THE TECHNOLOGICAL IMPACT ANALYSIS: A RESEARCH-BASED EXERCISE TO HEIGHTEN LEARNERS' TECHNOLOGICAL SENSITIVITY

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ABSTRACT

The Technological Impact Analysis (TIA) is a learning and teaching technique that requires learners to investigate and understand general technological advancement while studying the history, evolution and impact of a specific past or contemporary technology. During the presentation, we will describe the TIA technique, provide guidance for the use of the TIA and share examples of TIAs learners have completed.

INTRODUCTION

Technology remains one of the primary drivers of advancement in business and society. Futurists predict that the impact of technology in all facets of our lives will grow dramatically into any foreseeable future. While there are clearly many positive benefits of technological advancement in general and specific domains, we assert there are also at least two less desirable aspects of technological evolution.

First, it remains our assertion that with technological advancement, we become more dependent on specific technologies in all aspects of our work and lives. The centrality of computers and computerization is but one manifestation of this dependency. As this dependency grows, we become vulnerable to catastrophic setback if a central technology is incapacitated or made unavailable to us. Anyone who has ever lost a hard drive full of important documents knows that feeling of vulnerability firsthand.

Secondly, we believe that this dependency is deepened because most business and college students as well as most citizens rarely reflect upon or analyze the nature of technological advancement and the impact of technology advancement on the way we do business and on the ways we structure our lives. This failure to proactively reflect upon obvious and potential consequences of technological advance puts us in a particularly precarious position. For instance, in the early days of rapid Internet development and diffusion, one finds little dialogue about such things as privacy invasion, identity theft, spamming or the proliferation of adult website business. As it has turned out, all of these emergent factors have come back to haunt us in our quest to find a place for the Internet in business and society.

The TIA (Technological Impact Analysis) is a simple, yet profound learning tool that helps learners understand how specific technologies have developed, diffused and affected society in positive and negative ways. The TIA requires learners in research teams to study the background and evolution of a specific technology and to address six fundamental questions related to the chosen technology (see below). These questions form the framework for in-class presentations that each research team makes. Among the many technologies that have been studied are brewing, medical imaging systems, TiVo, video games, the personal computer and television.

BACKGROUND ON TIA (TECHNOLOGICAL IMPACT ANALYSIS) DEVELOPMENT

The concept of the TIA emerged from the lead author's study of technological impact during a recent full year sabbatical. In studying the technology literature, it became readily apparent that there has been minimal conceptual and empirical work done on the positive and negative aspects of technology, in general, and specific technologies in

particular. While some work has been done on reactions to and attitudes about technologies such as computers, no singularly comprehensive set of studies emerged considering the broad impacts and consequences of technological advancement.

This lack of deliberation and reflection surprised us. Hence the lead author developed the Survey of Technological Impact to begin collecting data on the perceptions held about technological advancement and its consequences. Over the past three years, data has been collected from futurist, student and real-world business samples.

The TIA exercise was developed as a result of this work and was designed to allow undergraduate and MBA learners to research and assess the impact of specific technologies they chose to study. To assist them in this quest, a TIA homework assignment was developed as an in-class activity to help learners work through the TIA process with the automobile as the focal technology. In this preparatory activity, six breakout groups are used to consider the six focal dimensions that make up the TIA. Each group shares with the class their perspectives on their assigned focal question as related to the automobile.

THE TECHNOLOGICAL IMPACT ANALYSIS

The final TIA presentation rests on the extensive background research that learners complete in management, social science and historical data bases. Early in the semester, a full class is devoted to familiarizing learners with database research and the resources available to deepen their understanding of their chose technology.

TIA research is focused on six questions which form the essence of the TIA. These questions are as follows:

1) *What are the historical and social origins of this technology? In other words, how and why has this technology become prominent*? This question allows learners to place a technology's emergence and diffusion in a broader context and to take into account the zeitgeist that was present when the technology emerged. Since most technologies emerge to address a particular set of issues or dynamics in the socio-economic arena of a society, this question grounds the learning in the real world of a particular era.
2) *What are three key developmental markers in the emergence and diffusion of this technology?* This question allows learners to identify technological precursors to the technology they are studying. It also focuses them on the sequential emergence of the technology through phases or stages.
3) *What have been the five most positive consequences of this technology?* Herein learners specify what they believe to be the good things that have resulted from the technology under study. They also clearly explain their

reasoning behind each positive consequence they identify.
4) *What have been the five most negative consequences of this technology?* This question requires learners to think critically about the identifiable negative consequences of a technology under study. Generally, most technologies have positive, beneficial and less positive or even negative effects and looking at the benefit to burden ratio helps learners realize this and to better assess the overall, cumulative impact of a technology of business and society.
5) *What have been at least three unanticipated consequences of this technology?* Learners struggle most with this question and it requires that they think beyond the obvious in formulating a response based in their research. We usually provide them an example using the internet as a focal technology. When the internet emerged into the popular marketplace, there were few if any predictions about identity theft, privacy concerns/compromise and the large volume of adult content and traffic. These represent unanticipated consequences of the technology. We point out that is it intelligent and necessary to reflect on both positive and negative consequences of a technology that may not be readily apparent as a technology is rapidly diffused. To do otherwise, as noted above, puts one and others in a precarious position where reactive rather than proactive responses eventuate in response to unanticipated consequences.
6) *What ethical issues must be considered when evaluating the merit of this technology?* This reflective question requires that learners consider such things as the level of technology dependence a technology foments as well as responsible versus irresponsible use and application of the technology. In using the TIA we find that learners, after comprehensive study are able to quite adeptly point out ethical issues and concerns.

The end product of the TIA research is a 20-30minute in-class presentation by the individual TIA research groups. All presentations follow the framework of the TIA as suggested above. Learners use PowerPoint to present their research findings and also provide an annotated bibliography based on their research. While no minimum number of citations is prescribed, it is clear in the syllabus expectations for the TIA that more comprehensive research will lead to a more intelligent and coherent TIA than less research.

With the annotated bibliography learners indicate specifically how each source contributed to their learning about their selected technology. Annotations must be at least 50 words in length. Copies of the PowerPoint presentation and annotated bibliography are turned in for evaluation and grading. Each research group also posts their work on a Blackboard forum used for such postings.

GUIDELINES FOR USAGE

We find the TIA to be a straight-forward, valuable tool for helping learners research a specific technology and learn about technologies researched by other research groups. It is easy to manage and in a class of 20-30 learners there will be five or six research groups. The six focal questions allow for the TIA to be used in a variety of classes where some focus exists on studying technology and its impact. Several guidelines for usage are worth sharing.

First, we allow the learner groups to choose their own group membership and technology to study. Learners are encouraged to study something that they are interested in as this will lead them to invest more in their study. We emphasize that studying historical technologies is just as valid as studying contemporaneous technologies.

Secondly, all technology topics must be approved prior to commencing research and we usually require that they make their technology selection within the first two weeks of class. Approval is based on the likelihood that the technology is sufficiently researchable and on the expressed reasons that the group wishes to study a given technology. Quite often, we have noted that learners tend to initially gravitate to "convenience" topics. This orientation is generally discouraged so as to provide within each class a variety of topical foci for the presentations.

A third guideline requires that the research team (or its representatives) meet four times with the professor during the semester to discuss progress on the project. Presentations occur during the final week of regular classes so the groups have the entire semester to accomplish their study. The TIA is usually weighted as 15% of the grade within the course wherein it is used. Approximately 75% of this grade is based on the presentation and 25% based on the quality of the background research as displayed in the annotated bibliography.

Learners respond well to the TIA as a learning tool, especially when they avoid procrastinating on their background research. Many learners report that the learning they acquire from their study and exposure to the studies of others makes them more sensitive to technology and the ways that different technologies affect our work and lives.

CONCLUSION

The Technological Impact Analysis has proven to be a useful tool for the study of technological impact in Managerial Ethics and Decision Making and Management Strategy classes. It is a direct and logical approach to this arena of learning. It is easy to use and applies a structured approach that is logical and sequential as well as holistic in focus.