Technology Education Teacher Supply and Demand—A Critical Situation

By Johnny J Moye

If the technology education profession is to survive, the time for action to ensure that survival is now.

The supply and demand of technology education teachers has been a matter of concern for many years. Weston (1997) reported, "…enrollment in and graduation from technology teacher education programs are on a downward spiral, the demand for teachers is on an upward trend, greatly accelerating the gap between supply and demand" (p. 6). Ndahi and Ritz (2003) stated, "It is clear that there is a shortage of teachers, especially technology education teachers, and the shortages will continue to increase" (p. 28). A study performed in 2009 identified that the supply and demand situation had become even more critical than what Weston (1997) and Ndahi and Ritz (2003) had reported. Over the past two decades, the number of technology education teachers in the United States has decreased dramatically, and state supervisors reported that they expect more programs to close in the near future.

Background

Technology education is an excellent format to integrate science, technology, engineering, and mathematics (STEM) studies by employing problem-based learning activities (Moye, 2008; Ritz, 2006; Zinser & Poldink, 2005). However, the benefits of technology education are still generally "misunderstood by the public" (Sanders, 2000, p. 16). The effects of technology education on increased student mathematics abilities have been identified in several studies (Dyer, Reed, & Berry, 2006; Frazier, 2009; Setter, 2006; Scarborough & White, 1994). It is evident that technology education is beneficial in raising student technological literacy and core academic success. However the supply of technology education teachers produced in the United States has not met the increased demand (Gray & Daugherty, 2004; Ndahi & Ritz, 2003; Weston, 1997; Wright & Devier, 1989).

The American Association for Employment in Education (AAEE) conducts annual research concerning educator supply and demand in the United States. The organization surveys school districts and colleges to determine current supply and demand of educators in 64 educational fields, including technology education. Over a five-year period (2003-2007), out of 55 available reports, three of the 11 regions reported that they had experienced *considerable shortages,* 32 reported that they experienced *some shortages,* and 12 of the regions reported as having a *balanced supply and demand* of technology education teachers (AAEE, 2004; 2005; 2006; 2007; 2008).

Annually the United States Department of Education (USDOE) publishes a list of teacher shortage areas for each state. In the most recent analysis (March, 2008), USDOE reported that only 24 states indicated a shortage of technology education teachers; 22 did not indicate a shortage (USDOE, 2008). These data could indicate one of

two points. The major shortfall of technology education teachers reported in Weston (1997) and Ndahi and Ritz (2003) have been resolved, or some states did not provide accurate data to the USDOE indicating the critical need for technology education teachers.

Findings—Technology Teacher Supply

The document review of *Industrial Teacher Educator Directories* found that in 2004-2005, there were 34 institutions that produced 338 technology education teachers (Schmidt & Custer, 2005). In 2005-2006, 32 institutions produced 315 technology education teachers (Schmidt & Custer, 2006). Twenty-nine institutions produced 311 technology education teachers in 2006-2007 (Schmidt & Custer, 2007). Finally, in 2007-2008, 27 institutions produced 258 technology teachers (Waugh, 2008).

Data obtained from *ITE Directories* identified a downward trend of institutions that produced technology education teachers as well as the number of teachers produced during the years of 2004 to 2008. This trend follows a similar downward pattern identified by Ritz (1999) and Ndahi and Ritz (2003). In 1995-1996, institutions produced 815 technology education teachers (Ritz, 1999). In 1996-1997 there were 635 technology teachers produced, and in 1997-1998 there were 732 (Ritz, 1999). In 2001-2002, 672 technology education teachers were produced (Ndahi & Ritz, 2003). Data indicated that the number of technology education teacher graduates had decreased by 68.35% between the years of 1995/1996 and 2007/2008. Figure 1 provides a graphic illustration of the downward trend of technology education teachers produced in the United States.

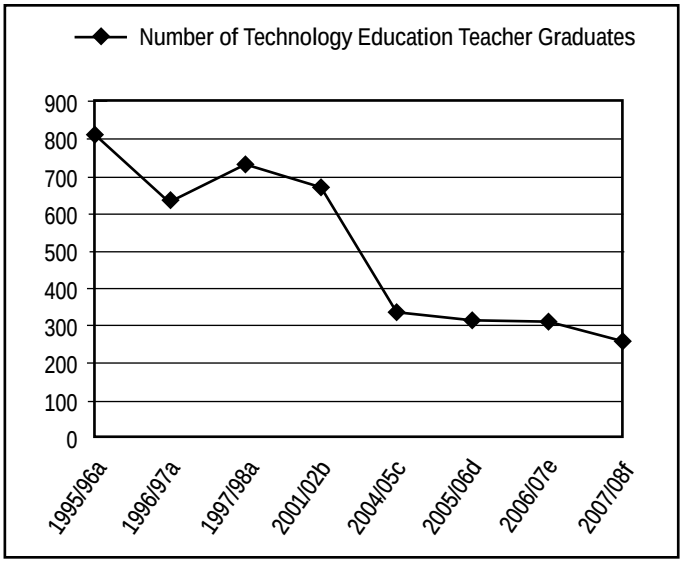

Figure 1. Downward Trend of Technology Education Teacher Graduates from 1995 to 2008.
[a]From Ritz, 1999. [b]Ndahi and Ritz, 2003. [c]Schmidt and Custer, 2005. [d]Schmidt and Custer, 2006. [e]Schmidt and Custer, 2007. [f]Waugh, 2008.

Findings—Technology Teacher Demand

Data from state supervisors indicated that there were approximately 12,146 middle and 16,164 high school (a total of 28,310) technology education teachers employed in the United States during the spring of 2009. The Weston (1997) study reported that there were 17,552 middle school and 20,416 high school (a total of 37,968) technology education teachers employed in the United States in 1995. In 2001, Ndahi and Ritz (2003) found that there were 16,774 middle school and 19,487 high school, for a total of 36,261 technology teachers employed. Based on these results, there were approximately 5,406 fewer middle school technology teachers in 2009 than there were in 1995, a decrease of 30.8%. There were also 4,252 fewer high school technology teachers, a 20.9% decrease from the number found in the 1995 Weston (1997) study. These data indicated that there were a total of 9,658 (25.85%) fewer secondary technology education teachers in 2009 than there were in 1995.

When comparing the number of teachers found in this study to the number of teachers employed in 2001 (Ndahi & Ritz, 2003) or compared to the 1995 number reported by Weston (1997), 35 (70%) states reported to have had fewer middle school teachers employed in 2009. Thirty-one state supervisors (62%) indicated that they had fewer high school technology teachers employed in their state in 2009. Ten states (20%) indicated an increase in the number of middle school teachers. Seventeen states (34%) indicated that they had experienced an increase in the number of high school technology teachers employed. Table 1 provides the number of middle and high school technology teachers employed in the United States during the years of 1995, 2001, and 2009. Figure 2 (page 33) provides a graphic illustration of the downward trend. During the spring of 2009, there were approximately 367 middle and 549 high school (a total of 916) technology education teacher vacancies. Weston (1997) reported that in nine states, "256 technology education positions went unfilled in 1996" (p. 7). Whereas the data from only nine states were not sufficient to establish an overall status of technology education vacancies in the United States, it does illustrate that a significant number of vacancies did exist in 1996. Ndahi and Ritz (2003) reported that the, "technology education profession was short 1665 licensed teachers" in 2001 (p. 28). Similar to the Weston (1997) and Ndahi and Ritz (2003) studies, this study also found that a shortage of technology education teachers continued to exist—916. However, there appeared to be an additional variable to consider—program closures.

Supervisors from California, Georgia, Massachusetts, Oregon, Maine, and North Dakota indicated that their states had a limited number of vacancies because, when technology education teachers had left positions, those positions were not filled and would probably not be filled in the future. Other states also may be experiencing the same situation. Unfortunately, it appears that teaching-position and program closures have and will continue to minimize the concern for vacated technology education positions in some states.

Supervisors estimated that the projected number of middle school vacancies will be 353 in the fall of 2009, 487 in 2012, and 598 in 2014. For high school, there are expected to be 470 vacancies in the fall of 2009, 665 in 2012, and 837 in 2014.

Table 1. Approximate Number of Middle and High School Technology Education Teachers Employed in the United States in 1995, 2001, and 2009

	1995		2001		2009	
States	Middle School	High School	Middle School	High School	Middle School	High School
Alabama	99	64	120	85	73	26
Alaska	201	266	-	300	15	130
Arizona	700	925	250	435	0	1
Arkansas	70	0	65	10	65	15
California	2000	3000	1224	1224	900	918
Colorado	150	135	138	287	129	263
Connecticut	500	345	450	290	350	400
Delaware	75	100	36	62	30	60
Florida	950	450	1064	760	525	175
Georgia	225	225	230	350	201	300
Hawaii	48	117	10	5	0	59
Idaho	74	95	40	168	20	62
Illinois	1100	1100	900	900	240	1500
Indiana	700	400	650	650	620	640
Iowa	100	750	280	550	450	619
Kansas	30	45	210	430	215	445
Kentucky	135	290	125	225	30	125
Louisiana	100	350	100	350	-	154
Maine	80	198	230	110	165	80
Maryland	300	300	510	511	500	560
Massachusetts	375	275	375	275	-	-
Michigan	422	1014	425	425	30	44
Minnesota	300	400	380	500	400	328
Mississippi	69	242	0	395	40	450
Missouri	350	575	343	580	218	467
Montana	122	130	75	175	-	170
Nebraska	285	286	256	256	50	10
Nevada	65	11	70	10	30	10
New Hampshire	83	64	80	110	68	118
New Jersey	145	145	700	800	750	850
New Mexico	97	196	150	150	130	135
New York	1700	1100	1700	1750	1755	945

Table 1. Continued

States	1995		2001		2009	
	Middle School	High School	Middle School	High School	Middle School	High School
North Carolina	355	325	360	350	236	224
North Dakota	31	120	30	81	35	65
Ohio	950	1250	1000	1000	960	950
Oklahoma	127	93	175	100	210	170
Oregon	150	30	-	-	208	52
Pennsylvania	1650	1650	1200	900	633	1267
Rhode Island	70	132	30	50	55	80
South Carolina	250	110	125	75	0	0
Oklahoma	127	93	175	100	210	170
Oregon	150	30	-	-	208	52
Pennsylvania	1650	1650	1200	900	633	1267
Rhode Island	70	132	30	50	55	80
South Carolina	250	110	125	75	0	0
South Dakota	60	42	42	32	20	20
Tennessee	110	221	209	140	144	115
Texas	600	950	706	1498	588	1032
Utah	240	95	200	250	141	112
Vermont	100	41	-	-	0	200
Virginia	389	570	571	468	345	610
Washington	-	520	-	300	32	255
West Virginia	145	100	95	120	90	115
Wisconsin	675	575	600	750	450	838
Wyoming	-	-	245	245	0	0
Totals	17,552	20,416	16,774	19,487	12,146	16,164
	37,968		36,261		28,310	

Note: A "-" indicates that there were no data available.

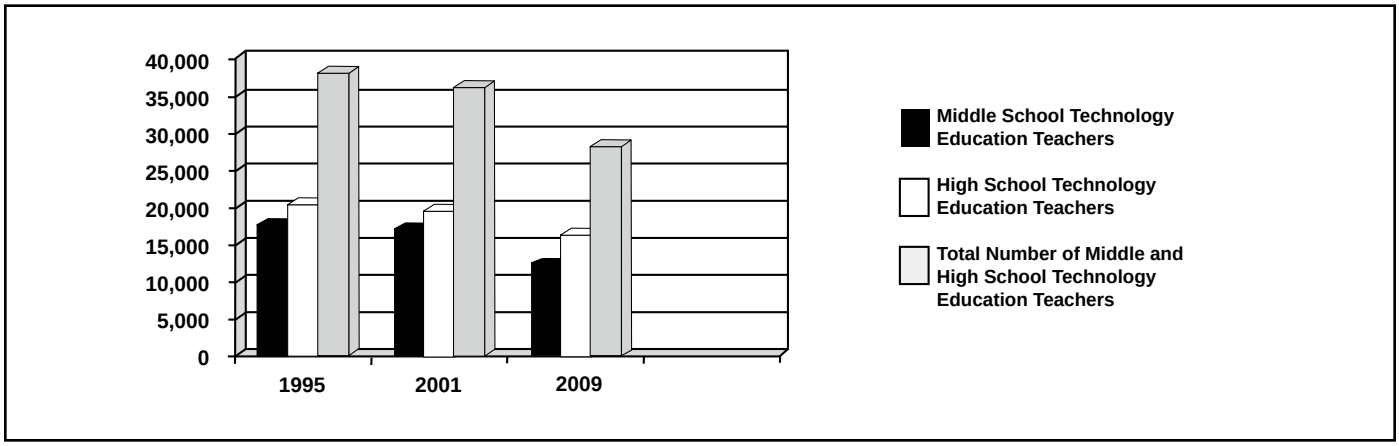

Figure 2. Downward Trend of Public Middle and High School Technology Education Teachers Employed in the United States, 1995, 2001, and 2009.

Technology Teacher Supply and Demand—Bottom Line

Between 2004 and 2008, colleges and universities produced an average of 306 technology education teachers per year. During that time, the annual average number of new teachers declined by 5.9 percent each year. If that trend continues, when projected, there will be approximately 242 technology teachers produced in 2009, 196 in 2012, and 173 in 2014. Supervisors reported that there will be approximately 823 middle and high school technology teacher vacancies in the fall of 2009, 1,152 in 2012, and 1,435 in 2014.

Using the projected number of technology teacher graduates and comparing them to the estimated number of vacancies, there will be a shortfall of 581 middle and high school technology teachers in the fall of 2009, 956 in 2012, and 1,262 in 2014. When estimating the supply and demand of technology education teachers in the United States, there will be an estimated shortfall of 2,799 teachers between the fall of 2009 and 2014. Figure 3 provides a graphic illustration of the estimated supply and demand of technology education teachers during the fall of 2009, 2012, and 2014.

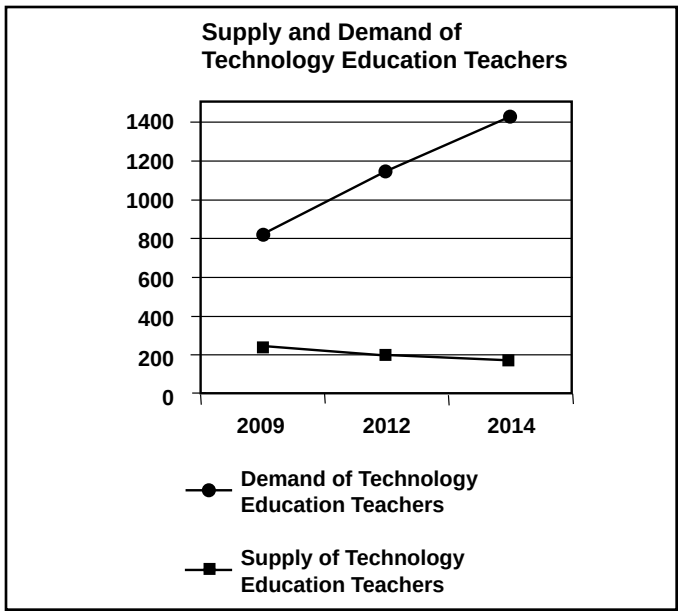

Figure 3. Estimated Supply and Demand of Technology Education Teachers 2009, 2012 and 2014.

A Critical Situation

The technology education profession is facing a critical situation. Weston (1997) said, "The time to take action is now, but just how or if the technology education teacher shortage is solved can only be answered in the years to come" (p. 9). Data indicated that institutions have produced fewer technology education teachers each year. The question must be asked: What has the profession done differently since Weston's study to ensure the survival of the profession? To effect change, recommendations should be reviewed, evaluated, and acted upon. If the technology education profession is to survive, the time for action to ensure that survival is *now.* The following recommendations are offered to mitigate the shortage of technology education teachers in the United States.

1. Technology education teachers are in contact with their students each day. These students are prospective technology education teachers. This researcher reiterates and recommends an Ndahi and Ritz (2003) recommendation: "If all high school teachers made a commitment to send one member of this year's graduating class to pursue a teaching degree in technology education, we could eradicate the technology education teacher shortage" (p. 30).
2. States and school districts should evaluate their technology education programs to ensure that the content is relevant to today's needs. Adopting pre-engineering content may be one solution.
3. Technology education teachers should advertise their success stories. They should attend parent/student organizational meetings to discuss what technology education can do for students. Teachers should publish success stories in local newspapers and general education professional publications.
4. Old Dominion University has taken the challenge to monitor the status of the technology education teacher supply and demand. The university should conduct a follow-up study in 2014, and every five years thereafter. The studies should establish current status and future needs of the technology education profession.
5. Standardized tests are considered tools that gauge student success. In 2008–2009, the National Assessment Governing Board/National Assessment of Educational Progress (NAGB/NAEP) developed an assessment tool designed to gauge student technological literacy (NAGB, n.d.). State technology education leaders should provide teachers with resources such as the NAEP technological literacy assessment to determine if their programs are preparing technologically literate students who are ready for future education and workplace experiences.
6. To determine and maintain an accurate status of technology education teachers and programs within each state, state technology education leaders should ensure that their mechanisms to collect and evaluate current supply and demand of technology education

teachers are adequate when reporting to entities such as the U. S. Department of Education and American Association for Employment in Education.

Data have indicated that the technology education teacher profession is in a "downward spiral" (Westin, 1997, p. 6) due to decreased technology education teacher enrollment trends. During the past two decades, institutions have not produced enough technology education teachers needed to fill vacancies (Dugger, 2007; Newberry, 2001; Ndahi & Ritz, 2003; Ritz, 1999; Volk, 1993; Weston, 1997). Although the demise of the technology teacher preparation profession did not occur in 2005 as Volk (1997) had predicted, the profession may be experiencing a "slow death" as Ritz (1999, p. 9) suggested may occur.

It is the responsibility of each technology education teacher to aid in the recovery of the critical technology education teacher supply-and-demand situation. Unfortunately, there are fewer and fewer technology teachers to aid in that recovery.

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