Perceptions and Practices of Technology Student Association Advisors on Implementation Strategies and Teaching Methods

W. J. Haynie, V. W. DeLuca, and B. Matthews

Though still small, the co-curricular student organization, the Technology Student Association (TSA), has had a significant impact on the technology education profession. As the profession evolved from the Industrial Arts of the 1960s to become today's Technology Education (TE), the student organization has changed with the times too. TSA began as the American Industrial Arts Student Association (AIASA) and celebrated its 25th anniversary in 2003. Advocates claim that TSA activities have had significant impact in shaping the TE curriculum and also help to promote curricular integration with other disciplines (Peterson, Ernst, Blue, Taylor, & Estler, 2004). Growing from less than one-third of one percent of the students enrolled in industrial arts courses who were involved in AIASA (reported as 21,600 of 7 million by Applegate in 1981) to over 200,000 TSA members in 47 states today (Honor, 2004), the membership of the organization has increased nearly tenfold. In 2003 approximately 6,000 TSA members were elementary school children (Honor, 2004). TSA is an important facet of the technology education movement.

Proponents consider TSA to be more than simply another extracurricular activity—in its best form it is truly co-curricular and helps a TE program achieve learning and social goals for its students. Still, research on related extracurricular activities has meaning for interpretation of this study. Much of the research on extracurricular activities has focused on the relationship of participation with students' emotional and academic development. Haensly, Lupkowski and Edling (1986) concluded that extracurricular activities provide an important context for social, emotional, and academic development. The beneficial effect of student organization participation on academic performance was also supported by Camp (1987) who found that it produced a positive contribution to student achievement. Some recent findings also support the claim that students learn subject matter information while engaged in TSA activities (Peterson, Ernst, Blue, Taylor, & Estler, 2004).

W. James Haynie (jim_haynie@ncsu.edu) and V. William DeLuca (william_deluca@ncsu.edu) are Associate Professors and Brian Matthews (Brian_Matthews@ncsu.edu) is an Assistant Professor in the Department of Mathematics, Science, and Technology Education at North Carolina State University, Raleigh.

Related findings showing positive impacts of extracurricular activity involvement include social and personal development enhancement (Carter & Neason, 1984); a relationship between VSO (Vocational Student Organization) participation and results on scales of personal development (Townsend, 1981); higher self-esteem among participants (Collins, 1977); enhanced self-concept (Yarworth & Gauthier, 1978); increased social status among peers (Spady, 1970); leaning gains outside of school classtime hours (Haynie, 1983), and greater satisfaction with school (Nover, 1981). These early studies provide evidence of the many benefits of student participation in extracurricular activities, but a recent report (Camp, Jackson, Buser, & Baldwin, 2000) cautioned that some of the research supporting the perceived benefits of student organizations was weak and perhaps flawed. Lankard (1996) noted that some of the claims of the benefits of VSO participation may be overstated and more research is needed. Still, Taylor (2004) demonstrated positive effects of TSA activities on problem solving and creativity among students. More research on these issues is clearly needed.

Though there were several studies examining achievement and socialization of students prior to 1990, no studies were found which examined the effect of student organizations on teacher-student interaction in a laboratory environment. With the evolution of a new self image for technology education, it is important to determine the effects of co-curricular and extra-curricular activities and organizations on the total technology education program.

A study conducted in 1989 surveyed TSA advisors to find their perceptions concerning characteristics of technology education programs with a TSA component and the relationship between participation in co-curricular organizations and the teaching methods used by TSA technology teachers (DeLuca & Haynie, 1991). The study reported here sought to undertake an exact replication (as nearly as possible) of that work with the additional inclusion of a few items on current issues, replacing outdated ones from the previous investigation. Except for inclusion of those new items in order to investigate some learning activities and teaching approaches that have recently become more common than they were in 1989, the methods and instruments were nearly identical. The original study was conducted at the 1989 TSA National Leadership Conference and reported in the *Journal of Technology Education* in 1991 (DeLuca & Haynie). To provide a longitudinal dimension to the work, careful attention was given to maintaining consistency of the instrumentation, sampling technique, and general methodology in the current study.

Methodology

Sample

The sample for this study consisted of TSA advisors in attendance at the 2003 National Technology Education Student Association Leadership Conference in Orlando, Florida, June 23-28, 2003. Each school participating in the conference was required to have at least one advisor in attendance. The survey was conducted during the Advisors' Meeting midway through the conference. Two-hundred copies of the instrument were distributed and they were collected at the door as attendees left the meeting. This approach insured maximum participation and resulted in the receipt of 192 usable response forms, a response of 95%.

Instrumentation

A 48 item questionnaire was developed by the researchers for this study. Responses were marked directly on the survey instrument. The instrument was developed by expanding and updating the 33 item instrument used in the previous survey (DeLuca & Haynie, 1991). To the maximum extent possible items remained exactly the same to facilitate direct comparisons between the findings of both surveys and enabling a longitudinal aspect to this work. The first nine items were designed to measure the characteristics of the participants' technology education program and the ways in which they implement their student organization chapters. Specifically, items asked the respondents when and where TSA functions were conducted and assessed TSA advisors' implementation of TSA activities as part of the instructional curriculum. Item 9 required advisors to select, from among eight choices, the term that best described the type of lab in which they teach.

The next 33 items were used to identify the frequency of use of various teaching methods and learning activities. These items used a five point Likert-type scale, ranging from Most Frequently (A) to Never (E). Missing responses were ignored in all cases. Four items requested advisors' perceptions concerning the impacts of the national Standards for Technology Education and the accountability movement, including mandated standardized testing. To insure total anonymity, the only demographic data collected included the state of residence of the respondent and whether the school setting was urban, rural, or suburban. The last item allowed for any comments the respondent wished to make. The format of the instrument was a single sheet printed on both sides and folded to form a four-page pamphlet just over 5 x 8 inches in size with 20% "white space" to give it a professional look and prevent it appearing overly burdensome to the respondent. This was the same format as used in 1989 study except that this time the respondents marked answers directly on the instrument instead of on a separate response sheet. The stems of all of the substantive items are presented in the tables within this article.

Data Analysis

The collected data were analyzed with SAS (Statistical Analysis System) software. Frequency and percent tables were generated for each item and comparisons were made to the same items from the 1989 survey. For each item requiring a Likert response, numeric values from 5 (most frequently) to 1 (never) were assigned to the responses and a mean score was calculated. These means were rank ordered for further investigation.

Findings

The results of the survey were analyzed to describe the characteristics of technology education programs that had a TSA component, to identify and classify teaching methods used, and to make comparisons with the 1989 data. Since the national conference at which the survey was conducted was held in Florida, it would be expected that there might be higher representation from that region of the country. Another factor contributing to this parochialism is the large number of TSA programs in the southeast. This suspicion was confirmed via Item 47 which divided the nation into four regions using the Mason-Dixon line and the Mississippi River as axes. The representation levels from those regions were: Northwest, 6%; Northeast, 15%; Southwest, 25%; and Southeast, 46%. This may limit the degree to which one can generalize the findings, but the information should still be helpful to the profession. Demographic data also revealed that, of the schools included, 16% were urban, 41% were rural, and 38% were suburban, with 5% not reporting.

Characteristics of TSA Enhanced Technology Education Programs

The responses to Items 1 through 8 are shown in Table 1. All respondents claimed to have an active TSA chapter—which is logical since the respondents were attending a national TSA conference.

Table 1
Responses to Items 1 through 8

Item No.	Stem	Yes % (*n*)	No % (*n*)	N. A. %	Yes % 1989
1	Active TSA chapter	100 (192)	0 (0)	0	100
2	Chapter meetings after school	84 (161)	14 (27)	2	73
3	Meetings in activity periods	47 (90)	44 (85)	9	53
4	Co-curricular approach	16 (31)	78 (149)	6	35
5	State adopted/approved course names	73 (140)	14 (26)	13	88
6	State adopted curriculum	81 (156)	7 (13)	12	84
7	TSA events used as basis of activities	70 (135)	25 (48)	5	NEW
8	Name "Technology Education" represents programs well	85 (163)	11 (21)	4	90

Item 2 revealed that 84% of the advisors indicated that meetings and activities were held after school. Activity periods during the school day were used by 47% (Item 3), indicating that some teachers conduct TSA activities/meetings at both times. The comparative data from 1989 shows that more after school and fewer activity period meetings are used today. The co-curricular approach in which class officers conduct meetings during each class, as advocated and used frequently in other VSO's (Vocational Student Organizations), has fallen in popularity in TSA from 35% to 16% since 1989.

Most of the advisors (73%) teach courses which are named in state adopted curriculum guides (Item 5). Additionally, 81% indicated that their curricula closely follow the state guidelines (Item 6), indicating little change since 1989.

A new Item 7 (replacing an outdated one from the earlier survey) found that 70% of the advisors actually use TSA competitive events as the basis for class learning activities. In Item 8, 85% of the respondents indicated that they are pleased with the name "Technology Education" for our programs. This rate of approval was down slightly from the 90% positive response to this item in 1989.

Item 9 asked advisors to classify their laboratories by type. In 1989, "unit laboratories" (woods, metals, drawing, etc.) were still in use by half of the teachers and 10% of the teachers reported they used "manufacturing" labs. In the current survey, only 14% of teachers still use "unit laboratories" and less than 1% employ "manufacturing labs." Now the most often used labs are: "Modular Lab" (31%), "Integrated 'General Shop' Labs" (17%), and "Other" (16%). Of the systems labs popularized in the 1970's and 1980's, only the "Communication Lab" (13%) appears to be in current use.

Teaching Methods

Items 10 through 42 concerned implementation of various teaching strategies. Items 34 through 42 were the new items added in this study—all of the other items in this section were exactly the same as in 1989 to allow meaningful comparisons. A five point Likert-type scale was used to determine the relative frequency of use for each technique. Ranked results on these 33 items, along with their current and 1989 means, and their previous rankings appear in Table 2. Results were analyzed to determine changes in frequency of use of the various teaching methods.

Computers have become the hallmark of the modern technology education laboratory. All of the items from the 1989 survey which concerned computers used by teachers and students had significantly higher ratings in the current sstudy. See items 32 (rank 1st), 33 (2nd), 31 (3rd), 29 (6th), and 30 (9th). Each of these computer related items were ranked among the top 10, while none of them did in 1989. Additionally, three other applications of computers not considered in 1989 now ranked 13th, 14th, and 19th.

Demonstrations are still very popular methods of teaching as shown by their 5th place ranking and the high percentage (75%) of teachers who use them frequently or most frequently. However, demonstrations had ranked 1st in 1989 and were used often by 93% of the teachers. "Lecture-demonstrations" are also

Table 2
Rank ordered responses to Items 10 through 42

Rank	Item #	Item Statement	Mean	1989 Rank	1989 Mean	*p*	Significance
1	32	Computers used by teacher to prepare materials	4.46	12	3.32	.0001	*
2	33	Computers used by teacher for clerical chores	4.39	14	3.21	.0001	*
3	31	Computers used BY STUDENTS for lab activities or study	4.34	11	3.38	.0001	*
4	40	Problem solving activities	4.23	New			
5	12	Demonstrations	4.04	1	4.32	.0015	*
6	29	Computers for presenting information	3.97	19	3.08	.0001	*
7	24	Individual projects	3.93	4	3.92	.91	NS
8	22	Group projects	3.89	6	3.64	.026	*
9	30	Computers for demonstrations	3.87	20	3.01	.0001	*
10	17	Individualized instruction	3.80	3	4.05	.023	*
11	21	Lab experiments	3.79	7	3.61	.189	NS
12	13	Lecture-demonstrations	3.76	2	4.07	.0042	*
13	35	Computers for drawing and design (CAD or CADD)	3.75	New			
14	34	Computers for simulations	3.70	New			
15	25	Teacher designed/assigned projects	3.64	10	3.38	.0296	*
16	10	Lectures of 10 to 25 minutes	3.53	5	3.67	.278	NS
17	14	Discussion (teacher led, class participatory)	3.45	8	3.55	.328	NS
18	18	Small group discussions	3.36	13	3.21	.199	NS

Table 2 (continued)
Rank ordered responses to Items 10 through 42

Rank	Item #	Item Statement	Mean	1989 Rank	1989 Mean	*p*	Significance
19	36	Computer-based modular instruction.	3.34	New			
20	20	Student peer tutors	3.28	16	3.12	.174	NS
21	38	Inquiry-based learning	3.23	New			
22	26	Student designed/selected (free choice) projects	3.19	9	3.46	.036	*
23	42	Library or internet research papers or presentations	3.17	New			
24	41	Written assignments over 1/2 page	3.12	New			
25	28	Discovery method	3.10	21	2.93	.201	NS
26	16	Traditional media (films, slides, TV)	3.10	18	2.97	.217	NS
27	27	Group designed/selected projects	2.98	15	3.19	.09	NS
28	39	Service-based learning	2.65	New			
29	15	Seminar (student led, teacher primarily observes)	2.57	23	2.55	.876	NS
30	37	Modular instruction which is NOT computer-based	2.57	New			
31	23	Mass production (line production)	2.42	17	3.12	.0001	*
32	19	Role playing	2.35	24	2.45	.45	NS
33	11	Lectures of over 30 minutes	2.04	22	2.68	.0001	*

used by 57% of the teachers. "Lecture-demonstrations" ranked 12th in the current study as compared to a ranking of 2nd in the previous study and their actual frequency of use has declined from the 80% reported in 1989.

The third highest ranked item in 1989 was Item 17, which indicated that individualized instruction was then used frequently or more often by 74% of the teachers and nearly all of them (99%) used it at least sometimes. Today, though, there has been some decline as "individualized instruction" is used frequently by 60% of teachers and ranks 10th—only 2% of the respondents reported never using this technique.

Items 10 and 11 (ranked 16th and 33rd) show that lectures, when used, tend to be short in length. Use of short lectures (Item 10) has not changed significantly since 1989, but long lectures have significantly dropped all the way to the bottom of the rankings. In Item 14, most teachers reported that they use "discussion (teacher led, class participatory)" to some extent. The ranking for this item was 17th and it found that only 8% use discussion "most frequently," but nearly all teachers (99%) use it at least "sometimes."

Among "big losers" in the rankings, "Mass production (line production) projects," which ranked a respectable 17th in 1989 dropped nearly to the bottom of the list (31st rank) with a significantly lower mean in the current investigation. Role playing (Item 19) ranked last in 1989 and still ranks near the bottom at 32nd.

Though there were some slight shifts in positions (partially due to the inclusion of nine additional items in the current study) several items remained relatively unchanged. These included "Individual projects" (Item 24, rank 7th), "Lab experiments" (Item 21, rank 11th), and "Student peer tutors" (Item 20, rank 20th).

Items 34-42 were added to the survey for this investigation. These were included so that future studies may track the implementation trends of learning activities and teaching techniques currently advocated for technology education or evolving in many other disciplines of education. Noteworthy among these are "Problem solving activities" (Item 40, rank 4th), "Computers for drawing and design" (Item 35, rank 13th), and "Computers for simulations" (Item 34, rank 14th). Library and written assignments (Items 42 and 41) ranked low at 23rd and 24th. Item 39 (ranked 28th) found that "Service-based learning" has not been adopted with enthusiasm in technology education and non-computer based modular instruction was the lowest ranked of the newly added items, ranking 30th.

On the last page of the instrument, four additional new items sought TSA advisors' perceptions concerning the national Standards for Technology Education and standardized testing for accountability purposes. Item 43 found that most of the advisors feel informed about the standards. In Item 44, the majority of teachers (83%) indicated that the Standards are appropriate and 78% claimed that the Standards enhance their programs (Item 45). Item 46 probably only applies to advisors in those states using high stakes accountability testing, but thus far 73% of the advisors already feel that their programs are being “stifled” by standardized testing. These data are reported in Table 3.

Table 3
Responses to Items 43 through 46

Item No.	Stem	% (*n*)	% (*n*)	% (*n*)	% (*n*)	%	*M*
43	To what degree do you feel that you are knowledgeable about the national Standards for Technology Education?	29 (56)	53 (102)	11 (22)	2 (3)	5	3.17
44	To what extent do you feel that the national Standards for Technology Education are appropriate in their current form?	36 (69)	47 (91)	7 (14)	0 (0)	10	3.32
45	To what degree do you feel that your program is enhanced by your efforts to reflect the national Standards for Technology Education?	34 (66)	44 (84)	13 (24)	1 (1)	9	3.23
46	To what extent do you feel that your program is stifled by the accountability movement in education and/or mandated standardized testing?	27 (51)	46 (88)	19 (36)	3 (5)	6	3.80

Discussion

The importance of computers and computer based activities in the current TE (Technology Education) curriculum is evident in these findings. Computers are used much more frequently and in more ways by both teachers and students now than they were in 1989. Problem solving activities are employed in many TE classes and they should (if designed appropriately) provide a good basis for curricular integration with other disciplines in the schools. Despite the increased number of computers and modular instructional units in use since 1989, traditional techniques familiar to the industrial arts labs of the 1950's and 60's are still evident at a high rate, including demonstrations, individual projects, and lab experiments.

There was a change in the type of activities students are doing in the classroom. Problem solving activities ranked highest; this is as expected given the nature of TSA competitive events. The use of individual projects remained unchanged but there was a significant increase in the use of group projects. There was a significant decrease in the use of student designed/selected projects and a significant increase in teacher designed/assigned projects. These results are consistent with TSA events being used as a basis of activities (Item 7). The mass production or line production activities that were such an important and visible hallmark of the Industrial Arts Curriculum Project and other curriculum projects of the 1970's and 80's showed a significant decrease, along with the laboratories designated to support technology systems or clusters such as manufacturing and transportation. Likewise, some change in teaching methods is evident. Demonstrations, lecture demonstrations, individualized instruction, and lectures over 30 minutes decreased significantly. With 70% of the teachers reporting that they use TSA events as a basis for activities, associated changes in teaching and classroom activities are evident.

The negative findings include a decline in utilization of the co-curricular approach in which each class has its own TSA officers who basically manage the class with guidance from the teacher. This approach has been shown to be very effective in other disciplines with co-curricula vocational student organizations, such as the Future Farmers of America and the Vocational and Industrial Clubs of America. In the absence of this co-curricular approach, technology teachers are not realizing opportunities to ease their own lab management burdens while helping students gain leadership and social skills. Another noteworthy negative finding is that library and Internet research papers and written assignments of over half a page in length ranked in the bottom third of the activities and techniques considered. With the movement in the profession toward increased curricular integration and leaders in other disciplines calling for writing across the curriculum, it seems out of step for TE classes not to require more and longer written and research assignments. Likewise, service-based learning is being advocated by many leaders in education and TE has wonderful potential for its implementation. However, few teachers are implementing this technique.

The fact that “lectures of over 30 minutes” ranked last among the techniques is viewed as positive—evidently students are still “doing” more than they are passively listening, even if the nature of the activities have changed in the cognitive direction in the last decade. With increasing pressure from end-of-course testing in some states and efforts in place to include new topics in the curriculum about which some teachers may not feel adequately informed, one might fear that teachers would resort more to lectures rather than retain faith in the “learn by doing” philosophy that has long been so basic to the profession. Thankfully, that does not appear to be happening at the current time, but future research efforts should track any potential changes.

Conclusions and Recommendations

Change in classroom approaches reflects the nature of TSA competitive events which are hands-on problem-based activities. TSA teachers also feel somewhat or highly knowledgeable about the Standards for Technological Literacy and their programs are enhanced by those standards. A great deal has changed over the past 14 years. Those changes exhibited by TSA teachers show progress toward standards and problem-based learning taught in a computer rich environment. The "learn by doing" approach remains the primary teaching method in TE, but the actual learning activities experienced by the students have changed to reflect the evolving curriculum. It is recommended that teacher educators help pre- and in-service teachers develop balanced approaches with activities that match the topics under study by their students. Teachers should analyze their approaches and the activities they assign to their students to insure that the best approaches are being employed. Future investigations should continue to track change in the profession and help identify noteworthy trends. In addition, research should compare TSA enhanced programs with TE programs which do not have TSA, investigating whether or not teachers differ in their instructional approaches. TSA and the activities it sponsors provide rich learning opportunities for students as well as making the public aware of high quality technology programs.

References

Applegate, R. (1981). American Industrial Arts Student Association, National Office, Washington, D.C. Telephone conversation, September 15, 1981.

Camp, W. G. (1987, December). *Student participation in vocational student Organizations and grades for the sophomore class of 1980 in America*. A paper Presented at the American Vocational Association Convention, Las Vegas, NV. (ERIC Document Reproduction Service No. 290 040)

Camp, W. G., Jackson, R. S., Buser, B. R., & Baldwin, E. T. (2000). *Vocational student organizations and student achievement*. Berkley, CA: National Center for Research in Vocational Education (MDS-1317).

Carter, R. & Neason A. (1984). Participation in FFA and self-perceptions of personal development. *Journal of the American Association of Teacher Educators in Agriculture*, *25*(3), 3904.

Collins, D. R. (1977). *An assessment of the benefits derived from membership in a vocational student organization in vocational, technical, and adult education*. (Project No. 19-017-151-226E). Menomonie, WI: Center for Vocational and Adult Education. (ERIC Document Reproduction Service No. 145 234)

Costa, A. L. 1984). Mediating the metacognitive. *Educational Leadership*, *42*(3), 57-62.

DeLuca, W. V., & Haynie, W. J. (1991). Perceptions and practices of Technology Student Association advisors on implementation strategies and teaching methods. *Journal of Technology Education, 3*(1), 4-15.

Haensly, P. A., Lupkowski, A. E., & Edling, E. P. (1986). The role of extracurricular activities in education. *The High School Journal*, 69(2), 110-119.

Haynie, W. J. (1983). Home projects: A new way to involve the community in AIASA. *Man/Society/Technology*, *42*(4), 12-13.

Honor, S. (2004). Personal communication from TSA National Office, 2-11-2004.

Jeffreys, B. J. & Camp W. G. (1988). Factors associated with participation in vocational student organizations. *Journal of Vocational Education Research*, *13*(2), 53-68.

Lankard, B. A. (1996). Myths and realities: Youth organizations. Columbus, OH: Center on Education and Training for Employment, The Ohio State University.

Nover, M. L. (1981). *Student involvement and the psychological experience of the high school.* A paper presented at the Annual Convention of the American Psychological Association, Los Angeles. (Eric Document Reproduction Service No. 210 613)

Peterson, R. E., Ernst, J., Blue, C. Taylor, J. S., & Estler, D. (2004). *The TECH-KnowProject*. Paper presented at the Southeastern Technology Education Conference, October 1, 2004, Chattanooga, TN.

Spady, W. G. (1970). Lament for the letterman: Effects of peer status and extra-curricular activities on goals and achievement. *American Journal of Sociology*, *75*, 680-701.

Sternberg, R., & Martin, M. (1988). When teaching thinking does not work, what goes wrong? *Teachers College Record, 89*(4), 555-578.

Taylor, J. S. (2004). *TSA and technological literacy: Is there a connection?* Presented at the Southeastern Technology Education Conference, October 1, 2004, Chattanooga, TN.

Townsend, C. D. (1981). FFA participation and personal development as perceived by Iowa vocational agriculture seniors. Dissertation Abstracts International. 42, 1444a.

Taylor, J. S. (2004). *An analysis of the variables that affect technological literacy as related to selected technology student association activities.* Unpublished doctoral dissertaion, North Carolina State University.

Yarworth, J. S., & Gauthier, W. J. (1978). Relationship of student self-concept and selected personal variables to participation in school activities. *Journal of Educational Psychology*, *70*(3), 335-344.