# The Changing Sufficiencies for Teachers on the Use of Educational Technologies'

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**Abstract:** As with many other fields, technological developments have rapid effects on the field of education. The use of new technologies in the field of education has been followed by ISTE (International Society for Technology in Education) and is conveyed as a standard. The sufficiency requirements of today's teachers regarding the use of technology is determined by the NETS*T standard. This research studies the changes taking place in the sufficiencies of teachers regarding the use of technology by analyzing the old and new NETS*T (National Educational Technology Standards for Teachers) standards as well as the indicators of these standards. Regarding teachers' sufficiencies on the use of technology; the speed of technological change, changing roles towards a guide and model (as opposed to an educator) and various innovations brought by the internet (the digital age, digital citizenship etc.) can be described as important determinants.

**Keywords:** Teacher sufficiencies, Educational technologies, Educational technology standards, NETS*T.

## 1. Introduction

In today's world of rapid technological development, important concepts such as "change" and "innovation" come to mind. Newer, more advanced and more functional models of many products of technology are released before the originals are effectively made use of. Examples of such products would be computers, mobile phones and PDAs. Each new product brings with it new features and capabilities. While once merely tools for voice communication, cellular phones are now capable of playing music, Bluetooth wireless communication, photography and video, multimedia sharing with MMS messaging and lately with the adoption of 3G technology, digital transactions. Mobile phones accurately summarize the change that has taken place in the last ten years. Similarly, despite the fact that the personal computer (PC) entered our lives in the 1970's and has become small enough to fit in our pockets, it has become more capable and functional.

An important technological development of today is the internet. Its current state entered our lives in the late 1990's and has become an important part of various aspects of our lives such as trade, banking, communication and health services. Another field that has been affected by the internet is education. As a technology, the internet has brought with it various changes and has made certain sufficiencies mandatory. An important part of the education system affected by these changes are teachers. The qualities of teachers change according to changes in technology.

## 2. Educational Technology

Technology can be defined as tools and utilities developed by man to inspect and manipulate their material surroundings as well as all associated knowledge (TDK, 2009). This definition shows that technology is not limited to items and tools. The whole concept regarding the tools and their use is under the scope of the definition of technology. The general purpose of technology, however, is to simplify or make life easier.

Educational technology can be seen as the use of technology in the field of education. In this regard, the concept of educational technology encapsulates both tools and utilities and the methods, techniques and underlying system of concepts associated with these tools and utilities (Demierl, Seferoğlu & Yağcı, 2004). Kaya (2005) states that educational technology is a complex and complete process which covers every aspect of human learning as well as the analysis of problems and the people, ideas, equipment and organization required to provide findings, applications, evaluation and management of the solutions to these problems. In other words, educational technology should be considered more than just tools and utilities. The use of educational technologies also covers the methods and techniques, or in other words the sufficiencies associated with the use of devices such as computers, television and PDAs. Akpınar (2004) has stated that every tool or item assisting in the reduction of the interaction of the subject matter to a level understandable by the student is within the study scope of educational technology.

## 3. Educational Technology Standards

Various innovations such as multimedia computers, video discs, CD-ROMs and other computer supported educational applications were introduced to the field of education in the 1990s with the expectation that they would be more widely adopted in time (Kronour, 2004). Due to the inability to ensure the expected levels of technology use, the United States Department of Education started the 'Preparing Tomorrow's Teachers to Use Technology' program (PT3) with significant success in its first year (Stuve & Cassady, 2005). In application, the program made use of the preexisting National Educational Technology Standards (NETS) to remedy what was seen as the problem of ensuring the equal and prevalent use of educational technology throughout the United States (NETS, 2006; Suve & Cassady, 2005; UNESCO, 2002). An important purpose of standards is to add the use of new technologies such as computers and the internet in educational programs. As such, the enforcement of new and high level technologies is attempted (Stuve & Cassady, 2005).

## 4. The Development and Factor Structure of NETS

NETS is not limited to the sufficiencies regarding the use of technology in education by teachers. When analyzed as a process, the standards required for students, teachers and administrators regarding the use and planning of technology were combined under the scope of NETS in June 1998, June 2000 and November 2001 respectively (NETS, 2006). These standards have been designated NETS-S (Student), NETS-T (Teacher) and NETS-A (Administrator). Despite its American origin, many countries and regions such as Australia, China, Ireland, Latin America and England have made use of the NETS standards to develop national and regional standards or have adapted them for their own use (UNESCO, 2002). The primary reason for this is that the NETS subsides within the International society for Technology in Education (ISTE). ISTE has declared its mission statement to be to ensure the effective use of new technology in P-12 education and teacher training without profit. As an international establishment, it is accepted as an authority in many countries (ISTE, 2009).

The ISTE updates the NETS standards at regular intervals based on technological developments. The NETS*T standard which deals with teacher sufficiencies has been updated 4 times up to the year 2009. NETS*T was first established in 1993 with 13 indicators and revisions made in 1997 dewvided it into three categories with 18 indicators. In 2000, it took the form of six categories with a total of 23 clauses (NETS, 2006). Finally, the updates performed in 2008 restructured the NETS*T standard into five categories and 20 indicators (NETS, 2009). These indicators determined by the ISTE based on new educational technologies are important aspects in portraying changing sufficiencies for teachers.

## 5. Changind Teacher Sufficiencies Based on the New NETS*T Standards

To understand the changing sufficiencies of teachers regarding the use of educational technology, a comparison between the latest and previous NETS*T standards must be conducted. Both standards can be viewed in Table 1.

| NETS*T 2000 Standards | | | NETS*T 2008 Standards | |
|---|---|---|---|---|
| I | Technology Operations and Concepts | I | Facilitate and Inspire Student Learning and Creativity | |
| II | Planning and Designing Learning Environments and Experiences | II | Design and Develop Digital-Age Learning Experiences and Assessments | |
| III | Teaching, Learning, and the Curriculum | III | Model Digital-Age Work and Learning | |
| IV | Assessment and Evaluation | IV | Promote and Model Digital Citizenship and Responsibility | |
| V | Productivity and Professional Practice | V | Engage in Professional Growth and Leadership | |
| VI | Social, Ethical, Legal, and Human Issues | | | |

**Tablo 1.** NETS-T Standards

It can be seen from Table 1 that significant changes have taken place in the sufficiencies required by teachers regarding the use of educational technology. The changing role of teachers towards guidance and counseling advisors stands out. While the teaching qualities of teachers are prioritized in the NETS*T standards of 2000, the new NETS*T standards emphasize teachers' quialities such as role modeling, inspiration, motivation and assistance. This situation is described in the initial instructions of the NETS*T standards as teachers' use of technology in the assistance of role modeling and in the fulfillment of student standards (NETS*S). Another important innovation is the inclusion of concepts such as the digital age, digital citizenship and digital responsibility as a reflection of the internet in NETS*T standards. Therefore the innovations brought by educational technology standards towards teachers can be described as the sufficiencies for the digital age.

Another important feature is considering teachers have basic levels of sufficiencies regarding technological knowledge and skills, the ensuring of teachers providing technology as a means for creativity and innovation is described as a new sufficiency. Emphasis is placed on teachers' assistance and role modeling, with teachers making use of face to face or virtual environments to increase student learning stated as sufficiencies.

Teachers' technology sufficiencies such as developing student creativity, increasing learning and planning processes of self evaluation were present in previous standards. Emphasis on the design and development of learning experiences for the digital age can be observed in these standards as well.

Considering the speed at which technology changes, new sufficiencies regarding these rapid changes have been put into place. These sufficiencies are described as models for the lifestyle and learning styles of the digital age. In today's world with rapidly changing technology, a required quality of teachers is the ability to follow new technology, analyze and evaluate it and lead students in its use, providing assistance to students on the use of this technology in both their daily lives and as a research tool or for learning purposes.

Another important sufficiency stated is the sufficiencies directed towards digital citizenship and responsibilities. Previous standards incorporated sufficiencies regarding legal and ethical use of computers. This section emphasizes the use of technology and knowledge in a legal and ethical manner with respect towards copyrights. Along with these additions, sufficiencies regarding the healthy use of technology has been omitted. Additionally, new sufficiencies have been implemented regarding the teachers being a model and motivational factor regarding digital ethics in the use of communication technologies for social communication such as chat and e-mail.

Regarding vocational development, supporting the use of educational technology as an addition to the general use of educational technologies can be seen as a new sufficiency. In other words, the role modeling and motivation provided by students, teachers and administrators (all individuals) to ensure an increase in the use of technology is considered a standard. Self development and the use of technology for lifelong learning was present in previous standards. However it can be seen that the new standards aim to construct a synergy within the school.

## 6. Results

The new NETS*T standards shaped towards new educational technologies (with an emphasis on the internet) established by ISTE in 2008 put forth new sufficiencies required of teachers regarding the use of educational technologies. The innovations and changes established by the new NETS*T standards regarding teachers' use of educational technologies can be summarized as follows:

- ❑ A change in teachers' roles towards advisors, role models and motivators regarding educational technologies.
- ❑ Considering teachers' pre-established and basic levels of technology use, a higher level of sufficiencies through the use of face to face and virtual environments.
- ❑ Teachers' ability to use the qualities of the digital age (ie. mobile phones, the internet, PDAs etc.) in the design of learning environments to stimulate curiosity in students, develop creativity and similar objectives rather than mere sources of information.
- ❑ To follow technology's rapid change and keep up with this change, while using these new technologies for educational purposes.
- ❑ In the wake of the spread of the internet, to inform society about increasingly important digital citizenship and to be a leading figure in the legal, ethical and copyright-aware use of technology.
- ❑ To establish a synergy with all individuals associated with education to increase the use of technology.
- ❑ Following this study, it is recommended that the new NETS*T standards prepared and established by experts in the field and with a broad field of view by the ISTE be integrated as an important planning resource and organizational tool for in-service training and the teacher training process by all nations.

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