historians are observers of reality. The best historians are often those people who do not think of themselves as historians, but, rather, as reporters of observed reality.

Richard Vinen maintains that “The best history is written by non-historians” because non-historians have no hidden agenda [26]. Vinen quotes George Orwell (author and political satirist),

Bernard Cohn (anthropologist), Teresa Toranska (choreographer), and Zdenek Mlynr (political reformer), among others, to illustrate his point that the most accurate historical descriptions come from people not interested in writing history.

Both Edgar Governo's "Historian of things that never were" web site [8] and David Kosalka's "Historian Underground" web site [11] emphasize the value of proletarian approaches to history. Even the Smithsonian Institute encourages everyone to be his own historian [24].

And, our personal favorite history, Hawking's *A Brief History of Time*, is the work of a remarkable man who, challenged by Lou Gehrig's disease, must communicate with the world through a computer and voice synthesizer.

If all of these non-historians have found the means to consider history in their various worlds, surely the typical IT professor can handle it as well.

#### 4. THE "NO TIME" ARGUMENT

During June 2003, a random look at 100 IT curricula accessible through the Internet, revealed 31 IT curricula included a specific course in the history of Information Technology. These courses are titled variously Perspectives on Computing, The History of Computing, Backgrounds of Computer Technology. Informal discussions with faculty responsible for such IT history courses lead to several generalities.

Students in such classes vary widely. Not only IT undergraduates, but also students from different disciplines at all levels elect to take an IT history class. The results have been extraordinary.

Students from non-IT disciplines often decide to minor or co-major in Information Technology. Some switch their majors.

Most significantly, students begin to view Information Technology in a new way, and also see themselves differently in relation to IT. Information Technology is no longer a collection of arcana, unrelated within and unconnected to anything without, but becomes a whole, an artform.

So how can we fit history into the IT curriculum? First of all, in each class we teach we need to be aware of—and make our students aware of—the cause-effect-new cause-new effect chain of technological development. With that chain in mind, we have several alternatives for providing our IT students with relevant historical perspectives on IT development. First, we can conduct faculty discussion to determine where in the existing IT courses historical perspectives can best be introduced. Second, we can consider including a History of Information Technology class in the IT core curriculum. Third, we can enter into a dialog with the history faculty to determine the best ways to develop IT history classes.

Whatever solution presents itself as best, we must keep our students aware (as King Solomon reminded us in Ecclesiastes 1:9) "there is nothing new under the sun."

Every invention is built upon a succession of preceding ideas. And as one goes back along this chain, the motivation for a problem which started the journey becomes ever clearer, with several works in the chain often standing out as milestones on the road toward our present knowledge.

By working through these original inventions which discuss and solve, or attempt to solve, antecedent problems, students can

discover the roots of modern solutions, ideas, and concepts, even whole subjects. Students also can come to see the obstacles that earlier thinkers had to clear in order to move ahead, and thereby gain insight into current technologies and how to approach them.

Then why not read a modern text that lays out this grand scheme? Why study history? Two excellent reasons immediately come to mind. First, when history is included in the required IT curriculum, IT students are brought as close as possible to the experience of inventions, without an intermediary interpreter. They see and feel the tenacity, the false starts and triumphs of its practitioners, the salient leaps which revolutionize fields and lead the way to the next cycle of tumult and passage.

The second reason is more subtle and perhaps derivative of the first, but profound nonetheless. When students are exposed to the historicity of inventions they are initiated into the way Information Technology is practiced: through research, publication, and discussion—leading to more research, publication, and discussion. Learning is a never-ending spiral. So students too should follow research and development into specific IT hardware and software developments from their respective edges.

Students can then research in a combination of individual work, small groups, and whole class exploration, after instructors preface student reading with an overview and alert them to particularly difficult parts. Discussion gradually will spread to the whole class which then reconstructs the argument, ponders the consequences of the result, and asks "Where do we go from here?" This process emulates in large part the dynamic of research in Information Technology.

As an added bonus, students understand that instructors believe in them enough to ask them to confront the sources as we would, and their response to this faith is manifest in the heightened intensity of their motivation and study, and in the spirit that drives their work.

#### 5. CONCLUSION

Every student majoring in Information Technology wants some day to be counted in the ranks of successful IT professionals. As IT faculty, we owe our students every opportunity to achieve their success goals.

Students can benefit in both understanding and motivation from "experiencing" technological developments through the eye of history. From Babbage and Lady Lovelace to stealth bomber hardware and software, all information technology is related in a continuous cause-effect-cause-effect spiral.

A vast supply of resources exist that illustrate and bring alive every concept taught to students at any level. If resource materials are carefully chosen, history of information technology can be accessible to and highly enriching for both students and instructors.

In the long run, we want our students to make history—to continue the Information Technology development cycle. Successful new technological developments are built upon what has gone before. Students who do not understand the cause-and-effect cycle of technological development are hampered by their ignorance. They are hindered in their quest for successful new contributions by their ignorance of historical context. As Santayana reminds us, "Those who do not remember history are condemned to repeat it." [22]

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