Discussion of the effectiveness of the national accreditation process of secondary science education programs

Judith A Bazler
Monmouth University

Meta Van Sickle
College of Charleston

Doris Simonis
Kent State University

Letty Graybill,
Monmouth University

Nancy Sorenson
St. Marys College

Erica Brounstein
Capital University

ABSTRACT

This paper reflects upon the development, design, and results of a questionnaire distributed to professors of science education concerning the processes involved in a national accreditation of teacher education programs in science. After a pilot study, five professors/administrators from public and private institutions designed a questionnaire and distributed it nationally. This paper discusses the research and the results.

Keywords: accreditation, science education, assessment

INTRODUCTION

The National Council for Accreditation of Teacher Education (NCATE) was founded "in 1954 to accredit teacher certification programs at U. S. colleges and universities. NCATE was a council of educators created to ensure and raise the quality of preparation for their profession. NCATE was recognized by the U. S. Department of Education as an accrediting institution. NCATE accreditation was specific to teacher education and was different from regional accreditation. Accreditation was voluntary in some states and mandatory in others. In some states, California was an example, the state created its own accreditation.

Before 2010, there were two national teacher education accrediting organizations, NCATE (National Council of Accreditation of Teacher Education) and TEAC (Teacher Education Accrediting Council). The boards of the Teacher Education Accreditation Council (TEAC) and the National Council for Accreditation of Teacher Education (NCATE) met in Washington, DC, on Friday, October 22, 2010 and voted unanimously to consolidate educator accreditation under a new agency, the Council for the Accreditation of Educator Preparation (CAEP). CAEP goals were to be to raise the performance of candidates as practitioners in the nation's P-12 schools and to raise standards for the evidence the field relies on to supports its claims of quality. By meeting these goals, NCATE and TEAC leaders believed they would raise the stature of the profession. The three standards CAEP will hold programs (or units) accountable for are that: 1. Candidates demonstrate knowledge, skills, and professional dispositions for effective work in schools; 2. Data drive decisions about candidates and programs; and 3. Resources and practices support candidate learning. Both organizations espouse that the accreditation process is to strengthen and inform teacher education programs. Currently, NCATE and TEAC rely upon the National professional organizations to develop content standards. The secondary science standards were developed by NSTA (National Science Teachers Association). Science educators used these standards when designing programs in science education. NCATE and TEAC used these standards when reviewing science education programs and the acceptance of the programs were labeled with "NSTA program recognition" after program review.

BACKGROUND

National standards and standards-based assessments have become the basis for curriculum development and accountability. However, the implementation processes lacked the time not only to reflect on what was being implemented but also to compare and contrast the tools and rubrics chosen with those selected by colleagues at other colleges/universities.

In the summer of 2010, a group of educators/administrators discussed required accreditation assessments/rubrics used in secondary science methods classes. These professionals came from institutions that were in the south, east, mid west and west of the U. S.; both private and public institutions were represented. In general they shared the process and procedures of the accreditation review work at their institutions. The group asked to participate included both current faculty and faculty that are now administrators but were faculty at the time of accreditation and administrators with responsibilities for accreditation. Three members of the groups were the sole authors of their institutions national secondary science accreditation report. In addition, one group member was at a school that had recently gone through accreditation but was now relocated into another school that has chosen to become state certified. This participant

provided information from both schools. Data collected and interviews completed during this pilot project then guided design and distribution of a questionnaire that would research:

- Knowledge of varied assessments used by Science Educators at various higher education institutions
- Knowledge of changes in accountability made in science education
- Knowledge of strategies used by Science Educators in delivering content in science methods classes
- Knowledge of challenges facing Science Educators in future years
- Support for Science Educators
- Research opportunities for Science Educators

METHOD

For this study we chose to work in a qualitative research tradition that focuses on the distribution of a questionnaire and the analysis of the written comments in a combination report. Qualitative case study (Bogdan & Biklen, 1998, 2007) was chosen because we needed faculty and administrators expertise in the national secondary science accreditation processes. Choosing specific faculty members and administrators so that patterns stand out is purposeful sampling (Bogdan & Biklen, 1998, 2007). We were able to use purposeful sampling of the Association of Science Teacher Educators (ASTE) in order to keep the research focus at the forefront (McMillan & Schumacher, 1997, 2006). All of the respondents to the survey were from the ASTE membership. We sent an email through the ASTE listserve and received replies from this purposeful sample. The criteria for the purposeful sampling were faculty member or administrative expertise or oversight of the process and/or writing, of a national secondary science accreditation report. The faculty members and administrators that responded have specific background in secondary science education and the accreditation process that was needed for the study.

Another reason for choosing a qualitative study was because we wanted to look at specific responses in depth. The open-ended responses requested throughout the survey were utilized "precisely because the researchers wished to understand the particular in depth, not to find out what is generally true of many" (Merriam, 1998, p.208, 2009). We specifically kept careful notes about our work with the faculty members and administrators and recorded information on a question-by-question basis.

We distributed the resultant questionnaire via the Internet through a professional organization, Association of Science Teacher Educators (ASTE) works in higher education with science teacher education. The questionnaire was sent out with one reminder one month after the original mailing. Data were collected on a designated website where all questionnaires were returned.

Finally, we chose a qualitative study for the purpose of motivating and facilitating development and improvement of science teacher education programs. Such studies are often more motivating for researchers, but specifically, "...they promote better problem solvers and critical thinkers" (Ertmer, Newby & MacDougal 1996, p. 720). It is our hope that our science education faculty members will use this research as a basis for self/critical reflection. Due to the complex political structures involved with this study, we decided that that qualitative research methods best suited our needs.

DATA ANALYSIS

The questionnaire data was analyzed using frequencies and percentages. The open ended answers were tabulated.

Demographics

Survey demographic findings
The demographic findings are shown in figure 1. The full set of data is included in the figure.

Figure 1, Demographics, N=29

Question	YES	NO
1. My science education program has been state licensed to teach science in a public school.	100%	
2. I have a degree (BS, BA, MA, MS, PhD) in science.	100%	
3. I teach the secondary science methods course (s).	58%	42%
4. My college/university/program has earned National Recognition by NSTA to prepare secondary science teachers.	58%	42%
5. My college/university/program is NCATE or TEAC accredited.	84%	16%
6. I am currently working on NSTA program recognition in secondary science education.	42%	58%
7. I am responsible for the secondary science education program.	68%	32%
8. I am the person responsible for writing the documents required for NSTA program recognition.	47%	53%
9. I wrote more than 50% of the NSTA recognition report.	26%	74%
10. When I wrote the NSTA recognition report, I included assessments for the secondary science education program.	53%	47%
11. I keep all the data from the assessments in the secondary science education program.	26%	74%
12. I analyze all the data from the assessments of the secondary science education program.	59%	41%
13. I am responsible for updating the documents for the secondary science education program.	41%	59%
14. I am a tenured professor of science education.	59%	41%
15. I received a course release, extra salary, or other compensation for your work in writing the accreditation reports, analyzing data collected to support the reports, and/or updating descriptions of curricula and program in secondary science education.	5%	95%
16. I share this data on an annual basis with the science department (s) and the education department.	32%	68%

Programs

All of the science education programs represented by our respondents were licensed to prepare teachers of science for public schools. The majority (84%) of the programs were either TEAC or NCATE accredited and the majority of the programs had earned National Recognition by NSTA to prepare secondary science teachers.

Professors

All of the respondents had a degree in science. Fifty-nine percent of the respondents were tenured professors of science education. Five percent received a course release, extra salary, or other compensation for their work in writing the accreditation reports, analyzing the data collected to support the reports, and/or updating descriptions of curricula and program in secondary science education. A majority of participants taught the secondary science methods course and were responsible for the science education program; however 42% were working on NSTA program recognition in secondary science education and 47% of the respondents were responsible for writing the documents required for program recognition. In fact, 74% report that they wrote more than 50% of the NSTA recognition report. Over half of the respondents included assessments for the secondary science education program. Twenty-six percent kept all the data and 59% analyzed all the data of the secondary science education program. Of the respondents 41% were responsible for updating the documents for the secondary science education program. Thirty-two percent shared the data on an annual basis with the science department (s) and the education department.

RESULTS

Survey findings

Forty-seven percent of the surveyed faculty members believed the NSTA Program Recognition process had affected their program in a positive way, but 37% believed that the secondary science education courses had been improved as a response to their science program accreditation evaluation and 42% did not see improvement. A large percent, 42% now included and assessed components in their program that they did not assess prior to the accreditation requirements and 54% said that they use the data from the assessments to improve the program. The amount and quality of safety included in their program increased with 26% of the respondents. Thirty-seven percent of the respondents observed that their rubrics have improved by going through the process but 32% observed that their teaching in the science methods course had changed due to the NSTA Program Recognition process. Twenty-six percent of the respondents believed that the amount of homework of the secondary science education students had increased due to the process. Sixty-eight percent of the respondents believed that the ETS Praxis II scores had not improved and that the academic success, job-finding, or classroom performance of the secondary science education students had not been positively increased by the NSTA Program Recognition. Twenty-six percent of the respondents thought that the students were more aware of the National Science Education Standards due to the program recognition. Thirty-two percent of the respondents believed that there was a difference in the

secondary science education program prior to accreditation recognition and after receiving it and that the process increased the rigor of their science education program.

The survey instrument is shown in figure 2. The full set of data is included in the figure.

Figure 2, Survey Instrument with Data, N=29

Question	Strongly Disagree/Disagree	Strongly Agree/Agree
1. I believe the NSTA Program Recognition process has affected our program in a positive manner.	32%	47%
2. Our secondary science education courses have been improved as a response to our science program accreditation evaluation	42%	37%
3. I now include and assess components in my program that I did not have before (safety, nature of science, issues, or inquiry).	47%	42%
4. The amount and quality of safety included in our program has increased.	47%	26%
5. My rubrics have improved by going through the process of NSTA recognition.	39%	37%
6. I use the data from the assessments to improve my program.	32%	54%
7. My teaching in the secondary science (science methods) education course has changed because of NSTA Program Recognition process.	39%	32%
8. The amount of homework of the secondary science education students has increased due to the NSTA Program Recognition process.	42%	26%
9. I believe that the ETS Praxis II scores and/or the State Science Content Test Scores have improved due to the program recognition process.	68%	16%
10. The academic success, job-finding, or classroom performance of the secondary science education students has been positively increased by the NSTA Program Recognition.	68%	16%
11. The secondary science education students are more aware of the National Science Education Standards due to the NSTA Program Recognition process.	58%	26%
12. There is a difference in the secondary science education program prior to recognition and after receiving it.	39%	42%
13. The NSTA Program Recognition process has increased the rigor of our science education program	42%	32%

- Data for the middle column of "neither agree nor disagree" was not included in the percentages shown.

In addition to the closed ended survey questions, the following three open-ended questions were provided to the respondents.

1. Describe the changes that have occurred in your science teacher education preparation program due to the NSTA program recognition process.

The majority of the respondents reported that there was more structure to the methods courses and there were more homework assignments and their assignments were more explicit. They reported that there was no flexibility for changes once the program was approved. More self-designed, hands-on laboratory experiences and more safety instruction plus more data collection and assessment were reported to be needed.

2. What remained unchanged in your program through the NSTA Program Recognition process?

The majority of the respondents reported that all of the content areas, safety, pedagogy, the use of inquiry and the use of technology remained unchanged in their secondary science education programs.

3. How has the NSTA Program Recognition process affected your scholarship and professionalism? For example, do you use the data as part of your scholarship?

The majority of respondents reported that the process had no affect on their scholarship and professionalism. A few of the respondents (14%) were now using the process for their research. A few report that their scholarship had slowed due to work on the reports.

Analysis of Results

Fifty-eight per cent of respondents were working on NSTA Recognition at the time of the survey which means that they needed to do a lot of work to help improve the program. At the same time, 68% said that they were not sharing data with science nor education department faculty. Forty-two percent of the programs were not nationally recognized and 58% of faculty were working on national recognition; therefore, the "I need to do these things to improve our program" data were substantiated. The places they felt that the programs were strong were in safety, homework, Praxis scores, job finding, classroom performance, and knowledge of the national science standards. The open-ended questions supported the idea that the content, pedagogy, safety, and homework was strong. The strongly disagree/disagree data showed that programs formerly recognized were already including attention to safety, content, and appropriate pedagogy and that their students' Praxis scores, job opportunities, classroom performance and knowledge of national science standards were in place.

Institutions were not showing value for this work and 95% of the science educators surveyed were not compensated and were definitely having time taken away from valuable research and scholarship. The vast majority were writing by themselves the majority of the required report. The national accreditation process had increased their workload with added data gathering and analysis.

Concerns

Our research indicates that the process of national accreditation has promoted a significant amount of preparation including keeping records and writing the reports to verify that the programs are meeting the goals and standards of the professional organization. The time, the labor, the expense of documenting is like an unfunded mandate that burdens the public schools

because universities in general are not providing the person power as needed just the added responsibility of one faculty with no resources provided. As programs are becoming more standardized, rubrics become more standard and rubrics while they, on one hand, assure one set of competencies are developed, they might hurt creativity. This process also limits faculty from creativity in research, teaching and scholarship. Future questions:

- If one spends a lot of time entering data, what happens to ones teaching?
- How do you adjust to the inflexibility of the assessments that are in place?
- When the national science standards change, what impact does that have on program improvement?
- How can we encourage our institutions to value this process by supporting the faculty with appropriate resources?
- Why should the science content faculty value the process when the process changes so often?

Finally, more discussion about assessments, accreditation by the science education faculty needs to be facilitated in the future.

REFERENCES

Allen, M. (2003). Eight Questions on Teacher Preparation: What Does the Research Say? A Summary of the Findings. Education Commission of the States.

Bazler, J. A., Van Sickle, M., Graybill, L., Simonis, D. A., Sorenson, N. A., Brownstein, E. (in review) Discussion of the Effectiveness of the National Accreditation Process of Secondary Science Education Programs, A Pilot Study. Journal of Science Teacher Education.

Bogdan, R., & Biklen, S.K. (1998). Qualitative research for education: An introduction to theory and methods. Boston: Allyn and Bacon.

Bogdan, R. & Biklen, S. (2007). Qualitative research for education: An introduction to theory and methods Boston, Mass.: Pearson A & B.

Bradley, A. (1997, October 29). Accreditors shift toward performance: NCATE to stress candidate evaluation. Education Week, 17 (9), 1-2.

Darling-Hammond, L. (1999). Reshaping Teaching Policy, Preparation, and Practice. Influences of the National Board for Professional Teaching AStandards. American Association of Colleges for Teacher Education, AACTE Publications.

Ertmer, P., Newby, T. & MacDougal, M. (1996). Students' responses and approaches to case-based instruction: The role of reflective self-regulation.

McMillan, J. & Schumacher, S. (1997). Research in education: A conceptual approach. New York: Long.

McMillan, J. & Schumacher, S. (2006). Research in education: Evidence-based inquiry. Boston : Pearson/Allyn and Bacon.

Merriam, S. (1998). Qualitative research and case study applications in education. San Francisco: Jossey-Bass.

Merriam, S. (2009). Research: A guide to design and implementation. San Francisco, Calif. : Jossey-Bass.

Tomei, L. J. (2002). Negotiating the Standards Maze: A Model for Teacher Education Programs. Paper presented at the Annual Meeting of the York, American Association of Colleges for Teacher Education (54th, New NY).

National Council for Accreditation of Teacher Education-Wikipedia, the free encyclopedia. http://en.wikipedia.org/wiki/National_Council_for_Accreditation_of_Teacher_Education

Wilson, S. M., Floden, R. E. (2003). Creating Effective Teachers: Concise Answers for Hard Questions. An Addendum to the Report "Teacher Preparation Research: Current Knowledge, Gaps, and Recommendations.". ERIC Publications (071)—Reports.

APPENDIX

Figure 1, Demographics

Question	YES	NO
1. My science education program has been state licensed to teach science in a public school.	100%	
2. I have a degree (BS, BA, MA, MS, PhD) in science.	100%	
3. I teach the secondary science methods course (s).	58%	42%
4. My college/university/program has earned National Recognition by NSTA to prepare secondary science teachers.	58%	42%
5. My college/university/program is NCATE or TEAC accredited.	84%	16%
6. I am currently working on NSTA program recognition in secondary science education.	42%	58%
7. I am responsible for the secondary science education program.	68%	32%
8. I am the person responsible for writing the documents required for NSTA program recognition.	47%	53%
9. I wrote more than 50% of the NSTA recognition report.	26%	74%
10. When I wrote the NSTA recognition report, I included assessments for the secondary science education program.	53%	47%
11. I keep all the data from the assessments in the secondary science education program.	26%	74%
12. I analyze all the data from the assessments of the secondary science education program.	59%	41%
13. I am responsible for updating the documents for the secondary science education program.	41%	59%
14. I am a tenured professor of science education.	59%	41%
15. I received a course release, extra salary, or other compensation for your work in writing the accreditation reports, analyzing data collected to support the reports, and/or updating descriptions of curricula and program in secondary science education.	5%	95%

16. I share this data on an annual basis with the science department (s) and the education department.	32%	68%

Figure 2, Survey Instrument with Data

Question	Strongly Disagree/Disagree	Strongly Agree/Agree
1. I believe the NSTA Program Recognition process has affected our program in a positive manner.	32%	47%
2. Our secondary science education courses have been improved as a response to our science program accreditation evaluation	42%	37%
3. I now include and assess components in my program that I did not have before (safety, nature of science, issues, or inquiry).	47%	42%
4. The amount and quality of safety included in our program has increased.	47%	26%
5. My rubrics have improved by going through the process of NSTA recognition.	39%	37%
6. I use the data from the assessments to improve my program.	32%	54%
7. My teaching in the secondary science (science methods) education course has changed because of NSTA Program Recognition process.	39%	32%
8. The amount of homework of the secondary science education students has increased due to the NSTA Program Recognition process.	42%	26%
9. I believe that the ETS Praxis II scores and/or the State Science Content Test Scores have improved due to the program recognition process.	68%	16%
10. The academic success, job-finding, or classroom performance of the secondary science education students has been positively increased by the NSTA Program Recognition.	68%	16%
11. The secondary science education students are more aware of the National Science Education Standards due to the NSTA Program Recognition process.	58%	26%
12. There is a difference in the secondary science education program prior to recognition and after receiving it.	39%	42%
13. The NSTA Program Recognition process has increased the rigor of our science education program	42%	32%