International Society for Technology in Education (ISTE)

Educational Computing and Technology Standards

for

Secondary Computer Science Education Initial Endorsement Program

INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION
480 Charnelton Street, Eugene, OR 97401-2626
Telephone: 541-336-5191
URL: http://www.iste.org

Contact for Information:
Lajeane Thomas, Ed.D., Chair
ISTE Accreditation and Standards Committee
Louisiana Tech University, P.O. Box 3161, Ruston, LA 71272
Tel: 318 257-3923; Fax: 318 257-4916
email: lthomas@latech.edu

Program Review Preparation Materials
Available Online: http://cnets.iste.org/NCATE

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The International Society For Technology In Education (ISTE)
Educational Computing and Technology Standards

Introduction

Educational computing and technology (ECT) is an emerging field, which encompasses many sub-disciplines. This field includes knowledge about and use of computers and related technologies for (1) integration of technology and curriculum to support learning; (2) delivery, development, prescription, and assessment of instruction; (3) effective use of computers as an aid to problem solving; (4) school and classroom management; (5) educational research; (6) electronic information access and exchange; (7) personal and professional productivity; (8) technical assistance and leadership; and (9) computer science education. The International Society for Technology in Education (ISTE) recognizes that educational computing and technology foundations (NETS for Teachers) are essential for all teachers. ISTE also acknowledges educational computing and technology specialty areas beyond these foundations and has established program standards for initial and advanced programs. These program standards will assist teacher education units, and professional organizations and agencies in understanding and evaluating the educational preparation needed for specialization within the field.

These programs will prepare teacher candidates to keep abreast of changes in educational computing and technology and their impact on education. In addition, the candidates will be equipped to utilize and integrate a broad range of educational computing and technology applications to enhance K-12 student learning and their own productivity. Finally, candidates will be prepared to work effectively as professional leaders to advance their specific fields within a culturally diverse society. ISTE has developed performance assessment standards for initial and advanced educational technology programs including: (1) the technology facilitation initial endorsement; (2) the technology leadership advanced program; and (3) the secondary computer science education initial endorsement program. Institutions offering one or more of these programs should respond to the corresponding set of program standards. **"Endorsement" indicates that these programs prepare teachers for an add-on endorsement to an existing teaching certificate**.

Technology Facilitation (TF) -- Initial Endorsement Standards
Technology Facilitation (TF) endorsement programs meeting ISTE standards prepare teacher candidates to serve as building/campus-level technology facilitators. Candidates completing this program will exhibit knowledge, skills, and dispositions equipping them to teach technology applications; demonstrate effective use of technology to support student learning of content; and provide professional development, mentoring, and basic technical assistance for other teachers who require support in their efforts to apply technology to support Grades K-12 student learning. ***(Revised Fall 2001)***

Technology Leadership (TL) -- Advanced Program Standards
Technology Leadership (TL) advanced programs meeting ISTE standards prepare candidates to serve as technology directors, coordinators, or specialists. Special preparation in computing systems, facilities planning and management, instructional program development, staff development, and other advanced applications of technology to support student learning and assessment will prepare candidates to serve in technology-related leadership positions at district, regional, and/or state levels. ***(Revised Fall 2001)***

Secondary Computer Science Education (CS) – Initial Endorsement Program Standards
Secondary Computer Science Education programs meeting ISTE standards prepare teacher candidates to serve as teachers of computer science in secondary schools. They focus on preparing their students in technical aspects of computing such as programming and algorithm design, computer system organization and operation, data representation and information organization, and social aspects of computing. High school computer science teachers help students examine the applications and implications of computing and provide the conceptual computer science framework to assist students interested in exploring the field in depth. ***(Revised Fall 2002)***

This specific document focuses on the requirements for submitting a program report for review by the International Society for Technology in Education (ISTE) that will determine national recognition for programs preparing candidates for an Educational Computing and Technology ***Secondary Computer Science Education*** initial endorsement program.

Development of ISTE Secondary Computer Science Standards

How These Specialty Organization Program Standards Were Developed

ISTE's Secondary Computer Science Education (CS) program standards were developed, drawing on research, practice, and expert review to obtain consensus. In developing new or revised program standards, the International Society for Technology in Education has invited, and refined proposed standards based on comments expressed about the specialty program standards and/or review procedures by NCATE, institutions, and states. The following opportunities were provided for the public and educational community to review and provide comment on the proposed standards.

a. Draft one (May - September, 2001)
   May – Online feedback regarding possible revisions to the existing CS Standards
   June – Accreditation team prepared first draft based on online feedback and assessment of changes in research and practice during past four years.
   June – Held meetings with various small groups of computer science educators at NECC
   September – ISTE's Special Interest Group for Computer Science (SIGCS) took leadership of the Standards revision process

b. Draft two (March 1 - June 15, 2002)
   March – Revision committee examined relevant literature and earlier draft feedback
   April – Revision committee finalized draft two. Identified lists of relevant constituencies for soliciting reviews
   May – Online review of draft two

c. Draft three (June 15 - August 1, 2002)
   June – Presentations to and feedback from selected professional groups at NECC
   June - July – Revision committee prepared draft three
   July – Presentation to and feedback from professionals at an international meeting for computer science educators (Germany)

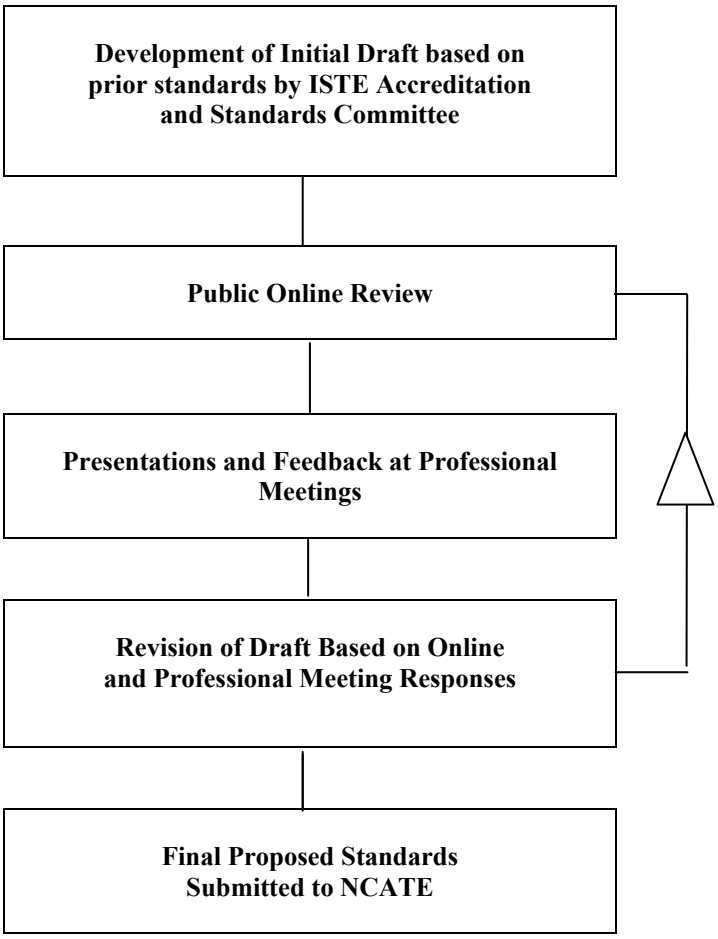
d. Final draft (August 15) submitted in the proposal to NCATE

Activities associated with draft one led to a substantial revision of existing standards that were incorporated into draft two. Of particular note was the decision to discontinue the initial certification program in favor of a single endorsement level set of standards. Additionally, the organization of both content and professional practice elements of the standards was substantially changed to reflect a more focused approach.

The existing standards relied on the discontinued program standards for computer literacy as prerequisite background. Feedback from expert reviewers suggested a major reorganization to align the expectations with the NETS for Teachers as prerequisite preparation for the computer science education program.

Each version of the standards was posted on the web for review throughout the three cycles of this process. Job titles of respondents represented a broad spectrum including technology coordinators, high school computing teachers, community college instructors, professors of education, and professors of computer science. The following diagram illustrates the cycle of review and refinement for the standards development.

Figure 1. Standards Review and Refinement Process



Explanation of the Knowledge Base

ISTE has made use of the knowledge base, including current research and the wisdom of practice, appropriate for preparing professionals for leadership positions in the area of educational technology and teachers of computer science. ISTE NETS are clearly built upon current accepted standards of accomplished teaching and leadership. Although the standards include the necessary technology components, they also are grounded in application of technology as it supports sound pedagogical theory and practice. All of the ISTE standards prepare preservice candidates, teachers, and technology specialists to provide the environments, experiences, and resources that will help P-12 students effectively apply technology for learning, communications, problem-solving, and decision-making. The ISTE standards for teachers, technology leaders, and administrators all are designed to support the development of technology-capable P-12 students, who must, in today's world, become:

- Capable information technology users,
- Information seekers, analyzers, and evaluators,
- Problem-solvers and decision-makers,
- Creative and effective users of productivity tools,
- Communicators, collaborators, publishers, and producers, and
- Informed, responsible, and contributing citizens. (NETS, 1998)

The Computer Science Education Standards enrich this general base and extend it to the teaching of secondary students as they explore computing in more detail.

The process described above indicates that significant feedback was sought and received from professionals in public and private secondary schools, community colleges, and four-year (or more) colleges and universities. Relevant literature in general learning and teaching, computer science curriculum, and computer science teaching was also used to guide the revision of the existing computer science education standards. A brief list of documents contributing significant research base for our standards follows.

Association for Computing Machinery (ACM) (2001). *Computing curricula 2001: Steelman report*. Retrieved August 12, 2002 from http://www.computer.org/education/cc2001/index.htm

Association for Computing Machinery (ACM). *ACM model high school computer science curriculum*. Retrieved August 12, 2002 from http://www.acm.org/education/hscur/index.html

Association for Computing Machinery (ACM). *SIGCSE Bulletin*. New York. Published quarterly. Retrieved August 12, 2002 from http://www.acm.org/sigcse/

Brookshear, J.G. (2002). *Computer science: An overview* (7th Ed.) Addison-Wesley.

The College Board (2002). *AP computer science*. Retrieved August 12, 2002 from http://www.collegeboard.com/ap/students/compsci/index.html

Computer Science and Telecommunications Board, National Research Council (1999). *Being fluent with information technology*. Washington, D.C.: National Academy Press.

Deek, F., & Kimmel, H. (2002). *A review of models for teacher preparation programs for precollege computer science education*. JCSE Online Annual. Eugene, OR: ISTE Retrieved August 12, 2002 from http://www.iste.org/sigcs/community/jcseonline/2002/4/index.html

Denning, P. (1998). Computing the profession. *EDUCOM Review, 33* (6), 26-30, 46-59.

Forcier, R. (1999). *The computer as an educational tool: Productivity and problem solving.* (2nd ed.). Columbus, OH: Merrill of Prentice Hall.

Galin, J., & Latchaw, J. (1998). *The dialogic classroom: Teachers integrating computer technology, pedagogy, and research*. Urbana, IL: National Council of Teachers of English.

Hawisher, G., & Selfe, C. (1999). *Passions, pedagogies, and 21st century technologies.* Urbana, IL: National Council of Teachers of English/Utah State University Press.

International Society for Technology in Education (ISTE). *JCSE Online*. Published quarterly online with an annual print compendium. Retrieved August 12, 2002 from http://www.iste.org/sigcs/community/jcseonline/index.html

Jonassen, D., Peck, K., & Wilson, B. (1999). *Learning with technology: A constructivist perspective.* Columbus, OH: Merrill of Prentice-Hall.

Kane, J. (1999). *Education, information, and transformation: Essays on learning and thinking*. Columbus, OH: Merrill of Prentice Hall.

Moursund, D. (1999). *Project-based learning using information technology*. Eugene, OR: International Society for Technology in Education.

Valdez, G., McNabb, M., Foertsch, M., Anderson, M., Hawkes, M., & Raack, L. (1999). *Computer-based technology and learning: Evolving uses and expectations.* Oak Brook, IL: North Central Regional Educational Laboratory.

Zemelman, S., Daniels, H., & Hyde, A. (1998). *Best practice: New standards for teaching and learning in America's schools*. (2nd ed.). Portsmouth, NH: Heinemann.

International Society For Technology In Education (ISTE)
Educational Computing and Technology Program
Standards for Secondary Computer Science Education Initial Endorsement

Introduction

Secondary Computer Science Education (CS)--Initial Endorsement Standards

Secondary Computer Science Education programs meeting ISTE standards prepare teacher candidates to serve as teachers of computer science in secondary schools. They focus on preparing their students in technical aspects of computing such as programming and algorithm design, computer system organization and operation, data representation and information organization, and social aspects of computing. High school computer science teachers help students examine the applications and implications of computing and provide the conceptual computer science framework to assist students interested in exploring the field in depth. ***(Revised Fall 2002)***

Who should complete the *ISTE Secondary Computer Science Education* program standards?

Secondary computer science teachers need to be prepared to meet the instructional needs of two audiences. As there are general math and general science courses for secondary students who may not study those disciplines beyond high school, there will likely be general computer science courses that use a literacy or a fluency approach to computing. Such a course provides non-specialists a foundation for living and adapting in a technology-rich culture. The second audience includes those who will be served by various courses designed to introduce secondary students more specifically to computer science. They are likely to involve, or build on, computer programming. Teacher candidates for secondary computer science must be prepared to address both kinds of courses.

The program standards and performances described in this document employ a broad definition of computer science education. Just as mathematics includes arithmetic, basic skills, and understandings necessary to effectively use mathematics, computer science is viewed as including the basic skills and understandings necessary for life-long learning relative to technology use. Also, as in mathematics, computer science educators must also deal with the more advanced aspects of the discipline--e.g., programming and algorithm design; computer system components, connections, and operations; data and problem modeling; and social interactions, implications, and issues. Institutions with teacher preparation programs should prepare their secondary computer science teacher candidates in all these aspects of computing. Several types of experiences are likely to contribute to such preparation. The formal study of computer science is critical, and it is anticipated that teacher candidates will complete preparation in computer science content to a depth approximating a minor.

Typically, teacher candidates will have their primary preparation in a discipline other than computer science education. That work should provide some general skills and practice that can be adapted to teaching computer science. Professional teaching methodology specific to computer science is also necessary to ensure that general teaching skills can be appropriately applied to computer science and to deal with discipline-specific practice. **"Endorsement" in the context of this program indicates that this program endorsement is added to an existing teaching certificate or credential.**

Analysis of Commonalities and Differences with Existing NCATE-Approved Program Standards

ISTE has examined the proposed Computer Science Education program standards for overlap with or duplication of existing NCATE-approved standards. No significant areas of duplication were identified.

The standards most closely related to the ISTE Secondary Computer Science Education guidelines are those of ITEA/CTTE. During previous revisions discussions have occurred with these groups to be sure that there were no perceived difficulties. None have been found thus far as a result of the very different nature of the content focus of the organizations' standards. The International Society for Technology in Education (ISTE) Secondary Computer Science Education program standards proposed in this document emphasize

preparation of candidates to teach computer science in secondary schools. Candidates completing this program will exhibit knowledge, skills, and dispositions equipping them to teach computer science concepts and skills. They focus on preparing their students in the more technical aspects of computing such as programming and algorithm design, computer system organization and operation, data representation and information organization, and social aspects of computing. Secondary computer science teachers help all students examine the applications and implications of computing and provide the conceptual computer science framework to assist students interested in exploring the field in depth.

The International Technology Education Association (ITEA/CTTE) prepares candidates to serve as teachers in Vocational Technical schools or K-12 schools providing coursework focusing on technology as it relates to four major areas of practice in the applications of technology: transportation, manufacturing, communications, and construction. The curriculum for this area of study focuses on technology as it is applied in these areas. Programs/states with universities focusing on technology as it relates to the above four major areas should apply to ITEA/CTTE for program approval. ITEA/CTTE does not address preparation of teachers of secondary computer science in its standards.

Preparing the Program Report for Secondary Computer Science Programs

The program report can be submitted either in paper form or preferably in electronic format. It is essential, if submitting electronically, that the report be either on a CD-ROM recorded in a format readable by both Mac and Windows; or in PDF format. Whether in paper or electronic format, the following parts must be included.

1. Title page
2. Table of Contents
3. All items requested on the ***Checksheet***
4. Continuous page numbering
5. Some means of securing the pages (if in paper format)
6. Artifacts should be numbered and referred to by the number when referencing them in the matrix
7. Program reports should be single-sided, if in paper format (4 copies)

When referring to the standards, be sure to use the abbreviations for the program levels:

STANDARD & INDICATOR ABBREVIATION	STANDARD & INDICATOR REFERANT
NETS-I.A	National Educational Technology Standards (foundations for all teachers), Standard I, Indicator A (Admission to either program should verify that candidates have met the NETS for Teachers (http://cnets.iste.org))
TF-III.B.	Technology Facilitation Standard III, Performance Indicator B
TL-II.C.	Technology Leadership Standard II, Performance Indicator C
CS-III.B.	Secondary Computer Science Standard III, Performance Indicator B

A well-assembled Program Report will assist the reviewers in completing an accurate and timely review.

The individual designated to oversee the development of the Program Report should consult with the institution's NCATE representative regarding the official NCATE submission deadlines. The submission dates for materials to reach NCATE are February 1 or September 15. In general, four copies of paper reports or CD-ROMs must be sent to NCATE eighteen months prior to the institution's scheduled NCATE visit if the program is submitting a Program Report for the first time. If there are questions regarding the exact due date, consult the NCATE website for the exact deadline. An earlier submission of the Program

Report allows time for a rejoinder to be submitted if the program does not receive national approval upon first submission.

A variety of forms are included in this document to assist in the development of the Program Report. The first form is the ***Checksheet*** (p.10). It lists the necessary contextual information and evidence to be gathered for the Program Report and provides the contact information of the preparers of the document. It is helpful, when preparing the Program Report if materials are numbered and in the same order that they are requested on the ***Checksheet.***

The ***Faculty List*** (p. 11) form is included for your use in providing useful information about the faculty for the program. The institution can provide the information in an alternative format, but this form indicates which specific faculty information is needed.

Next is the ***Secondary Computer Science Education Standards Matrix*** and instructions (p.13) for the endorsement program. Instructions for completing the matrix are included with an example. The matrix identifies the Secondary Computer Science Education Standards and provides a table with space for the institution to link to evidence from your endorsement candidates and participating secondary students that indicate their levels of performance in addressing each standard. Descriptions with links to sources of evidence provide Program Reviewers with materials to view that verify that those rating the candidates and students understand the expectations at each assessment level, and are consistently applying the standards and rubrics to assess the candidates' performances.

The ***Secondary Computer Science Education (CS) Program Rubric*** (p.18) provides descriptions of performance expectations for each standard and indicator for use in determining if candidates and/or secondary students are "approaching" a level of performance expected for the standard, are "meeting" the standard, or have "exceeded" the expected performance for meeting the standard. Of course, if the candidate or student has had no opportunity to meet the standard, or there is little or no evidence indicating a level of performance on that standard, there will be no rating for the individual on that particular standard. If this lack of attention to the indicator or standard shows up as consistent in the aggregated data reported on the ***Summary of Candidate Performance for Educational Computing and Technology Programs*** (pp.28-30) then this should provide insights regarding programmatic areas that may need improvement. The ***Summary*** provides a comment area where the institution can identify plans they have for alleviating problems that exhibit themselves as the data is aggregated and trends appear.

Also included, is an example showing how programs using portfolio assessment might plan for addressing the standards and exhibit to the Program Reviewers how those standards are addressed in particular experiences and/or courses. This example, ***Summary of Standards and Performance Assessment Experiences for Secondary Computer Science Education Endorsement Programs*** (p.27), is a table showing the standards and indicators across the top, and the particular technology-related experiences (assignments, projects, products, field activities, etc.) that provide experiences that address the standards and indicators for Secondary Computer Science Education. Then there is a mark in each row/column showing which indicators are met in which activities. This makes it easy for the reviewer and the faculty to see which standards are addressed in which activities, IF all standards indicators have been addressed; WHEN during the program certain indicators are introduced, reinforced, and assessed; and IF multiple measures are applied over time to ensure that the standards have been met.

Checksheet for the International Society for Technology in Education
Secondary Computer Science Education Program Standards

Please include one copy of this cover sheet with each program report

Submitted by (Name of Institution)**:**

Address:

Chief Compiler:

Phone: **Fax:**

Date: **E-mail Address:**

Date of On-site Visit:

CHECK SHEET FOR CONTEXTUAL INFORMATION TO BE INCLUDED IN PROGRAM REPORT:

A. **Overview** for each program, including the following:

____ (1) Explanation of the knowledge base, philosophy for preparation, and goals and objectives of the program.

____ (2) Candidates' required experiences resulting in opportunities to exhibit performance standards, where these experiences fit in the overall program, and what artifacts are expected as a result of the experience.

____ (3) Description of field experiences, student teaching, and internships, as appropriate per program. Include the amount of time and the type of supervision.

____ (4) Information about plans for, and operation of, the program assessment system.

_____(5) Description of where the program is located within the professional education unit and its interrelationships with other programs in the unit and the university/college.

____ (6) Program self-evaluation focusing on perceived program strengths and deviations from specialty organization standards.

____ (7) a. Number of candidates currently enrolled in the program.
b. Number of graduates from each program over the past three years.

____ (8) List of faculty with assignments in the program. Use LIST OF FACULTY form provided or a narrative describing your faculty, their responsibilities for these programs and their experiences, accomplishments, and/or teaching qualities that make them particularly effective in this program. (Please do NOT submit vitae.)

____ (9) Indicate labs/classroom computer facilities available for use in the college of education classrooms and P-12 settings for internships.

____ (10) Attach a copy of any written policies or procedures that guide or govern each program (e.g., State Guidelines, etc.).

____ (11) Criteria used at admission to computer science education programs to determine if the candidate has met the ISTE NETS technology foundations standards.

___ (12) Criteria used at completion of program and follow-up in the field to determine if the program has prepared the candidate for positions in computer science education.

B. **Matrix/Matrices.** The Program Matrices indicate standards and performance indicators and the importance of identifying evidence that can support that the candidates have met those expectations. However, the program report does not require that this format be used to convey candidates' knowledge and understanding of the subject content they are preparing to teach. The institution specifies how the program determines that candidates have demonstrated subject knowledge and understanding for teaching as described in the specialty program standards and selects a format that clearly denotes that the candidates have met the standards and performance expectations.

NOTE: The institutional Program Report totals no more than 140 pages, including appendices. Since ISTE provides standards for three Program Areas (Technology Facilitation, Technology Leadership, and Secondary Computer Science Education) the page limit is 140 pages per each program submitted.

LIST OF FACULTY

Please complete this chart or a narrative describing your faculty, their responsibilities for these programs and their experiences, accomplishments, and/or teaching qualities that make them particularly effective in this program. (Please do NOT submit vitae.)

	Program:	
Include one sheet per program for which accreditation is sought.		

List faculty teaching specialty area and professional area coursework in the program.

	Name (include full/part adjuncts, TA's, other)	Highest Degree Attained	Tenure Track? (Yes/No)	Rank	Full Time at University? (Yes/No)	% Time in Specialty Courses	Dept.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Comment:

International Society for Technology in Education
Educational Computing and Technology Programs

Secondary Computer Science Education Initial Endorsement

1) Standards Instructions and Matrix

2) Rubrics

3) Supporting Explanation

Instructions for Completing the Matrix

The matrices for ISTE /NCATE Standards includes in column one, a list of the standards, indicators, and performance tasks and, in column two, a space where links to evidence showing the standard has been met can be recorded. The evidence may consist of performance results based on a variety of data from the assessment of artifacts from candidate work, application of rubrics, observation tools, exams, reflections, journals, writing samples, videos, lesson plans, e.g., compiled in a standards-based electronic portfolio. If the information is digital, the matrix can provide a link directly to the source. If the information is in paper form or other non-digital accessible form, then a narrative description and clear identification of the location of the evidence can be inserted in the matrix instead. Below is shown one standard performance indicator from the Secondary Computer Science Education matrix as an example:

Sample: Secondary Computer Science Education Standards Matrix - initial endorsement

Standard CS-IV. Social Aspects of Computing. We live within a cultural environment and interact daily with other people. Computing specialists need to communicate and work with each other and with non-specialists. Specialists and non-specialists alike need to be cognizant of issues and risks related to computing in our society and to learn independently as new developments in technology arise. Secondary Computer Science Teacher Candidates will demonstrate skills and understanding relative to social aspects of computing that are appropriate for specialists and non-specialists.	
CS-IV.A. Performance Indicators & Tasks	**Links To Evidence That Standard Has Been Met:**
CS-IV.A. Societal Impact and Issues. To prepare high school graduates to make informed decisions regarding computing in their personal lives and with respect to societal laws and norms, secondary computer science teacher candidates will demonstrate an understanding of computing and potential issues and skill at recognizing, researching, and analyzing issues to reach defensible conclusions. Teacher candidates will:	
CS-IV.A.1 demonstrate awareness of social issues related to the use of computers in society and principles for making informed decisions regarding them (e.g., security, privacy, intellectual property, limits of computing, gender, equity, rapid change).	a. link to Web project and presentation rubrics with specific items aimed at assessing respect for intellectual property and use of copyright citations and reflections on teacher candidate copyright issues. 3) CS Standards Rubric--Summary Report: See summary results (p. 12, Portfolio Exhibit C., TF-III.A, *Rubric Summary Report*). **b.** link to lesson plans from field experiences incorporating assessment tools gauging the secondary students' appropriate respect for social aspects of computing. See CS Standards Observation Criteria Summary (p. 18, Portfoilo Exhibit D) designed to collect evidence on teacher candidates' modeling of ethical practice, and social awareness regarding sensitivity to gender and equity of access in use of technology in the classroom; and observation of secondary student responses. **c.** link to assessment criteria for collecting evidence from candidate's writing assignments discussing security, privacy, and limits of computing and results from the assessments (http://www.univ.edu/CS/candidatewritings).

Table I. Secondary Computer Science Education (CS) Standards Matrix

Prerequisite Foundation Standards- ISTE National Educational Technology Standards (NETS) for Teachers. Computer Science candidates must meet prerequisite foundations for educational technology prior to full admission to the Computer Science program. (See Appendix IV or http://cnets.iste.org for the NETS for Students and Teachers). (See Appendix V. for standards and rubrics)	
Prerequisite Foundations Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
NETS for Teachers. Since the Secondary Computer Science Standards are designed as an add-on endorsement to an existing teaching certificate, it is essential that the Admission Requirements for this program include the technology foundations that all teachers should possess. Assurance that the CS Endorsement Candidate has met the ISTE National Educational Technology Standards for Teachers (NETS-T) lays a foundation for the more advanced criteria that is necessary to teach Secondary Computer Science Education in secondary school. Programs MUST provide evidence through results from an Admissions Assessment (which is aligned to the NETS-T) or by providing a complete matrix showing evidence that the candidate meets the NETS for Teachers). The NETS-T Standards Matrix and Rubric are included in Appendix IV and V.	
Secondary Computer Science (CS) Content Standards	
Specialty Content Preparation in Computer Science. Professional study in computer science education for secondary teachers provides experiences selected to develop a breadth and depth of knowledge of computer science. Courses and performances fulfilling these requirements must include experiences beyond the beginning level in computer science. It is anticipated that study approximately equivalent to a minor in computer science will provide the necessary specialty content in computer science to meet these standards.	
CS Standard I. Programming and Algorithm Design CS endorsement candidates will demonstrate proficiency in programming that requires the use of data abstraction to solve non-trivial programming problems in multiple programming paradigms.	
CS-I. Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-I.A. Laboratory-based Programming Experiences CS endorsement candidates will perform laboratory-based activities that demonstrate programming proficiency in a modern high-level programming language. A sequence of experiences is recommended to provide a connected, orderly approach to computer science during the initial study of the discipline. The endorsement candidates and their students will:	
CS-I.A.1. demonstrate knowledge of and skill regarding the syntax and semantics of a high level programming language, its control structures, and its basic data representations	
CS-I.A.2. demonstrate knowledge of and skill regarding common data abstraction mechanisms (e.g., data types or classes such as stacks, trees, etc.)	
CS-I.A.3. demonstrate knowledge of and skill regarding program correctness issues and practices (e.g., testing program results, test data design, loop invariants)	
CS-I.A.4. design, implement, and test programs of sufficient complexity to demonstrate knowledge and skills included in CS-I.A.1	
CS-I Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-I.B. Multiple Paradigms.	

CS endorsement candidates will demonstrate an understanding of and flexibility with differing approaches/paradigms in programming (e.g., imperative, functional, object-oriented), The endorsement candidates and their students will:	
CS-I.B.1. design, implement, and test programs in languages from two different programming paradigms in a manner appropriate to each paradigm	
CS Standard II. Computer Systems--Components, Organization, and Operation CS endorsement candidates will demonstrate in-depth knowledge of how computer systems work individually and collectively. The candidates and their students will:	
CS-II Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-II.1. effectively use a variety of computing environments (e.g., single- and multi-user systems and various operating systems)	
CS-II.2. describe the operation of a computer system-CPU & instruction cycle, peripherals, operating system, network components, and applications-indicating their purposes and interactions among them	
CS Standard III. Data Representation and Information Organization CS endorsement candidates will demonstrate an understanding of data and information representation and organization at a variety of levels--machine level representation (for program correctness); data structures (for program implementation); problem representation (for solution design); files and databases (for general applications); and interactions among systems and people (for overall system design and effectiveness). CS endorsement candidates and their students will:	
CS-III Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-III.1. describe how data is represented at the machine level (e.g., character, boolean, integer, floating point)	
CS-III.2. identify and provide usage examples of the various data structures and files provided by a programming language (e.g., objects, various collections, files)	
CS-III.3. describe the elements (people, hardware, software, etc.) and their interactions within information systems (database systems, the Web, etc.)	
CS Standard IV. Social Aspects of Computing We live within a cultural environment and interact daily with other people. Computing specialists need to communicate and work with each other and with non-specialists. Specialists and non-specialists need to be cognizant of issues and risks related to computing in our society and to learn independently as new developments in technology arise. CS endorsement candidates will demonstrate skills and understanding relative to social aspects of computing that are appropriate for specialists and non-specialists.	
CS-IV.A. Societal Impact and Issues. In order to prepare high school graduates to make informed decisions regarding computing in their personal lives and with respect to societal laws and norms, CS endorsement candidates will demonstrate an understanding of computing and potential issues and skill at recognizing, researching, and analyzing issues to reach defensible conclusions. They will promote understandings relative to social aspects of computing among their secondary students. CS endorsement candidates and their students will:	
CS-IV Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-IV.A.1. demonstrate awareness of social issues related to the use of computers in society and principles for making informed decisions regarding them (e.g., security, privacy, intellectual property, equitable access to technology resources, gender issues, cultural diversity, differences in learner needs, limits of computing, rapid change)	
CS-IV.A.2. analyze various social issues involving computing, producing defensible conclusions	
CS-IV.A.3. demonstrate an understanding of significant historical events relative to computing	

CS-IV Performance Indicators & Tasks	Links to Evidence that Standard has been met:
CS-IV.B. Independent Learning and Communication CS endorsement candidates will demonstrate the ability to help their students learn independently about computing and communicate what has been learned to others. CS endorsement candidates will:	
CS-IV.B.1. conduct independent learning on specific, unfamiliar topics in general areas central to computer science and provide their students with opportunities to do the same	
CS-IV.B.2. produce and present reports of substantial independent learning achieved in CS-IV.B.1 and provide their students with opportunities to do the same	
CS-IV.C. Collaborative Software Development. CS endorsement candidates will demonstrate knowledge and experience in collaborative software development and provide opportunities for their students to do the same. CS endorsement candidates and their students will:	
CS-IV.C.1. participate in team software development projects that apply sound software engineering principles	

Professional Preparation Standards

Professional Preparation.
Professional studies culminating in computer science education endorsements provide studies of and experiences in the methods, techniques, and strategies related to teaching computer science at the secondary level. Teaching involves at least the activities of planning, delivering and managing, and assessing instruction. Teacher candidates should prepare to do each of these. They should also be prepared for the role of professional computer science educator.

CS Standard V. Planning Instruction
CS endorsement candidates will demonstrate an understanding of the teaching tasks and approaches and be able to apply and evaluate them with respect to the students in their computer science classes. Evidence of these capabilities should include examples of student performance resulting from this planning. Candidates will:

CS-V Performance Indicators & Tasks	Links to Evidence that Standard has been met:
CS-V.1. Identify resources, strategies, activities, and manipulatives appropriate to teaching secondary computer science	
CS-V.2. Plan lessons/modules/courses related to each of: • programming process • knowledge/concepts • issue examination	
CS-V.3. Develop assessment strategies appropriate to lesson goals and the need to provide student feedback	
CS-V.4. Perform course and lesson planning that addresses student population characteristics (e.g., academic ability, cultural experience, gender)	

CS Standard VI. Classroom and Field Experiences in Computer Science--Delivering Instruction CS endorsement candidates will observe and participate in instructional planning and delivery in secondary computer science classrooms. Evidence should include some examples of effects on student performance. Candidates will:	
CS-VI Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-VI.1. Observe and discuss the teaching of secondary computer science	
CS-VI.2. Participate in the teaching of secondary computer science (lab assistant, tutoring, mini-teaching, etc.)	
CS-VI.3. Plan and deliver a unit of instruction	
CS Standard VII. Classroom & Course Management. CS endorsement candidates will apply methods and skills appropriate to the management of the secondary computer science classroom. Evidence should include some examples of effects on student performance. Candidates will:	
CS-VII Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-VII.1. Plan direct instruction involving simultaneous use of computing facilities by students (e.g., holding class in the lab, closed labs)	
CS-VII.2. Plan instruction involving students independently using computing facilities	
CS Standard VIII. Instructional Assessment. Reflection upon one's own performance as a teacher is essential for improving that performance. Thus, teacher candidates will examine and work to improve their teaching practice. Assessing secondary student performance is essential to determining success in teaching practice, as well. CS endorsement candidates will:	
CS-VIII Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-VIII.1. Develop a personal plan for evaluating their own practice of teaching	
CS-VIII.2. Make use of their plan for self-evaluation in the instructional delivery activities alluded to in CS-VI	
CS-VIII.3. Develop assessment criteria and procedures to determine successful performance and analyze results to improve instructional practice.	
CS Standard IX. Professional Development. CS endorsement candidates must recognize and plan for ongoing professional development that will be needed to sustain themselves and their students. Candidates will:	
CS-IX Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
CS-IX.1. discuss guidance roles and possible enrichment activities for secondary computer science students (e.g., computing career guidance, preparation for college, gender equity, cultural diversity, and extracurricular activities such as computer clubs and organized competitions)	
CS-IX.2. plan for professional growth after identifying professional computer science and computer science education societies, organizations, groups, etc. that provide professional growth opportunities and resources	

Table II. Secondary Computer Science Education (CS) Program Rubric

Specialty Content Preparation in Computer Science
Professional study in computer science education for secondary teachers provides experiences selected to develop a breadth and depth of knowledge of computer science. Courses and performances fulfilling these requirements must include experiences beyond the beginning level in computer science. It is anticipated that study approximately equivalent to a minor in computer science will provide the necessary specialty content in computer science to meet these standards.

CS Standard I. Programming and Algorithm Design
CS endorsement candidates will demonstrate proficiency in programming that requires the use of data abstraction to solve non-trivial programming problems in multiple programming paradigms.

CS-I.A. Laboratory-based Programming Experiences
CS endorsement candidates will perform laboratory-based activities that demonstrate programming proficiency in a modern high-level programming language. A sequence of experiences is recommended to provide a connected, orderly approach to computer science during the initial study of the discipline. The endorsement candidates and their students will:

Performance Indicator	Approaches Standard	Meets Standard	Exceeds Standard
CS-I.A.1. demonstrate knowledge of and skill regarding the syntax and semantics of a high level programming language, its control structures, and its basic data representations	Correctly describe effects of execution of a given sequence of programming instructions (trace code) involving basic features of the programming language used.	Select and organize basic language instructions and data representations to accomplish a given straightforward task. Discuss **generally** how they work to accomplish the task.	Discuss rationale for choices made in selecting and organizing basic language instructions and data representations to accomplish a given straightforward task. Suggest alternative approaches and compare and contrast alternative approaches to the task.
CS-I.A.2. demonstrate knowledge of and skill regarding common data abstraction mechanisms (e.g., data types or classes such as stacks, trees, etc.)	Correctly describe the purpose and use of various common data abstractions (e.g., ADT/class such as a vector, stack, tree, graph). Given a specific design, implement an ADT/class.	Select an ADT/class appropriate for a given task and appropriately use it. Extend a given ADT/class for use in a different context.	Design and implement an ADT/class given a general indication of its purpose.
CS-I.A.3. demonstrate knowledge of and skill regarding program correctness issues and practices (e.g., testing program results, test data design, loop invariants)	Determine whether a program operates correctly on supplied test data.	Develop test data for a given problem and apply it to program solution. Describe the rationale for selecting various data values.	Develop and implement a unit testing suite for a given problem.
CS-I.A.4. design, implement, and test programs of sufficient complexity to demonstrate knowledge and skills included in CS-I.A.1	With some instructor or peer assistance, design and implement a program to accomplish a given task requiring a variety of language features and data abstractions. Test (and correct) the program using a supplied data set.	Without assistance, design and implement a program to accomplish a given task requiring a variety of language features and data abstractions. Develop test data for the problem and apply it to the program.	Identify best practices appropriate for program design, implementation, testing, documentation, and layout.

CS-I.B. Multiple Paradigms CS endorsement candidates will demonstrate an understanding of and flexibility with differing approaches/paradigms in programming (e.g., imperative, functional, object-oriented), The endorsement candidates and their students will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-I.B.1. design, implement, and test programs in languages from two different programming paradigms in a manner appropriate to each paradigm	Describe in general terms program design and development processes of two disparate programming paradigms using program code examples to illustrate key points.	In languages from two different programming paradigms, produce correctly functioning programs for problems **appropriate to the language paradigm** used.	Discuss the strengths and weaknesses of two different programming paradigms in the context of a given problem.
CS Standard II. Computer Systems--Components, Organization, and Operation CS endorsement candidates will demonstrate in-depth knowledge of how computer systems work individually and collectively. The candidates and their students will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-II.1. effectively use a variety of computing environments (e.g., single- and multi-user systems and various operating systems)	Use various operating systems, application software, and program development environments in daily activity and to complete assignments.	Identify alternatives and select appropriate features of operating system, application software, and program development environment.	Compare and contrast features of various operating systems, application software, and program development environments identifying appropriate occasions or contexts for their use.
CS-II.2. describe the operation of a computer system--CPU & instruction cycle, peripherals, operating system, network components, and applications--indicating their purposes and interactions among them	Identify the purpose of the major (hardware and software) components of a computer system.	Describe the interactions of the various major components (hardware and software) of a computer system in the context of some particular activity (e.g., booting a system, saving a file).	Write simple programs/scripts that change the performance of an operating system.
CS Standard III. Data Representation and Information Organization CS endorsement candidates will demonstrate an understanding of data and information representation and organization at a variety of levels--machine level representation (for program correctness); data structures (for program implementation); problem representation (for solution design); files and databases (for general applications); and interactions among systems and people (for overall system design and effectiveness). CS endorsement candidates and their students will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-III.1. describe how data is represented at the machine level (e.g., character, boolean, integer, floating point)	Describe in general terms the primitive data representations in a familiar programming language.	Describe specifically (in terms of how bits are used) the primitive data representations in a familiar programming language. Identify values for which overflow and underflow exist.	Discuss the impact on correctness of primitive data representation (i.e., overflow, underflow, loss of significant digits) and techniques for minimizing the impact.

Performance Indicator	Approaches Standard	Meets Standard	Exceeds Standard
CS-III.2**.** identify and provide usage examples of the various data structures and files provided by a programming language (e.g., objects, collections, and files)	Identify common non-primitive ADTs/classes and file organizations available in a familiar programming language.	Provide contexts in which the use of various non-primitive ADTs/classes and file organizations available in a familiar programming language are appropriate.	Critique the choice of various non-primitive ADTs/classes and file organizations for given problems.
CS-III.3. describe the elements (people, hardware, software, etc.) and their interactions within information systems (database systems, the Web, etc.)	Identify the various "general" elements of information systems and describe their role.	Indicate the responsibilities of the various general elements of information systems and describe the interplay between them.	Design an information system for a given task/function.

CS Standard IV. Social Aspects of Computing

We live within a cultural environment and interact daily with other people. Computing specialists need to communicate and work with each other and with non-specialists. Specialists and non-specialists need to be cognizant of issues and risks related to computing in our society and to learn independently as new developments in technology arise. CS endorsement candidates will demonstrate skills and understanding relative to social aspects of computing that are appropriate for specialists and non-specialists.

CS-IV.A. Societal Impact and Issues

In order to prepare high school graduates to make informed decisions regarding computing in their personal lives and with respect to societal laws and norms, CS endorsement candidates will demonstrate an understanding of computing and potential issues and skill at recognizing, researching, and analyzing issues to reach defensible conclusions. They will promote understandings relative to social aspects of computing among their secondary students. CS endorsement candidates and their students will:

Performance Indicator	Approaches Standard	Meets Standard	Exceeds Standard
CS-IV.A.1. demonstrate awareness of social issues related to the use of computers in society and principles for making informed decisions regarding them (e.g., security, privacy, intellectual property, equitable access to technology resources, gender issues, cultural diversity, differences in learner needs, limits of computing, rapid change)	Identify a variety of societal issues relating to the use of computers in **our** society.	Describe a reasonable process for reaching conclusions about societal issues of computing (e.g., security, privacy, intellectual property, equitable access to technology resources, gender issues, cultural diversity, differences in learner needs, limits of computing, rapid change).	Identify computing issues with respect to societies other than one's own. Compare and contrast various processes for examining social issues (e.g., security, privacy, intellectual property, equitable access to technology resources, gender issues, cultural diversity, differences in learner needs, limits of computing, rapid change).
CS-IV.A.2. analyze various social issues involving computing, producing defensible conclusions	Identify the major aspects of societal issues of computing (with pros and cons) and suggest a resolution for each.	Present various aspects of societal issues and provide a coherent rationale for a particular resolution for each.	Critique arguments for various positions on societal issues of computing.
CS-IV.A.3. demonstrate an understanding of significant historical events relative to computing.	Identify significant events, people, and artifacts in the history of computing.	Discuss seminal developments and trends that exist in the field of computing.	Analyze developments and trends in the field of computing to determine possible impact on society.

CS-IV.B. Independent Learning and Communication CS endorsement candidates will demonstrate the ability to help their students learn independently about computing and communicate what has been learned to others. CS endorsement candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-IV.B.1. conduct independent learning on specific, unfamiliar topics in general areas central to computer science and provide their students with opportunities to do the same	Identify resources appropriate for learning about a given topic in computer science.	Demonstrate independent learning on an assigned topic.	Assist others in applying independent learning techniques.
CS-IV.B.2. produce and present reports of substantial independent learning achieved in CS-IV.B.1 and provide their students with opportunities to do the same	Develop a report based on independent learning.	Make a presentation of a report based on independent learning.	Prepare and submit for publication or formal presentation a paper developed through independent learning.
CS-IV.C. Collaborative Software Development CS endorsement candidates will demonstrate knowledge and experience in collaborative software development and provide opportunities for their students to do the same. CS endorsement candidates and their students will:			
CS-IV.C.1. participate in team software development projects that apply sound software engineering principles	Describe basic software engineering principles and techniques for applying collaborative software development.	Participate in team software development projects.	Evaluate group work results by describing behaviors and activities that enhance and detract from successful efforts.

Professional Preparation Standards for Secondary Computer Science Education

Professional Preparation

Professional studies culminating in computer science education endorsements provide studies of and experiences in the methods, techniques, and strategies related to teaching computer science at the secondary level. Teaching involves at least the activities of planning, delivering and managing, and assessing instruction. Teacher candidates should prepare to do each of these. They should also be prepared for the role of professional computer science educator.

CS Standard V. Planning Instruction Endorsement candidates will demonstrate an understanding of the teaching tasks and approaches and be able to apply and evaluate them with respect to the students in their computer science classes. Evidence of these capabilities should include examples of student performance resulting from this planning. Candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-V.1. identify resources, strategies, activities, and manipulatives appropriate to teaching secondary computer science.	Observe instructional activities and note strategies, activities, etc. used in the instruction.	Identify resources and strategies for teaching a specific concept, skill, etc.	Differentiate between resources, strategies, etc. for effective teaching and learning on a given lesson.
CS-V.2. plan lessons/modules/ courses related to: • programming process • knowledge/concepts • issue examination	Examine online lesson plans for the various kinds of instruction in computer science.	Prepare lesson plans for the various kinds of instruction in computer science.	Critique lesson plans for the various kinds of instruction in computer science offering specific suggestions for improvement.

Performance Indicator	Approaches Standard	Meets Standard	Exceeds Standard
CS-V.3. develop assessment strategies appropriate to lesson goals and the need to provide student feedback	Examine assessments activities suggested in lessons plans.	Prepare assessment activities appropriate to the lesson type and goals for a given lesson.	Compare and contrast various assessment activities for a given topic in discussions with peers.
CS-V.4. perform course and lesson planning that addresses student population characteristics (e.g., academic ability, cultural experience, gender)	Identify strategies for addressing differences in student populations.	Develop lesson plans that meet needs of a diverse student population.	Compare and contrast various approaches to meeting needs of diverse student populations in discussions with peers.
CS Standard VI. Classroom and Field Experiences in Computer Science--Delivering Instruction CS endorsement candidates will observe and participate in instructional planning and delivery in secondary computer science classrooms. Evidence should include some examples of effects on student performance. Candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-VI.1. observe and discuss the teaching of secondary computer science	Identify possible computer science classes for observation and prepare an observation plan.	Observe an actual secondary computer science class noting items in the observation plan as well as any unexpected events.	Participate in group discussions of the observations noting effective combination of techniques and instructional goals.
CS-VI.2. participate in the teaching of secondary computer science (lab assistant, tutoring, mini-teaching, etc.)	Identify possible opportunities for participation and plan the experience.	Carry out planned participation in a school setting.	Reflect on the participation identifying positive and negative aspects of the experience.
CS-VI.3. plan and deliver a unit of instruction	Identify an opportunities for teaching a unit and plan the instruction.	Deliver the planned instructional unit in a school setting.	Reflect on the instructional activity suggesting modifications to it.
CS Standard VII. Classroom & Course Management CS endorsement candidates will apply methods and skills appropriate to the management of the secondary computer science classroom. Evidence should include some examples of effects on student performance. Candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-VII.1. plan direct instruction involving simultaneous use of computing facilities by students (e.g., holding class in the lab, closed labs)	Identify topics where lab-based instruction is appropriate after observing such instruction.	Plan instruction for a lab-based lesson.	Compare and contrast, in discussions with peers, various techniques for engaging students while conducting lab-based instruction.
CS-VII.B. plan instruction involving students independently using computing facilities	Identify topics where independent student laboratory work is appropriate.	Plan an instructional activity involving independent student laboratory work.	Compare and contrast, in discussions with peers, various techniques for facilitating learning in independent laboratory situations.

CS Standard VIII. Instructional Assessment Reflection upon one's own performance as a teacher is essential for improving that performance. Thus, teacher candidates will examine and work to improve their teaching practice. Assessing secondary student performance is essential to determining success in teaching practice, as well. CS endorsement candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-VIII.1. develop a personal plan for evaluating their own practice of teaching	Examine techniques for self-assessment of instruction.	Prepare a plan for self-assessment of an instructional activity.	Critique self-assessment plans of peers.
CS-VIII.2. make use of their plan for self-evaluation in the instructional delivery activities	Discuss implementation strategies for self-assessment with someone with experience in classroom instruction.	Use a prepared plan for self-assessment to evaluate an instructional activity.	Assist peers in developing and implementing self-assessment plans.
CS-VIII.3. develop assessment criteria and procedures to determine successful performance. Analyze results to improve instructional practice.	Develops knowledge level assessment tools.	Develops criteria to assess knowledge, skills, and dispositions related to CS standards and analyzes results for improving student learning.	Develops criteria to assess knowledge, skills, and dispositions related to CS standards, analyzes results for improving student learning, and uses data for programmatic decision-making.
CS Standard IX. Professional Development CS endorsement candidates must recognize and plan for ongoing professional development that will be needed to sustain themselves and their students. Candidates will:			
Performance Indicator	**Approaches Standard**	**Meets Standard**	**Exceeds Standard**
CS-IX.1. discuss guidance roles and possible enrichment activities for secondary computer science students (e.g., computing career guidance, preparation for college, gender equity, cultural diversity, and extracurricular activities such as computer clubs and organized competitions)	Identify resources for computer science career guidance.	Discuss enrichment activities common to secondary computer science classes.	Organize and implement an actual enrichment activity for secondary school computer science students.
CS-IX.2. plan for professional growth after identifying professional computer science and computer science education societies, organizations, groups, etc. that provide professional growth opportunities and resources	Identify professional computer science education organizations at local, state, and national levels.	Develop a plan for professional development utilizing resources of professional organizations.	Participate in professional activities offered by professional organizations.

Supporting Explanation--Computer Science (CS) Standards and Rubrics

Units preparing candidates for this program may collect artifacts demonstrating candidates' performances in addressing the program standards, assess performance by evaluating artifacts using the above ISTE/NCATE Secondary Computer Science rubrics and aggregate the performance data collected to provide program-level data. The standards and rubrics should help faculty to identify the kinds of experiences they provide in their courses and whether or not those experiences generate candidate performance that approaches, meets, or exceeds the standards. Each major assignment or experience should be planned to address the performance indicators at levels appropriate to prepare candidates for the essential benchmark assessments. Candidates should be aware of the level of expectations for their performance on each assignment and that their performances will be measured against the "meets standard" performance level of the rubric. The rubric assumes a cumulative approach will be used, i.e., performance that "exceeds the standard" assumes the candidates can also perform tasks suggested under the prior categories of *Approaches Standard* and *Meets Standard*. Some of the standards are culminating performances while others involve repeated performance. For example, in computer programming (CS-I.A.1.a – CS-I.A.1.d), students will have many opportunities to demonstrate their knowledge and skill but about different language features each time. Thus, a collection of assessments will be necessary to indicate success. For some other standards a single assessment might suffice. However, it is wise to include multiple reinforcing experiences to ensure mastery. Rubrics, observation tools, self assessments, and test scores with quantifiable performance assessment ratings are often used to collect performance data that can be used to measure individual performance and be aggregated as evidence of program-level performance. When artifacts are collected in a portfolio, it is preferred to have that portfolios be available for online review to substantiate the quality of work of your candidates. The performance artifacts used as evidence in the matrix should be selective, representing benchmark assessment points. It is not necessary to include all assessments for every portfolio, but to provide a sample of items that represent the three levels and the assessment tool used for evaluating the item.

Requirements for Candidate Proficiency Evidence

Key Elements of Program Report
This section is intended to assist institutions in developing the materials and evidence for program review. Particular attention should be paid to presenting clear evidence of candidates' accomplished teaching performance. The **Program Report** is the official document submitted to ISTE for peer review and evaluation. It describes the institution/program's best efforts to assemble evidence to show how it complies with the teacher preparation program standards in the Computer Science Education program. Reviewers will be provided the contextual information requested on the **Check Sheet (p. 10)** and the **Evidence** (identified or linked in the standards matrix) provided by the program to determine compliance with the standards. The report must include information and aggregated data followed by summary narrative that provide evidence of candidate knowledge and performance. The document should be thorough, concise, easy to read, summative, and accurate.

Evidence of Teacher Candidate Performance
The performance-based assessment systems used by the program to provide evidence that candidates have the knowledge, skills, and dispositions to affect student learning must be evidenced throughout the programs. The Program Report should clearly address the program assessment system. This section should describe the on-going collection and aggregation of data; the summary system for the instructor, peer, and self-assessment; the summary system for data collected from observations; and rubrics for evaluation of knowledge products. The Program Report should address program plans to further develop assessment tools and methods to collect and aggregate data.

The local system for evaluating candidate performance in the Secondary Computer Science Education program will be required to follow the principles adapted from "Principles for Performance-based Assessment Systems in Professional Education Programs" from NCATE's Specialty Areas Studies Board, February 2000 taken from "Interim Policies and Procedures for SASB Approval of Specialized Professional Association Standards" www.ncate.org, (NCATE, 2000):

(1) The system is driven by a conceptual framework and program values that espouse assessment as a vehicle for both individual and program self-evaluation and improvement. Assessment is planned and implemented by key stakeholders in a manner consistent with the method of inquiry in the discipline and is considered a means to an end rather than an end in itself. This program's conceptual framework should align with the institution's overall conceptual framework, and should be described in the program's Contextual Statement (See Check Sheet).

(2) The system includes components that work together in a synergistic manner to address the knowledge, skills, and dispositions of candidates across program goals, objectives and curriculum consistent with the performance-based standards of the respective national professional specialty. Assessment is a goal-oriented process linked to program purposes/goals and national standards.

(3) Multiple measures are planned and administered on a systematic, ongoing basis throughout the program beginning with the admissions process. The system includes quantitative and qualitative measures useful for formative and summative assessment. Benchmarks for assessment of standards should be planned and administered at planned points in the development of the teacher candidate. Aggregated data from benchmark assessments should be used to assess improvement over time.

(4) The system includes one or more measures that have been created, reviewed, and/or scored by specialty professionals external to the program. Such professionals include those with relevant specialized expertise whose primary responsibility is not to the program/unit, such as field-based master teachers, clinical teachers, intern supervisors, and/or supervisors/employers of program candidates/graduates. Programs may include external performance indices (where appropriate).

(5) The assessment system is clearly delineated. Measures and associated criteria or rubrics (including minimal proficiency levels), as well as policies and practices for obtaining and using results, are described in program documents in a manner that candidates and other stakeholders can understand. Candidates are made aware of program standards and assessment requirements to which they will be held and are provided with models and/or examples of performance and the instruction and support needed to attain such levels. Programs are encouraged to develop a concise guide for candidates that outlines the benchmark assessments that occur in the program and the nature of such assessments.

(6) The assessment methods and corresponding criteria included in the system are sufficiently comprehensive and rigorous to make important decisions about the proficiencies of candidates and to safeguard those they may potentially serve. Critical decision-making points are delineated in the system. Decisions that are made reflect the application of relevant criteria and use of results in a manner that discriminates acceptable versus unacceptable performance. Benchmark assessments can be used for critical decision-making and should discriminate between acceptable and unacceptable candidate performance.

(7) The system includes policies and procedures for the gathering, use, storage, and reporting of individual results. Such policies address the rights of individuals (e.g., those afforded candidates by the Family Educational Rights and Privacy Act; confidentiality/anonymity of survey responses).

(8) The system includes a structure and procedures for sampling, analyzing, summarizing, and reporting aggregated results. Data are gathered on an ongoing basis and are summarized in a manner that reflects pass rates, the range of performances, and/or the "typical" or "average" performance (e.g., mean, median, or modal performance) as appropriate to the types of measures. Summaries of results are provided to key program stakeholders in a clear manner that acknowledges the source(s) and limitations of the data, data collection and reporting time frame, program strengths, and areas of needed or potential improvement. Information following these criteria provide examples and discussion of how programs can report evidence for each standard on a variety of assessments.

(9) The program and its assessment system facilitates the use of results for individual program improvement. Assessment results are regularly reviewed in relation to program goals and objectives as well as to relevant state and national standards and stimulate changes designed to optimize success. Programs must demonstrate how assessment data influence program content and/or structure relative to meeting standards for each ISTE/NCATE program.

(10) The system has a mechanism and procedures for evaluating and improving itself and its component assessment methods. Evidence of the reliability and validity of the system and its component measures is gathered and used to make decisions about their ongoing use and/or revision. Evidence should address the ability of the system to comprehensively assess performance in a credible manner that is valid, fair, and unbiased.

The institution's submission of evidence to document teacher candidate proficiencies should provide information (data, summaries, and limited examples/artifacts) to document accomplished teacher candidate skills, knowledge, and dispositions and their effect on student learning. Achievement of these proficiencies relative to the standards in the program will serve as the basis for judgments about program quality and compliance with the ISTE/NCATE programs. Program faculty might find it helpful to organize their evidence for each standard by developing two types of summaries: 1) ISTE *Summary of Standards and Performance Assessment Experiences for Secondary Computer Science Education Endorsement Programs* and 2) *Summary of Candidate Performance for Secondary Computer Science Education Programs*

EXAMPLE: SUMMARY OF STANDARDS AND PERFORMANCE ASSESSMENT EXPERIENCES FOR
Secondary Computer Science Education Endorsement Programs

Summary of Prerequisite Knowledge, Skills, and Dispositions for Educational Computing and Technology																												
NETS Foundations for Teachers:	Operations Concepts				Planning & Designing Learning Environments and Experiences						Teaching, Learning and the Curriculum					Assessment and Evaluation			Productivity and Professional Practice				Social, Ethical, Legal and Human Issues				
Standards & Indicators	I A		I B		II A	II B	II C	II D	II E	II F	III A	III B	III C	III D	III E	IV A	IV B	IV C	V A	V B	V C	V D	VI A	VI B	VI C	VI D	VI E		
Benchmark I. Prerequisite Check (transcript review, pre-test, performance assessment,...)	*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Summary of Secondary Computer Science Education Standards-Based Assessment Experiences																													
ISTE Secondary Computer Science Education Standards & Indicators	Programming and Algorithm Design					Computer Systems – Components, Organization, and Operation		Data Representation and Information Organization			Social Aspects of Computing						Planning Instruction				Classroom and Field Experiences in Computer Science – Delivering Instruction			Classroom and Course Management		Instructional Assessment		Professional Development	
	I A 1	I A 2	I A 3	I A 4	I B 1	II A	II B	III A	III B	III C	IV A 1	IV A 2	IV A 3	IV B 1	IV B 2	IV C 1	V A	V B	V C	V D	VI A	VI B	VI C	VII A	VII B	VIII A	VIII B	IX A	IX B
Benchmark II. Computer Science Experiences																													
1. File:	*	*	*			*		*								*													
2. File:						*	*	*																					
3. File:				*		*		*	*							*													
4. File:					*	*		*	*	*				*		*													
5. File:						*					*	*	*	*	*														
6. File:							*			*	*	*																	
Benchmark III. Professional Education Experiences																													
7. File:																	*	*	*	*	*	*	*	*	*	*	*	*	*
Self Selected Entry File:											*	*						*	*	*			*				*		

This is a sample of a possible way to organize the major events that generate evidence through evaluation of artifacts that are organized in either an electronic portfolio or a paper one. The "required entries" are determined by the faculty, who then determine if all of the standards have been addressed, assessed by multiple measures, and if any areas need reinforcement. It provides the major activities within the programs and visually depicts what standards are addressed and how many times they are reinforced in the program. The results of the aggregation of data from the assessment of the artifacts should feed into the overall assessment system.

Assessment Data Aggregated by Standard

The second table that may be helpful to programs in summarizing candidate performance provides a summary of the assessment data aggregated across all candidates by standard. The table may represent the 1) major benchmark assessments, 2) the benchmark assessment point in the program, 3) the assessment tools, and 4) the number or percent of candidates who were judged "approaching". "meeting", or "exceeding" the standards as in the following example of a Summary of Candidate Performance for Educational Computing and Technology Programs.

Example 2:

Summary of Candidate Performance for
Educational Computing and Technology Programs

Program: ___ Secondary Computer Science (CS) Education - Endorsement

Number of candidates completing program: ____ (for __ year(s) from _____ to _____)
Total Number of secondary students assessed: ____ (for __ year(s) from _____ to _____

PREREQUISITE ADMISSION CRITERIA FOR TECHNOLOGY FACILITATION, LEADERSHIP, & COMPUTER SCIENCE EDUCATION PROGRAMS

BENCHMARK I. ADMISSION TO PROGRAM					
Activity	***Assessment Point***	***Assessment Tool(s) (provide link to too and criteria for ratingl)***	***Levels of Performance Exhibited Number and % of candidates performing at each level Approaches***	***Meets***	***Exceeds***
A. General Admission Criteria Candidates are assessed using general admission criteria determined by university and unit.	Admission to Program	A.1. Pre-Test (K)			
		A.2. Transcript Review (K)			
		A.3. Interview (K, D)			
		A.4. Performance Assessment (S)			
B. Prerequisite Technology Foundation Standards: NETS for All Teachers Candidates are assessed for their knowledge (K), skills(S), and dispositions (D) applying the National Educational Technology Standards (NETS) for Teachers and Students at the prerequisite checkpoint. Candidates not meeting *Prerequisite Technology Foundation Standards* are provided opportunities to develop their skills and be reassessed or are counseled out of the program. Evidence collected from assessment of activities and artifacts required by program in their *Summary of NETS Experiences* can be aggregated for each standard and reported as evidence of candidate performance.					
I. Technology Operations and Concepts for all teachers (K,S)	Prerequisite Checkpoint	NETS Performance Assessment Rubric Multiple measures: for example: exams, portfolios of artifacts assessed by rubrics, observation tools, self-assessment tools, interviews, grades.			
II. Planning and Designing Learn-ing Environments and Experiences for all teachers (S, K)	Prerequisite Checkpoint				
III. Teaching, Learning, and the Curriculum for all teachers (S,K)	Prerequisite Checkpoint				
IV. Assessment and Evaluation for all teachers (S,K, D)	Prerequisite Checkpoint				
V. Productivity and Professional Practice for all teachers (S, K, D)	Prerequisite Checkpoint				
VI. Social, Ethical, Legal, and Human Issues for all teachers (S, K, D)	Prerequisite Checkpoint				
PROGRAM PLANS RESULTING FROM EVALUATION/ASSESSMENT DATA COLLECTED:					

SECONDARY COMPUTER SCIENCE EXPERIENCES

BENCHMARK II. COMPUTER SCIENCE EXPERIENCES

Activity	*Assessment Point*	*Assessment Tool(s) (provide link to tool)*	*Levels of Performance Exhibited* *Number & % of candidates/students performing at each level* *Approaches Standard* *Candidate*	*Student*	*Meets Standard* *Candidate*	*Student*	*Exceeds Standard* *Candidate*	*Student*
I. Programming and Algorithm Design (K, S)	End of CS Coursework	Apply Performance Assessment Rubric to evidence collected using a variety of tools and multiple measures (Examples: exams (K), portfolios of artifacts assessed by rubrics (K, S, D), observation tools (K, S, D), self-assessment tools (D) , interviews (K, D). to determine summary ratings.						
II. Computer Systems-Components, Organization, and Operation (K,S)	End of CS Coursework							
III. Data Representation and Information Organization	End of CS Coursework							
IV. Social Aspects of Computing	End of CS Coursework							

Activity	*Assessment Point*	*Assessment Tool(s) (provide link to tool)*	*Levels of Performance Exhibited* *Number & % of candidates performing at each level.* *Candidate* *Approaches Standard*	*Candidate* *Meets Standard*	*Candidate* *Exceeds Standard*
V. Planning Instruction	End of CS Coursework	Apply Performance Assessment Rubric to evidence collected using a variety of tools and multiple measures (Examples: exams (K), portfolios of artifacts assessed by rubrics (K, S, D), observation tools (K, S, D), self-assessment tools (D) , interviews (K, D). to determine summary ratings.			
VI. Classroom and Field Experiences in Computer Science-Delivering Instruction	End of CS Coursework				
VII. Classroom and Course Management	End of CS Coursework				
VIII. Instructional Assessment	End of CS Coursework				
IX. Professional Development	End of CS Coursework				

PROGRAM PLANS RESULTING FROM EVALUATION/ASSESSMENT DATA COLLECTED FOR CANDIDATES AND SECONDARY STUDENTS:

SECONDARY COMPUTER SCIENCE PROFESSIONAL EDUCATION EXPERIENCES

BENCHMARK III. PROFESSIONAL EDUCATION EXPERIENCES

Activity	*Assessment Point*	*Assessment Tool(s) (provide link to tool)*	*Levels of Performance Exhibited Number & % of candidates & students performing at levels*					
			Approaches Standard		*Meets Standard*		*Exceeds Standard*	
			Candidate	*Student*	*Candidate*	*Student*	*Candidate*	*Student*
I. Programming and Algorithm Design (K, S)	Culmination of Program	Apply Performance Assessment Rubric to evidence collected using a variety of tools and multiple measures (Examples: exams (K), portfolios of artifacts assessed by rubrics (K, S, D), observation tools (K, S, D), self-assessment tools (D) , interviews (K, D). to determine summary ratings.						
II. Computer Systems-Components, Organization, and Operation (K,S)	Culmination of Program							
III. Data Representation and Information Organization	Culmination of Program							
IV. Social Aspects of Computing	Culmination of Program							

Activity	*Assessment Point*	*Assessment Tool(s) (provide link to tool)*	*Levels of Performance Exhibited Number & % of candidates performing at each level.*		
			Candidate Approaches Standard	*Candidate Meets Standard*	*Candidate Exceeds Standard*
V. Planning Instruction	Culmination of Program	Apply Performance Assessment Rubric to evidence collected using a variety of tools and multiple measures (Examples: exams (K), portfolios of artifacts assessed by rubrics (K, S, D), observation tools (K, S, D), self-assessment tools (D) , interviews (K, D). to determine summary ratings.			
VI. Classroom and Field Experiences in Computer Science-Delivering Instruction	Culmination of Program				
VII. Classroom and Course Management	Culmination of Program				
VIII. Instructional Assessment	Culmination of Program				
IX. Professional Development	Culmination of Program				

PROGRAM PLANS RESULTING FROM EVALUATION/ASSESSMENT DATA COLLECTED FOR CANDIDATES AND SECONDARY STUDENTS:

Process For Review Of Institutional Program Evidence

The International Society for Technology in Education (ISTE) Accreditation and Standards Committee annually reviews the ISTE Guidelines. This committee is comprised of members recommended by the Accreditation and Standards Committee Chair, appointed by the President, and approved by the Board of Directors of ISTE. The present committee membership consists of individuals with experience in graduate and undergraduate teacher education, computer science, pre-college instruction, administration, technology coordination at the state, regional, and district levels. The Program Review Coordinator is appointed by the Committee Chair and works closely with the Committee in the standards development, program review, Program Reviewer Training, and state review process. Recruitment of reviewers occurs regularly at the SITE, NECC, and PT3 national conferences where training for reviewers occurs. ISTE recruits individuals who represent racial, ethnic, and gender diversity; geographic diversity, and diverse roles in education.

The process for review of institutional program evidence begins with delivery of the program report to the ISTE Program Review Coordinator. Program evidence may be submitted electronically (via email attachment [in PDF or MS Word format], Web link, CD) or in paper form (4 copies). Electronic submission is preferred. In general, the procedure for handling the review process includes the following steps.

1. NCATE receives institutional program evidence and state partnership proposals.
2. Program evidence and state proposals are forwarded to the ISTE Program Review Coordinator
3. The Program Review Coordinator assigns 3 readers to evaluate each proposal.
4. Readers review program proposal/state partnership proposal, rate the program/proposal, and return their evaluation to the Program Review Coordinator.
5. The Program Review Coordinator compiles results from the three reviewers and submits the evaluation report to NCATE.
6. The final report is sent to NCATE, to the Chair of the Accreditation and Standards Committee, and one copy is filed.
7. Notation of consistency of three evaluators and any obvious misunderstandings of guidelines that need addressing are made and conveyed to the reviewers.
8. A summary of results of accreditation reviews are reported at least yearly to the ISTE Board.
9. Institutions not meeting standards may submit a rejoinder.Review of the rejoinder will be completed by the reviewers who read the initial report. Rejoinders should be completed before the on-site BOE visit.

The institution's program report is distributed to individuals trained as ISTE Program Review Readers. Each reviewer will evaluate the evidence submitted applying the rubric scoring rules as described in the Supporting Explanation accompanying each standards matrix. In addition to the standards matrix, the reviewers will provide narrative responses for the contextual information requested on the Cover Sheet and will provide summaries of strengths and weaknesses they discover from the combined review of performance data and contextual information provided.

The three reports will be submitted to the Program Review Coordinator where they will be compiled and reviewed for consistency. Reviewers are required to provide explanations for any indicators that they evaluate as scoring less than the "meeting standards" level. The final report will summarize perceived strengths and weaknesses reported through the review process and compiled ratings and comments relating specifically to the standards rubrics. Compiling the scores earned and the strengths and weaknesses suggested from evaluation of the contextual information received, the Program Review Coordinator will inform NCATE of its recommendation regarding national recognition for each program reviewed. See Appendix VI. for a copy of a recent report to NCATE. Note that the report to NCATE was based on the prior set of standards and criteria. To prepare the new reports, 3 reviewers will continue to be asked to submit their ratings of each standard and indicator along with their comments justifying the rating; to then consider the results, and provide a holistic rating for each of the six standards. The institutions will receive all of the comments and the compiled rating for each indicator as feedback for their program along with strengths and weaknesses, suggestions, and comments from the reviewers. The Program Review Coordinator will supply ISTE's recommendation to NCATE regarding "national recognition" for the program, a cover letter for the institution, and a copy of the standards evaluation form. If the program has

not received a recommendation for national recognition, then the institution may submit a rejoinder focusing on identified weaknesses.

Process For Review Of State Program Approval

If a state chooses the NCATE option, the review process in Section VI above will be used to determine whether the individual institutions merit national recognition.

If a state chooses the State option, programs would receive national recognition through state program approval processes. Under theses circumstances the State must provide information intended to show how their standards are aligned with the ISTE standards. States will provide the following three sets of documentation in their proposal:

First, information on the contextual background of the state standards:

- Identification of the specific program addressed and the SPA standards with which it corresponds;
- A description of what the state does to ensure that educators are prepared to function effectively, including any testing requirements for internships and licensure in the specialty area;
- A description of how the state standards were prepared, including background history, key participants, involvement of specialty organization experts, roles of various state agencies, and a summary of anticipated changes in the near future;
- A description of any unique state or local circumstances that the specialty organization should take into consideration when reviewing the state submission. This is especially important in instances where law and other mitigating circumstances could affect the state's ability to parallel the SPA standards or to provide some of the information described above.

Second, information on alignment of the state standards with the specialty standards:

- A matrix that facilitates direct comparison of state standards describing teacher candidate knowledge and skills with each SPA standard.
- Information that states are expected to provide for review of their teacher candidate standards by SPAs is different from the information that institutions provide for review of programs by SPAs. Institutions summarize assessment results that demonstrate candidate proficiencies in relation to the standards. By contrast, the purpose of the state standards alignment submission is to show the comparability or similarity of state standards with the SPA standards.

Third, copies of state program approval reports will be provided to ISTE. Specialty organizations should expect information to be submitted under NCATE 2000 state option partnerships about state program approval processes and state use of candidate performance information as follows:

- A description of the state's quality assurance systems for institutions and individuals participating in program approvals [including (1) selection, training, and evaluation of reviewers, (2) monitoring of confidentiality and objectivity, (3) reviewing frequency of approval, disapproval, conditional approval or deferment, and (4) procedures for resolving conflicts or redressing unfavorable actions].
- The context for the state's program approval process, including any unique circumstances that might affect SPA understanding of what the state is doing.
- A description of how the state plans to collect candidate performance information from multiple forms of assessments, and use that information (through program approval, licensure, or other functions), or how it will foster collection and use of such information by teacher preparation programs.

ISTE State Reviewers will review the materials submitted by the State using the applying the following criteria:

States must use a consistent review process across all institutions and programs:

- A recognized state education agency or professional standards board should oversee and evaluate the review process.
- Written procedures should clarify the review process sufficiently to ensure a consistent application of standards in every review.
- The qualifications and training of those conducting reviews should be sufficiently specific to ensure consistency across reviewers.

States must ensure unbiased, objective decisions regarding program approval or non-approval:

- Conflicts of interest should be avoided in reviews: review should be conducted by a team that includes individuals with no present or past affiliation or bias toward the institution, and, whenever possible, individuals from other states should either conduct program reviews or have a significant role in reviewing program materials and in making decisions regarding program adherence to professional guidelines.

State program reviews must be conducted by qualified persons, based upon a thorough understanding and application of the ISTE program standards:

- Those conducting program reviews should be trained by a relevant specialized professional association.
- Qualifications of reviewers should be periodically evaluated by the appropriate specialized professional association to ascertain currency, accuracy, thoroughness, and fairness in interpreting and applying guidelines.

State review decisions must be based on accurate information regarding program policies and procedures:

- The review process should include a thorough study of written information that addresses the relevant specialty guidelines.
- Reviewers should have sufficient time to study program information prior to any site visit.
- Site visits may be used to validate and further analyze written program information and determine more fully the consistency of program practices with specialty guidelines.
- Institutions should have the opportunity to issue a rejoinder to the review, clarifying or correcting information regarding program policies or practices.
- The final decision regarding program approval or non-approval should take such information into account.

State review decisions must be communicated clearly and to provide feedback useful for program development:

- The review should culminate in a clearly written report that indicates the overall program decision (merits national recognition or not) and whether each of the specialty association standards has been met or not. The report should also provide information regarding perceived program strengths and/or weaknesses.
- Comments should be specific enough to serve as the basis for program development.
- The report should be provided to the administrative unit/program in a timely manner.
- Copies of reports should be maintained by the organization, agency, or unit conducting the review and should be provided to the appropriate NCATE constituent specialized professional association (ISTE Program Review Coordinator).

Quality Assurance Mechanisms, Including Selection of State and Institution Program Reviewers

A. Selection of BOEs and Reviewers. ISTE recommended BOE Representatives and Program Review Readers are selected through a process designed to ensure high quality reviews. An invitation to apply for positions as Board of Examiner (BOE) site-visitors and state/university program reviewers is distributed to all ISTE members through a web-based member newsletter, through organizational listservs for the ISTE special interest groups, and on the ISTE Web page. Candidates are asked to submit a vita to the Chair of the Accreditation and Standards Committee. Those who respond are sent a letter identifying the duties and responsibilities of the positions, to identify any obvious conflicts of interests to performing reviews of certain institutions/states, and to invite them to attend a session on accreditation at the next ISTE conference. The vitae are evaluated by the Committee and invitations to participate as Program Reviewer or BOE are issued. Descriptions of the roles, responsibilities, and terms of service for accreditation-related positions are in the ISTE Policies and Procedures (Policy No. 4.03.18 and 4.03.19). Care is taken in recruiting for and encouraging individuals to apply who represent racial, ethnic, gender, geographic diversity and perform diverse roles in their profession. A major opportunity for recruiting occurs at conferences where we present the standards and hold reviewer training for volunteers.

B. Training. Training is done by NCATE and the site visits are coordinated by the NCATE Office. Once the request for BOE trainees is received by ISTE, the names and vitae are submitted and all further training and site-visits are handled through NCATE.

The State Reviewer and Program Reviewer training and procedures are directed by the ISTE Accreditation and Standards Committee and approved by the ISTE Board. State Reviews and Program Reviews are managed by the Program Review Coordinator, a member of the Accreditation and Standards Committee. Electronic copies of the program review and state partnership reviews are sent to NCATE, to the Chair of the Accreditation and Standards Committee, and a copy is on file with the Program Review Coordinator.

Training in the review process for the new standards will be held on-line and will be succeeded by a final training meeting held at a conference venue. Upon completion of the training, reviewers serve for a term of three years. Reviewers can be invited to continue after their three-year term at the discretion of the Program Review Coordinator. As new standards are adopted, reviewers who wish to continue must retrain with the new standards and procedures. When program proposals are distributed, newly trained reviewers are grouped with experienced reviewers so that comparisons can be made regarding consistency of evaluation. If such problems surface, follow-up training may be required. Readers who do not respond to reviews appropriately or do not submit materials to the Program Review Coordinator in a timely manner will not receive additional reviews. This action may be taken at the discretion of the Program Review Coordinator and Accreditation and Standards Committee Chair.

This procedure is designed to a) identify any problems that exist in interpreting or responding to the guidelines, b) establish effective training procedures for readers, and c) develop consistency of evaluation among readers.

Description of SPA Training and Assistance

To date, ISTE has provided program and state assistance as requested on an individual basis. Phone communication has been most frequent, but some groups have requested presentations or calendar information regarding when presentations of the standards would occur. Some have requested names of individuals from their state that can serve on review teams, or names of individuals who could do training. ISTE has attempted to fulfill these requests. A currently funded Assessment Project will result, within the next three years, in model assessment systems available online and professional development opportunities across the nation to assist universities/states in documenting candidate performance. Two additional

projects will supply video examples of accomplished teaching with technology and related reflections intended to serve as models of effective teaching with technology. ISTE currently provides information about accreditation and standards on its Web site (http://www.iste.org). It is the goal of the ISTE Accreditation Committee to expand the resources available to states and universities for the purpose of preparing for implementation of these new standards via on-line training modules. The modules will specifically address: NETS for Teachers: Foundations for Facilitator and Leadership Programs, ECT Facilitation (ECTF) Standards Requirements, ECTF Reviewer Training, ECT Leadership (ECTL) Standards Requirements, ECTL Reviewer Training, State Partnership Requirements, State Partnership Reviewer Training. Those successfully completing reviewer training will receive a letter stating their qualifications for reviewing programs.

Differences in Current and Revised Standards

Six major differences in the proposed and currently approved standards

1. Currently, standards exist for both an initial endorsement and for bachelor-degree preparation. The proposed revision includes only standards for the initial endorsement. This change was made in response to the perception that few teachers teach computer science full time and that few states have certification in the field of computer science. No dispute with this position was encountered in the feedback received.

2. The prerequisite preparation for the proposed program is defined by the NETS for Teachers (NETS*T) standards (released in June 2000). The NETS*T will replace the foundations in the current approved standards. This change is consistent with other ISTE standards.

3. A minimal level of field experience was added to the endorsement program. This was done to ensure that students have opportunities to observe and interact within a computer science classroom.

4. The current standards have several items relating to the ability of computer science teachers to serve as a technical resource to all other teachers. Feedback indicated that this was no longer reasonable, and thus, these items were deleted.

5. The current standards have several items relating to the ability of computer science teachers to provide extensive technical maintenance and management of computing facilities. Again, feedback indicated that such activity should not be the responsibility of instructional staff. The proposed standards focus on classroom management in the lab rather than management of the lab itself. Thus, items relating primarily to technical support were deleted.

6. The general organization of both the content and professional teaching practice has been changed to reflect key content and pedagogy. While grouping of various items changed significantly, most of the previous standards are still included, perhaps in different terminology. This was done partially in response to technological change (e.g., networking and the Web). Additionally, the new organization is more aligned with current professional literature and practice. During the review process we also asked certain groups to specifically consider the organizational structure, and there was overwhelming support from the field for the new structure.

APPENDIX I: NETS for Teachers Standards Matrix

NATIONAL EDUCATIONAL TECHNOLOGY STANDARDS FOR TEACHERS MATRIX

Prerequisite Foundation Standards- ISTE National Educational Technology Standards (NETS) for Teachers. Computer Science candidates must meet prerequisite foundations for educational technology prior to full admission to the Computer Science program.	
Prerequisite Foundations Performance Indicators & Tasks	**Links to Evidence that Standard has been met:**
NETS FOR TEACHERS STANDARDS AND INDICATORS	
I. Technology Operations and Concepts *Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:*	
A. demonstrate introductory knowledge, skills and understanding of concepts related to technology	
B. demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies	
II. Planning and Designing Learning Environments and Experiences *Teachers plan and design effective learning environments and experiences supported by technology. Teachers:*	
A. design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners	
B. apply current research on teaching and learning technology when planning learning environments and experiences	
C. identify and locate technology resources and evaluate them for accuracy and suitability	
D. plan for the management of technology resources within the context of learning activities	
E. plan strategies to manage student learning in a technology-enhanced environment	
III. Teaching, Learning and Curriculum *Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning. Teachers:*	
A. facilitate technology-enhanced experiences that address content standards and student technology standards	
B. use technology to support learner-centered strategies that address the diverse needs of students	
C. apply technology to develop students' higher order skills and creativity	
D. manage student learning activities in a technology-enhanced environment	

Prerequisite Foundations Performance Indicators & Tasks	Links to Evidence that Standard has been met:
IV. Assessment and Evaluation *Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:*	
A. apply technology in assessing student learning of subject matter using a variety of assessment techniques	
B. use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning	
C. apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity	
V. Productivity and Professional Practice *Teachers use technology to enhance their productivity and professional practice. Teachers:*	
A. use technology resources to engage in ongoing professional development and lifelong learning	
B. continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning	
C. apply technology to increase productivity	
D. use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning	
VI. Social, Ethical, Legal and Human Issues *Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PF-12 schools and apply that understanding in practice. Teachers:*	
A. model and teach legal and ethical practice related to technology use	
B. apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities	
C. identify and use technology resources that affirm diversity	
D. promote safe and healthy use of technology resources	
E. facilitate equitable access to technology resources for all students	

Summary Rubrics and Suggested Evidence

I. Technology Operations and Concepts

Teachers demonstrate a sound understanding of technology operations and concepts.

Performance Indicators: Teachers will:

A. demonstrate introductory technology literacy knowledge, skills, and concepts (described in the ISTE NETS Technology Foundation Standards for Students).

B. demonstrate sustained growth in technology knowledge and skills to stay abreast of contemporary and emerging technologies.

Suggested Evidence

- Evidence of basic technology proficiency as described in the ISTE NETS-S (Profile 1 - of NETS-T General Preparation)
- Classroom Technology Application Plan (CTAP)
- Technology Professional Development Plan

Summary Rubric

Developing	Approaching	Meets	Exceeds
Technology skills at initial, basic level. Professional Development Plan is still emerging. Classroom Technology Plan is still emerging; evidence is not related to student learning.	Technology skills at intermediate level. Professional Development Plan under development but not fully implemented. Classroom Technology Plan is well developed with focus is on student learning.	Technology skills at proficient level. Professional Development Plan (1-3 years) shows evidence of successful implementation and self-assessment in current and emerging technologies. Classroom Technology Plan targets improvement in student learning	Technology skills at advanced level. Professional Development Plan (3-5 years) periodically updated from multiple sources to fit changing teaching environment to ensure continuous professional growth in both current and emerging technologies. Classroom Technology Plan addresses short- and long-term improvement in student learning.

II. Planning and Designing Learning Environments and Experiences.

Teachers plan and design effective learning environments and experiences supported by technology.

Performance Indicators: Teachers:

A. design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

B. apply current research on teaching and learning with technology when planning learning environments and experiences.

C. identify and locate technology resources and evaluate them for accuracy and suitability.

D. plan for the management of technology resources within the context of learning activities.

E. plan strategies to manage student learning in a technology-enhanced environment.

Suggested Evidence:

- Classroom Technology Application Plan (CTAP)
- Technology in Teaching Unit/Lesson Plans
- Evidence of instruction that connects appropriate technology resources, curriculum content and assessments for specific student populations
- Citations or references to current research on teaching and learning with technology is cited in technology plan or unit plan.
- Description of a rationale for inclusion of specific technology resources in a unit or lesson plan, including how these resources were identified, located, evaluated and selected.
- Evidence of orchestration of activities to maximize student learning by matching the most appropriate technology setting and resources to instructional and learner needs.
- Evidence of adapting to a variety of technology-enhanced learning environments, e.g. one computer classrooms, multi-workstations, portable technologies, computer labs.

Summary Rubric

Developing	Approaching	Meets	Exceeds
Instructional plans undeveloped. Minimal citations or inappropriate interpretation of current research on use of technology in education. Technology resources not identified, not used, not evaluated for accuracy and/or not appropriate for instructional outcomes.	Instructional plans shows single instructional strategy with insufficient student use of technology, focusing on narrow set of needs. Appropriate citations to research, but unclear or inconsistent application to instructional plan. Technology resources evaluated based on narrow criteria or incomplete rationale for inclusion in unit/lesson. Limited evidence of using technology resources in unit/lesson.	Instructional plans shows multiple instructional strategies that include student use of technology, including attention to diverse learning styles and needs. Appropriate citations to relevant research, with clear and consistent application to instructional plan and learning environment. Technology resources well managed and are appropriate for lesson or unit, including critical analysis and rationale for inclusion in unit/lesson.	Instructional plans demonstrate multiple strategies that focus on innovative student use of technology, including innovative ways of addressing learning style, special needs. Comprehensive citations to current and diverse research demonstrating extensive reading and consistent, creative integration into innovative learning environment with strong management. Technology resources used meet multiple student outcomes, include comprehensive description and critical analysis or accuracy and suitability for inclusion in unit/lesson.

III. Teaching, Learning, and the Curriculum.

Teachers implement curriculum plans, that include methods and strategies that apply technology to maximize student learning.

Performance Indicators: Teachers will:

A. facilitate technology- enhanced experiences that address content standards and student technology standards.

B. use technology to support learner-centered strategies that address the diverse needs of learners.

C. apply technology to develop students' higher order skills and creativity.

D. manage student learning activities in a technology-enhanced environment.

Suggested Evidence:

- Technology in Teaching Unit/Lesson Plans
- Video clip of teaching or Classroom Observation
- Examples of units/lessons that use technology resources to individualize, instruction to address diverse learning needs.
- Units and lessons which allow students to explore higher order thinking and problem solving by using technology to extend and expand (go beyond the classroom) instruction.
- Evidence of student learning activities that adapt to a variety of technology-enhanced learning environments, e.g. one computer classrooms, multi-workstations, portable technologies, computer labs.

Summary Rubric

Developing	Approaching	Meets	Exceeds
Technology use not appropriate to meet content standards or student technology standards. Limited or no attention to learner centered-strategies or attention to diverse needs of learners. Unit or lesson addresses lower level thinking skills or lacks creativity. Classroom management techniques, technology use, and grouping strategies may not support active student engagement.	Lesson link to content standards and/or student technology standards is weak or unclear. Learner-centered strategies are identified but may not meet the diverse needs of all learners. Unit or lesson addresses higher order thinking skills without a real-world context or student creativity. Classroom management techniques, technology use and single grouping strategies contribute to active student use but evidence is inconsistent or incomplete.	Technology use clearly aligns to attainment of both content standards and student technology standards. Learner-centered strategy address diverse needs of students in classroom. Unit or lesson addresses higher order thinking skills within authentic, challenging tasks, and encourages student creativity. Classroom management, technology integration and multiple grouping strategies clearly demonstrate student active engagement with technology resources to enhance learning.	Seamlessly integrates multiple technologies for students to clearly demonstrate attainment of content standards and student technology standards. Multiple learner-centered strategies target identified needs of learners, challenging them to think in new and creative ways. Unit or lesson involves student in solving real-world problems that require students to evaluate, synthesize and creatively apply information technology and content standards aligned for conceptual understanding. Flexible, multiple classroom management strategies and multiple learning strategies enhance student control of their own learning with technology.

IV. Assessment and Evaluation.

Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

Performance Indicators: Teachers will:

A. apply technology in assessing student learning of subject matter knowledge and skills using a variety of assessment techniques.

B. use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

C. apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.

Suggested Evidence:

- Technology in Teaching Unit/Lesson Plans
- Technology for Record Keeping
- Use of electronic means to collect and assess student performance data e.g. grade books, web-based testing, computer aided instruction, or other performance tasks.
- Evidence of using technology tools to interpret student assessment information, report results, analyze trends, recognize patterns and draw conclusions about classroom performance to improve instructional practice.

Summary Rubric

Developing	Approaching	Meets	Exceeds
Limited or no evidence of technology use to collect, analyze and report information about student learning. Limited knowledge of where to find information about student learning. Insufficient evidence of using data to improve instructional practice or student learning. Minimal methods used to determine students' appropriate use of technology resources for learning, communication, and productivity	Technology used for basic recordkeeping and simple reporting about student learning. Data collected about student learning, but analysis is limited and it is unclear how this information is applied to improving instructional practice or student learning. Single method used to evaluate students' appropriate use of technology resources for learning, communication, and productivity	A variety of technologies used to gather, analyze, and report student performance data, supporting both traditional and alternative assessment strategies. A variety of data is collected that leads to effective analysis and clearly leads to improving practice and student learning. Multiple methods used to evaluate students' appropriate use of technology resources for learning, communication, and productivity	Extensive use of multiple technology strategies to enhance creative and innovative ways to support performance-based assessment, portfolios, and collect classroom observation data. Creatively finds sources of a variety of student performance data. Includes clear analysis and synthesis, and creative presentation of findings. Clearly articulates how data analysis contributes to improving instructional practice and student learning. Innovative multiple methods used to evaluate students' creative uses of technology resources for learning, communication, and productivity

V. Productivity and Professional Practice.

Teachers use technology to enhance their productivity and professional practice.

Performance Indicators: Teachers will:

A. use technology resources to engage in on-going professional development and lifelong learning.

B. continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.

C. apply technology to increase productivity.

D. use technology to communicate and collaborate with peers, parents, and the larger community to nurture student learning.

Suggested Evidence:

- Classroom Technology Application Plan (CTAP)
- Technology in Communication
- Technology Professional Development Plan
- Evidence of participation in continuing education (educational technology conference attendance, curriculum integration workshops, on-line courses)
- Evidence of using technology to collaborate, prepare publications, and produce other creative work
- Evidence of using technology tools for sustained communication, (e.g. e-mail, list serve, shared network folders, web pages, video conferences)

Summary Rubric

Developing	Approaching	Meets	Exceeds
Limited resources for professional development identified. Limited evidence of reflection on professional practice to make informed decisions about use of technology to support student learning. Uses one low level productivity tool for all tasks. Uses simple communication tools for one-way communi-cation with peers, parents and larger community.	Resources for professional development identified, but link to ongoing professional development unclear. Reflection in portfolio and professional development plan shows evidence of making informed decision regarding use of technology for own productivity but may not show application to support student learning. Uses multiple productivity tools to produce basic publications and presentations. Uses several communication tools and encourages two-way communication with peers, parents, and larger community. Communication strategy may support student learning, but link between communication and work products is not always clear.	Resources for professional development identified and linked to concrete example of use in ongoing professional development. Evidence of engagement in technology-based opportunities for professional development, including distance learning. Reflection in portfolio and professional development plan shows clear evidence of making informed decision regarding use of technology for own productivity and to support student learning. Able to differentiate appropriate uses of different productivity and multimedia tools, to prepare publications and other creative work. Uses multiple communication tools to encourage two-way communication with peers, parents, and community.	Extended examples of opportunities described for professional development and lifelong learning. Professional development plan involves collaborative exchange of information regarding new and emerging technology resources for supporting student learning. In-depth reflection in portfolio and professional development plan shows innovative evidence of making making informed decision regarding use of technology for own productivity and to support student learning. Produces highly creative work using a variety of productivity and multimedia tools. Conduct an event where students have opportunities to demonstrate in a public setting their technology-based products.

VI. Social, Ethical, Legal, and Human Issues.

Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PreK-12 schools and apply those principles in practice.

Performance Indicators: Teachers will:

A. model and teach legal and ethical practice related to technology use.
B. apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.
C. identify and use technology resources that affirm diversity.
D. promote safe and healthy use of technology resources.
E. facilitate equitable access to technology resources for all students.

Suggested Evidence:

- Technology Professional Development Plan
- Technology in Education Philosophy or Vision Statement
- Lessons that include copyright policy, citations;
- Student work that includes appropriate references, lessons that model intellectual property rights and acceptable use policies; and
- Classroom rules that address issues of privacy, security, appropriate access, and implementation of appropriate use policies.
- Evidence that classroom use of technology is organized in ways that are developmentally appropriate, and not put student health at risk (ergonomically sound, time appropriate, etc), and ensures security of student data and information

Summary Rubric

Developing	Approaching	Meets	Exceeds
Actions and/or resources raised doubts about the teacher's legal and/or ethical behavior. Students' actions and/or resources in their possession demonstrated that the teacher had not effectively taught legal and/or ethical issues. Limited evidence of using technology to meet diverse needs of students. Limited use or resources that affirm diversity, or misunderstanding of the concept. Issues of safe and healthy use of technology resources are articulated but not evident in classroom. Understanding of issues of equitable access not clearly evident.	Demonstrates legal and ethical practice, although not always clear or consistent. Students' actions and/or resources in their possession indicate that more instruction is warranted on legal and/or ethical issues. Technology resources identified which support students with diverse learning needs, although the application in instruction not clear. Identified resources that affirm diversity but not fully implemented or explained, Classroom safety procedures are developed but not enforced. Awareness of healthy use of technology resources is evidenced in plan, but not clear in practice in the classroom. A plan for equitable access is evident, but implementation is not clear.	Demonstrates and advocates for legal and ethical behaviors among students, colleagues, and community members regarding the use of technology and information. The teacher contributes, by example, to the ethical development of students. Technology resources identified which clearly support students with diverse learning needs. Identified issues related to diversity of individuals representing a variety of cultures, backgrounds, abilities, and evidence of incorporating technology-based resources to reinforce positive attributes of diverse learners in classroom. Classroom procedures are developed and enforced that guide students' safe use of technology resources. Healthy use of technology resources is evidenced in classroom policies, procedures, and student knowledge and adherence. Has well-defined policies and advocates for equitable access to technology resources in the classroom	A written policy statement related to legal and ethical behaviors related to technology use, and advocate for its acceptance among students, teachers, parents, and educational officials, or professional association. Innovative uses of technology resources that support many types of special needs. Evidence of conscious search for resources that affirm diversity reflected in the society at large. Utilizes these resources to initiate dialogue on understanding and tolerance. Classroom policies are continually adjusted to address current research on safety. Students are empowered to self-monitor to check for safety issues. Classroom procedures on healthy use of technology are updated regularly to reflect new research. In addition to policies and procedures, evidence clearly exists of advocacy for equitable access to technology for all students in their school, school district, community, and homes.

APPENDIX III: Prerequisite ISTE NETS-T Standards & INTASC Standards Correlation

INTASC* Principles *Interstate New Teacher Assessment and Support Consortium	Each principle is further discussed in terms of the knowledge, dispositions, and performances it implies. These provide the basis for evaluating evidence about a candidates' achievement of the standards, thus providing guidance for both preparation and assessment.
Principle #1: **Knowledge of Subject Matter**	The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.
Principle #2: **Knowledge of Human Development & Learning**	The teacher understands how children learn and develop and can provide learning opportunities that support their intellectual, social, and personal development.
Principle #3: **Adapting Instruction for Individual Needs**	The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.
Principle #4: **Multiple Instructional Strategies**	The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.
Principle #5: **Classroom Motivation and Management**	The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.
Principle #6: **Communication Skills**	The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.
Principle #7: **Instructional Planning Skills**	The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
Principle #8: **Assessment of Student Learning**	The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the learner.
Principle #9: **Professional Commitment and Responsibility**	The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.
Principle #10: **Partnerships**	The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support students' learning and well-being.

*Interstate New Teacher Assessment and Support consortium (INTASC) is a consortium of more than thirty states operating under the Council of Chief State School Officers (CCSSO) that has developed standards and an assessment process for initial teacher certification. (Campbell, Melenyzer, Nettles & Wyman, 2000)

In attempting to correlate the overlap of the two sets of standards, it should be emphasized that achieving the ISTE NETS-Teacher Standards should help students achieve the appropriate INTASC Standard, while the reverse may not be true, since technology is not mentioned in the INTASC Standards. An overview of the draft correlation is shown below, followed by the specific ISTE Performance Indicators.

Overview

INTASC Standard Addressed→	1	2	3	4	5	6	7	8	9	10
ISTE NETS-Teacher Standards										
I. Technology Operations and Concepts. Teachers demonstrate a sound understanding of technology operation and concepts.	X								X	
II. Planning and Designing Learning Environments and Experiences. Teachers plan and design effective learning environments and experiences supported by technology.	X		X	X	X		X			
III. Teaching, Learning, and the Curriculum. Teachers implement curriculum plans, that include methods and strategies that apply technology to maximize student learning.	X	X	X	X	X		X			
IV. Assessment and Evaluation. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.	X							X		
V. Productivity and Professional Practice. Teachers use technology to enhance their productivity and professional practice.						X			X	X
VI. Social, Ethical, Legal, and Human Issues. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PreK-12 schools and apply those principles in practice.			X						X	

Detailed View

ISTE NETS-T Standards & Performance Indicators	**INTASC Standards Addressed**
I. Technology Operations and Concepts. Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:	1, 9
A. demonstrate introductory technology literacy knowledge, skills, and concepts (described in the ISTE NETS Technology Foundation Standards for Students).	1
B. demonstrate sustained growth in technology knowledge and skills to stay abreast of contemporary and emerging technologies.	9
II. Planning and Designing Learning Environments and Experiences. Teachers plan and design effective learning environments and experiences supported by technology. Teachers:	1,3, 4, 5, 7
A. design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.	1,3, 4, 7
B. apply current research on teaching and learning with technology when planning learning environments and experiences.	
C. identify and locate technology resources and evaluate them for accuracy and suitability.	
D. plan for the management of technology resources within the context of learning activities.	
E. plan strategies to manage student learning in a technology-enhanced environment.	1,5
III. Teaching, Learning, and the Curriculum. Teachers implement curriculum plans, that include methods and strategies that apply technology to maximize student learning. Teachers:	1, 3, 4, 5, 7
A. facilitate technology-enhanced experiences that address content standards and student technology standards.	1, 7
B. use technology to support learner-centered strategies that address the diverse needs of learners.	2, 3
C. apply technology to develop students' higher order skills and creativity.	4

D. manage student learning activities in a technology-enhanced environment.	5
IV. Assessment and Evaluation. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:	1, 8
A. apply technology in assessing student learning of subject matter knowledge and skills using a variety of assessment techniques.	1, 8
B. use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.	8
C. apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.	8
V. Productivity and Professional Practice. Teachers use technology to enhance their productivity and professional practice. Teachers:	6, 9,10
A. use technology resources to engage in on-going professional development and lifelong learning.	9
B. continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.	9
C. apply technology to increase productivity.	9
D. use technology to communicate and collaborate with peers, parents, and the larger community to nurture student learning.	6,10
VI. Social, Ethical, Legal, and Human Issues. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PreK-12 schools and apply those principles in practice. Teachers:	3, 9
A. model and teach legal and ethical practice related to technology use.	9
B. apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.	3
C. identify and use technology resources that affirm diversity.	3
D. promote safe and healthy use of technology resources.	9
E. facilitate equitable access to technology resources for all students.	

These tables are an attempt to correlate the ISTE NETS for Teachers Standards and the INTASC Standards.
All comments, contributions and suggestions would be appreciated.