

8-27-2012

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Issues Confronting Technology Education: An International Perspective

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Abstract

As technology education progresses, professionals encounter problems that are unique to this school subject and their localized educational and cultural environments. This paper will review issues related to implementing technology education identified through contacts with international professional leaders over a three year period. The research will cite issues affecting the progression of technology education in different countries as identified by professional educators who work in these countries. The researcher will attempt to categorize these issues to provide perspective to the profession.

Key Words: Technology Education, Issues, Country Programs

Introduction

In preparing future leaders and classroom technology education teachers, it is important to transfer knowledge of changes that are occurring and will occur in this school subject. In order to prepare effective teachers for teaching technology education, professors and teacher mentors attempt to pass on the knowledge and skills needed to teach this school subject. This knowledge includes the content and skills that makes one technologically literate. It includes knowledge about the nature of technology, the products of technology, how to design, make, and use these products, and the impacts that technology has on individuals, society, and the environment. The educational community must also teach technology teachers about the operation of our programs within schools and have them experience a school environment including actual teaching and interacting with pupils, teachers, administrators, and the public. All of this knowledge is fine and much needed.

However, what are the other issues future technology education leaders need to know so they may work effectively as practicing professionals? This researcher believes they need to know the problems that the community of technology educators currently face and will face in the future. What issues do professors in other nations face as they position this school subject within the schools of their countries? These issues are part of a graduate level course that this faculty member teaches each year. It is conducted in this way to show students what technology education is like in other countries and to better prepare them to face issues they may encounter in their professional careers.

For the past five years, the author have has as part of a graduate course he teaches (for both masters and Ph.D. students) designed where students learn about technology education in other countries. This includes the basics of the educational system of the country, what content is included in the technology education programs of that country, and how technology teachers are prepared in that country. The PATT proceeding, Sense Publishing books, *International Journal of Technology and Design Education*, *Journal of Technology Education*, and the Council on Technology Teacher Education Yearbook, *International Technology Teacher Education* (Williams, 2006), provide excellence reference materials for students to begin this process. After the graduate students learn the basics of technology education for a particular country, they then contact a professor from that country and determine a major issue that is impacting technology education in that country. Students must develop a paper and make a class presentation on both the country and the issue that is being faced. Students have to report from

their international contact how they are addressing the issue and then reflect on how the student might approach the issue themselves.

Methodologies

The researcher has been tracking data from student's experiences in interacting with international scholars for the past three years and would like to report what the students have found in their interactions on issues in technology education from across the globe. Many participants from PATT Conferences have served as contacts for these young researchers. This correspondence has also been a major learning experience for them in their development to find more detail about technology education from a worldview, but also as important, having students interact with scholars from other parts of the world. All too often we do not teach a world view but are rather monistic in our approach to technology education.

The requirements of this assignment are presented in the course syllabus for students to follow. The professor gives several reviews of how the project should progress, even showing recordings of presentations developed by class members in earlier years. I then contact professors in other countries and ask them if they will assist students in this project. Students are then allowed to select their country and scholar to contact and discuss the assignment. No contact is made until the student first reviews the literature on the country's technology program (requirement for another class project). With today's communication technology, most communicate by email, some students have Skype™ discussions, while others chat using the telephone. In the future Adobe Connect™ might be used to let the international scholar speak directly to the class. For the assignment students were to ask the international scholar a major issue they were trying to solve related to technology education in their country, how the scholar was addressing the problem, and then the student was to reflect how they might address the same problem.

Findings

The data reported comes from 38 student contacts from 16 countries over a three year period, 2009-2011. It involved 31 different scholars. The researcher tries to rotate scholar contacts within countries annually. This is done for two reasons. First it is an attempt to not overburden any one person. Second, the contacts rely heavily upon individuals that the researcher knows from interactions at PATT Conferences or International Technology and Engineering Educators Association Conferences or people the author has communicated about their research and writings. Some scholars have been contacted more than once. This paper will report what was found each year, plus provide an analysis of what the researcher believes is projected through the overall findings.

Fall 2009

During this semester 14 international scholars were contacted. They included contacts from Australia, Belgium, Canada, England, Finland, Germany, Ireland, Israel, Japan, The Netherlands, New Zealand, Scotland, and South Africa. It should be noted that scholars have numerous issues they could discuss with the student researchers. Respective scholars were asked to only report on one issue. One student contacted a scholar without permission, resulting in the same scholar being contacted twice during this year; two separate issues were reported by the scholar. Issues reported in 2009 were on the subject's image, curriculum, teacher preparation, and professional development of teachers. Subject image issues included: perceived value of technology education and female participation in technology education. Curriculum issues included impacts of STEM on technology education programs (how will it be

assessed), integrating technology into the school curriculum (a trans-disciplinary approach), implementation of technology education into the secondary school course cycle, and integration of information technology into the technology education curriculum. Teacher preparation issues included: technology education teacher shortage (2) and recruitment of teachers from science and engineering to teach technology education (2). A major professional development issue was implementation of the national curriculum (4). See Table 1 for a listing of these issues.

Table 1

Issues Impacting Technology Education, 2009

Country	Issue
Australia	Implementation of national curriculum Technology education teacher shortage
Belgium	Perceived value of technology education
Canada	Implementation of technology education curriculum
England	Impacts of STEM on programs (how will it be assessed)
Finland	Female participation in technology education
Germany	Integrating technology into the school curriculum (trans-disciplinary)
Ireland	Implementation of senior cycle new national curriculum
Israel	Recruitment of teachers (science and technology/engineering)
Japan	Integration of information technology into the curriculum
The Netherlands	Lack of teaching technology knowledge and skills by science teachers
New Zealand	Curriculum change (new national framework)
Scotland	Curriculum implementation (teacher professional development)
South Africa	Shortage of qualified technology education teachers

Fall 2010

During this academic term, 13 international scholars were contacted. Countries represented by these contacts included Australia, Canada, Denmark, England, Finland, France, Ireland, Israel, The Netherlands, New Zealand, Scotland, South Africa, and Sweden. These scholars were asked to report a major issue they were confronting with the implementation of technology education in their country. Issues reported for 2010 were in four theoretical

categories including the subject's image, the curriculum, teacher preparation, and teacher professional development. Subject image issues reported included the stigma associated with technology education of the past (industrial arts), shortage of females in STEM professions (careers), and lack of student appeal for technology education (4 people reported this issue with 2 citing lack of female appeal). Curriculum issues focused on implementation of the country's new national curriculum and unification in delivering the same curriculum throughout the country. Teacher preparation issues focused on training science teachers to deliver technology education in schools, training teachers to implement the new national curriculum, and training teachers how to deliver technology content in secondary schools. This last issue was directed toward teaching technology for general outcomes (technological) vs. vocational purposes. The last set of issues appeared to be closely related to teacher preparation issues, but it was approached from a professional development prospective and included strengthening the countries technology education professional organization, while the other country had limited professional development opportunities for its teachers to learn more about and how to implement technology education in primary and secondary schools grades. Table 2 lists the major issues cited by the individual country scholars in 2010.

Table 2

Issues Impacting Technology Education, 2010

Country	Issue
Australia	Strengthening professional organizations for technology education
Canada	The stigma associated with technology education of the past
Denmark	Limited professional development
England	Shortage of females in STEM professions
Finland	Female interests in crafts/technology education
France	Lack of appeal for technology education, particularly by females
Ireland	Implementation of the new national curriculum
Israel	Low quality of technology education programs
The Netherlands	Teacher training (science teachers delivering technology education)
New Zealand	Training teachers to implement the new national curriculum
Scotland	Content delivered in secondary schools (technological or vocational)
South Africa	Implementation of a unified curriculum
Sweden	Lack of student interest in technology and engineering careers

Fall 2011

The final year reported in this study was 2011. Eleven scholars were contacted for the country project during this time span. It included scholars from Australia, England, Finland, France, Ireland, Israel, The Netherlands, New Zealand, Scotland, South Africa, and Sweden. The issues reported for 2011 were placed into five categories. These included the subject's image, curriculum, teacher preparation, professional development, and political change and financial issues. Image issues included the gender gap in enrollment in technology education programs, increasing college enrollments of STEM majors, and changing the focus of what technology education programs should become. Curriculum issues included revamping the country's curriculum and including technology education content and activities in the basic education curriculum. Teacher preparation issues concentrated on the opposition to the new national technology education curriculum and implementing technology education as a school subject. Teacher professional development issues identified through the study included teacher professional development for using the new national curriculum, enabling science teachers to use project-based learning strategies, and finally to develop quality technology education teachers. A new category was added this year to the issues cited previously, political change and its associated funding issues. See Table 3 for a summary of the issues reported in 2011.

Table 3

Issues Impacting Technology Education, 2011

Country	Issue
Australia	Revamping of national curriculum
England	Political change and program funding
Finland	Including technology education content and activities in basic education
France	Gender enrollment gap in technology education programs
Ireland curriculum	Teacher professional development for the new national curriculum
Israel	Teacher training in project-based learning practices
The Netherlands	Increasing college enrollment in STEM majors
New Zealand	Opposition to the new national technology education curriculum
Scotland	Changing the meaning of what technology education should be
South Africa	Developing qualified technology education teachers

Discussion

Design and technology education scholars continually work on refining their delivery of this school subject within their countries. It appears that all have problems or issues to overcome to better deliver technology education to the youth of their countries. Over a three year period, issues related to the image of this school subject, its related curriculum, teacher preparation, teacher professional development, and political change and its related funding issue were shown to be of major concern. However, there can be a fine line between when a curriculum issue becomes a teacher preparation issue, a teacher professional development issue, or a political change issue. Image issues can also be related to teacher preparation and the national curriculum.

For this study, image issues were defined as an opinion on a concept of something that is held by others. Curriculum was defined as a program for the preparation of learners; a group of related courses, often in a special field of study. Teacher preparation was defined as the process of preparing teachers. Professional development implies an intensive approach to improving people to more effectively prepare those they teach or supervise. Political change is when the government, in this case, ministry of education, changes the requirements for schooling and the funding associated with the education of its population. While using established meanings for these terms, the classifications may remain cloudy when trying to categorize information.

Overall, if the definitions the researcher established were followed and categorizations used were accurate, scholars consume time trying to correct issues resulting from a tarnished image of technology education (11), lack of professional development of teachers (9), shortcomings in teacher preparation (9), curriculum design issues (8), and positioning for our school subject during political change and its funding ramifications (1). See Table 4 which displays how these issues were reported by year.

Table 4

Issues Confronting Technology Education

Issues	2009	2010	2011	Totals
Image	2	6	3	11
Curriculum	4	2	2	8
Teacher Preparation	4	3	2	9
Teacher Professional Development	4	2	3	9
Political Change and Funding			1	1

One might argue that all issues are spinoffs of images associated with technology education. Are these images conceptualized from our roots in practical education or the past and current relationships we might have with vocational (career and technical) education? Does it come from the hands-on nature of our practice? Have we not continued to align our practices to the needs of students we should be serving or the needs of external populations, particularly the political and economic world (Ritz & Bevins, 2011)? One can see that countries of the European Union have worked together to improve the image of technology education to better attract females and other students to our school subject (Fadjukoff, 2010). Do we need to re-brand and create a new image for technology education?

Can the image of technology education be transformed with an improved curriculum design? New Zealand (Fox-Turnbull & O'Sullivan, 2011; Compton & Compton, 2010) has a new national curriculum that is based on an excellent foundation. Getting teachers to accept the new curriculum is a current quest. Australia (Middleton, 2011) is currently working on a new national curriculum design. Is it doomed to fail due to the ability to get a large enough mass of teachers to learn to implement the curriculum through professional development? Ireland (Seery, Lynch, & Dunbar, 2011) is experiencing problems with implementing its new national curriculum design.

However, if we did not have a curriculum issue, would the issue stem from ones initial teacher preparation program or shortcomings in continued professional development? The Netherlands (Koski & de Vries, 2011) and Israel (Barak, 2011) are experiencing problems because their policy makers have chosen to have science teachers deliver the content of technology education through science classes. Do these issues again relate to curriculum design for delivering our school subject? How will the economic crisis and demise of governments further erode the foundations of our school subject?

Conclusions

This study was the result of an analysis of issues identified by scholars who work with technology education in various countries throughout the world. Graduate students contacted these experts and asked them to identify a major issue they were encountering with implementing technology education in their country. The study involved three classes over a three year period. Thirty-one scholars from 16 countries were contacted by 38 students. The issues identified were on the image of technology, its curriculum, its teacher preparation, its professional development, and the effects of government changes.

This project contributes to the education of graduate students in three particular ways. First, it provides a global perspective on technology education. Second, it allows graduate students to communicate with scholars from another country. Third, it allows students to reflect on issues that others are encountering and better educate them to deal with these issues in their professional careers.

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