

The Tribal Environment and Natural Resources Management Approach to Indian Education and Student Assessment



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The Tribal Environmental and Natural Resources Management (TENRM) program at Northwest Indian College is a pilot program intended to provide an education in environmental science that is grounded in the American Indian and Alaska Native perspectives and traditions crucial to tribal survival. Northwest Indian College is a tribal college located in Washington State. The college is chartered by the Lummi Nation.

TENRM was designed in response to needs expressed by leaders from 26 Pacific Northwest tribes to train future leaders who understand tribal resource management issues in the context of community and culture. The basic need identified was to increase the number of American Indians and Alaska Natives working in tribal natural resources and environmental management programs that developed as a result of federal court decisions reaffirming tribal treaty rights to harvest and manage fish, shellfish, and other natural resources within the Puget Sound region.

The program offers students a holistic approach to knowledge, together with skills in computation and analysis for solving increasingly complex environmental problems. The TENRM educational strategy for natural resources and environmental management employs high academic standards while also aiming to strengthen each student's cultural identity.

Tribal colleges can lead the way in providing this education. The TENRM program was established in 1997 at the Northwest Indian College with funding from the National Science Foundation (NSF)¹ as a national model of tribal and

regional college partnering. The program received two rounds of funding, a three-year grant beginning in 1997, and a renewal of that grant beginning in 2000. The total funding was approximately \$1.3 million.

TENRM prepares American Indian and Alaska Native students from throughout the United States to work with their tribes in natural resources management. Students earn an Associate of Arts and Sciences (A.A.S.) or an Associate of Technical Arts (A.T.A.) degree, which prepares them for further baccalaureate work in environmental and natural resource management or in a related field, or for immediate technical employment in tribal resource management.

The A.A.S. degree in Tribal Resource Management is tailored to meet the requirements for direct transfer from a two-year college into partnering institutions: Huxley College of the Environment or Fairhaven College at Western Washington University (WWU) in Bellingham, Washington; or, into The Evergreen State College in Olympia, Washington. A.A.S. recipients also qualify for transfer directly, as juniors, to other Washington State colleges and universities. Students earning the A.T.A. degree are prepared for work in policy, planning, paralegal, or other dimensions of tribal resource management.

The core faculty³ and other participants in the TENRM learning community³ including students, have strived to develop modes of assessment of student performance that are culturally and academically appropriate for tribal colleges. The TENRM program's several years of experience have yielded a number of lessons and suggest promising ways to proceed with assessment of student success; these are being applied in the ongoing pilot program. We believe the model for assessment developed as part of TENRM can be one of the program's significant contributions.

This paper describes the development and uses of student assessment in TENRM. Key features of the TENRM approach to assessment have been discussed in Berardi et al. (2001, 2002). This paper provides information on the use of assessment in this program, with possible application to tribal college programs elsewhere.

It is hoped that this information can be of assistance to other tribal colleges in developing their own environmental and natural resources education programs, so as to take advantage of the experience gained in TENRM. As with other aspects of TENRM, development of assessment methods is an ongoing activity and we expect to continue to refine and improve our approach as we learn from our experience.⁴

Key Features of Assessment in TENRM

Student assessment in TENRM cannot be understood on its own. Assessment has been developed as an integral part of the overall approach to education in TENRM. The several somewhat distinct aspects of TENRM—for example, recruitment, curriculum, or learning community—all mutually support each other. They are intended to be philosophically consistent, and we hope they are operationally consistent in the conduct of the TENRM program.

Nevertheless, examination of how student assessment is done in TENRM can be useful in extending the TENRM model to other tribal colleges. Considering assessment practices from educational settings in nontribal situations also is a part of our continuing self-examination and the refinement of the model.

It is our belief that standard academic methods of assessing student performance cannot be relied on in the cultural and educational setting of a program like TENRM.⁵ Such methods may fail to identify real progress being made, or, conversely, may give misleading indications of lack of progress, because they focus on indicators that may be inappropriate to these students and their curriculum.⁶ For instance, students may be absent for extended periods of time due to personal or family needs, cultural traditions, or school service functions. Students may, in fact, complete only partial credit. Further, it may take them substantially more than two years to finish the program.

Extensive discussion of appropriate assessment measures for non-standard educational settings can be found in Volume X, Issue 2, of *The Tribal College Journal*⁷ (1998-99), which emphasizes the importance of culturally appropriate assessment methods and focuses on documentation of student learning (pertinent also to college accreditation). The articles draw from the experiences of faculty at several tribal colleges in the Midwest and West.⁸

TENRM considered ideas obtained from tribal and other educational settings to address learning challenges in a practical and direct way. A central feature of the approach to assessment at TENRM has been to eliminate the usual punitive measures—for example, for lower grades, for poor attendance, and for late work. These measures do not work in the TENRM setting, and can be counterproductive to the overall goals of the program. Instead, the fundamental approach TENRM developed focuses on achievement of competency, and—importantly—encourages full community support for the students in their efforts to complete competencies.

TENRM de-emphasizes attendance (“seat time”), and emphasizes proficiencies gained and work completed, whether it is accomplished inside or outside the classroom. TENRM tries to be creative in developing appropriate and effective ways of measuring actual performance. For example, we calculate grade point average (GPA) on the basis of credit hours *completed* rather than credit hours *attempted*, as is the usual practice.⁹

Overall, we use a combination of measures and indicators to assess performance. These include conventional methods of testing knowledge and performance: written and oral tests, both with specific information on skills and on integrative, comprehensive material. This testing occurs regularly and frequently.

TENRM also uses various forms of observation and evaluation of student performance in their group work and in their teaching of each other. These observations are made by the TENRM faculty, and also by the students. Group work and interactions are considered to be an important part of the cultural context and the vital learning community for TENRM, as can be found in

teaching practices appropriate to learning communities (Angelo & Cross, 1993; Bean, 1996; Brookfield, 1995; Campbell & Smith, 1997; Finkel, 2000; Gardiner, 1994; Nichols, 1995a, 1995b; Palmer, 1988; Smith & McCann, 2001; as well as materials available from the Washington Center for Improving the Quality of Undergraduate Education, most notably, MacGregor, 1999—see <http://www.evergreen.edu/washcenter/>), as well as for tribal settings (see Cajete, 1994, 1999; Cajete & Little Bear, 2000; Deloria & Wildcat, 2001; James, 2001).

Evaluations are based on multiple explicit criteria, which span the full range of academic and cultural concerns of TENRM. These include the following:

- Staying grounded in one’s cultural values
- Maintaining self-respect and a sense of self, within the context of community
- Using critical and integrative abilities for problem solving
- Improving in the application of particular subject matter knowledge and skills
- Improving in the basic areas of writing, reading comprehension, speaking, and computation or mathematics

The combined assessment derived from academic testing and from the broader evaluation is then used to appraise student progress and performance. This approach, we believe, is consistent with the philosophy and principles of TENRM, as discussed in the following section.

TENRM Approach to Assessment

As an integrated part of the TENRM program, the approach to student assessment is designed to support the overall goals of the program and to be consistent with the underlying principles and other aspects of the TENRM philosophy of education. TENRM goals, principles, and other elements of the TENRM philosophy are summarized below and discussed in more detail in the *Handbook for Facilitators*, available from Northwest Indian College (Berardi et al., 2001).

Three overriding goals have been articulated by TENRM, and the program is designed to try to achieve these goals. The goals, as well as features of the TENRM program that support each goal, are identified in Figure 1.

TENRM is built on the foundation of three fundamental principles.

Foundations of TENRM Program

First Principle: Articulation of Tribal and Western Knowledge

Second Principle: Non-Abandonment Policy

Third Principle: Developmental Education

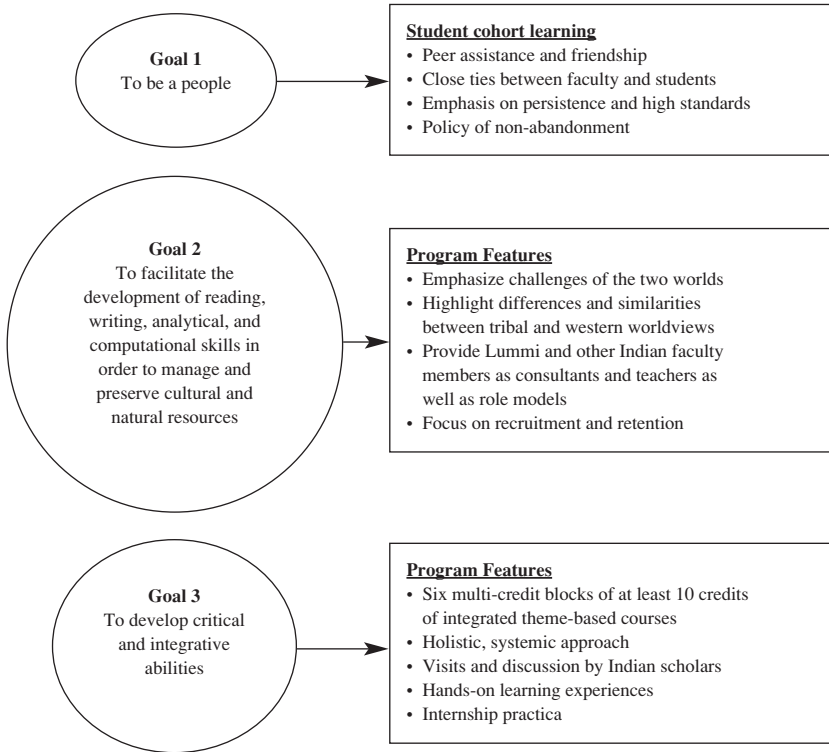


Figure 1. Three goals of TENRM

These principles underlay and guide every aspect of the design and implementation of TENRM, including the adaptations we continue to make to improve the program based on our experience.

First Principle: Integration of Tribal and Western Knowledge

The ability to work in both the tribal and the standard “western” realms of science and knowledge is needed by tribal natural resource managers and environmental specialists. The TENRM program intends to help students articulate these two realms. The validity of each is respected, and the differences and similarities between them are recognized. The necessary knowledge of “western” science is provided, within the context of tribal culture and knowledge.¹⁰ The students’ tribal cultural knowledge is broadened, with speakers and academic materials in Indian and Alaska Native science and resource management fields.¹¹

Second Principle: Non-Abandonment Policy

From the beginning, a basic TENRM working policy and approach has been that all students enrolled in the program are strongly supported to continue with the

program. Through the experience of the first year, TENRM has developed the concept of non-abandonment as an explicit policy as well as an underlying element of the program's philosophy.

The non-abandonment principle means that the faculty and administration will do everything they reasonably can to support students to complete the program. The policy does not mean that standards will be lowered for students who are struggling. It means, rather, that the program will not take any formal action to remove them from the program if the students fail to attend class or complete their course credits on schedule. They will be welcomed back to class and assisted to complete missed work. The non-abandonment policy is consistent with an overall philosophy of noncoercion, and internal- and community-based loci of motivation.

Third Principle: Developmental Education

In order for the TENRM program to succeed, the education of each cohort of incoming students must begin at the level of knowledge and preparation students bring to the program. Academic skills among beginning students are generally weak, and we have found that much of the first quarter must be devoted to strengthening computational and writing skills.¹²

However, students also often bring personal life or work experience with natural resources that provide a base on which to build a higher level of education. Students may be weak in standard academic skills, but their practical experience often serves to strengthen their learning.

Consistent with these principles, TENRM uses modes of assessment that do not rely wholly on standard academic testing methods and that do not employ standard punitive measures for absences, late work, and similar behavior. Instead, TENRM aims to assess those same characteristics that the program helps develop in the students such areas as integrative understanding and skills, multidisciplinary competencies, ability to work in both the tribal and the "western" science worlds, and learning community contributions.

Similarly, the methods of assessment must match the form of communication and knowledge suited to the TENRM education, in particular more emphasis on verbal communication (rather than relying primarily on the medium of writing), and placing greater importance on group contributions and interactions. In developing the TENRM approach to student assessment, the assistance of an external evaluator, Joan LaFrance, has proven very important. Dr. LaFrance has contributed insights from a more detached perspective than core faculty, students, or administrators could, as well as providing skilled and seasoned professional experience.¹³

Initially, students were accepted on the basis of their preparedness for college-level work, that is, their background in basic skills of reading, writing, and computation, or their motivation and readiness to acquire these skills. Students also were selected on the basis of the strength of their tribal identity, or their willingness to explore and attempt to develop such identity.

TENRM instructors typically have met weekly to discuss each student's progress in the dual areas: basic (and, eventually, advanced) skills acquisition, and tribal identity ("to be a people"). Additional faculty from NWIC, beyond the original core of six, have become involved.

Methods of Assessment

TENRM employs multiple methods of assessing student performance. This mix is intended to fit the objectives of the TENRM program and also student modes of knowledge and communication. These assessment methods include written and verbal expression, and observation of group work. Assessment is recorded and communicated to students in the form of grades, discussion between faculty and students, and written evaluations and other feedback to the students. Assessment is performed both by individual faculty and by faculty teams.

Written Expression

Students are assigned a wide range of written tasks, including personal journals, in-class tests, take-home essays, and lengthy project papers. The written work is critiqued both in written comments and in discussions between faculty and students. As much as possible, opportunity is given for revision of the longer written works based on feedback on early drafts.

Verbal Expression

Verbal expression and oral presentation are valued in the TENRM program, perhaps more than in standard academic settings, for two reasons. First, oral presentations are important modes of communication in the natural resource professional work students are seeking, with their own communities, and in public hearings and agency presentations. Secondly, oral communication has been traditionally important in tribal communities, and some students have developed considerable skill. Verbal abilities need to be recognized and supported, while being further developed as a communication tool for the science information gained through the TENRM program. Sometimes written and verbal work are combined (and also individual and group feedback—see below), as when students read sections of written work in class and other class members discuss the work and give feedback to the authors.

Group Work

The concept of a community of learners is fundamental to TENRM. Faculty and students form a community of learners. This community is situated within the broader communities of Northwest Indian College, the Lummi Nation, and the respective home tribal communities of the students.¹⁴ Faculty learn along with students. This helps develop the students' confidence in approaching the faculty with questions about pedagogy as well as course content. This also expands students' sense of investing in and owning the learning process.

Similarly, the cohort of students is a supportive community (in its own right, as representative of the full tribal community); therefore, student

contributions to and cooperation with their group are aspects of their education that are important to evaluate. As in any true community of learners, TENRM students must develop adequate communication skills (e.g., reflective listening, perspective-taking, and conflict resolution) to deepen and strengthen their sense of community and to deal with the inevitable conflicts that will arise as the community matures. Learning communities engender far greater interaction between students than do typical course formats; students and faculty must have the skills to function well in such a rich learning environment.

Faculty assessment of students' group work is done verbally (in the group and in regular private sessions), and less frequently in written form. Valuable assessment also comes from other students, in open discussion during group work (and also, perhaps, in private discussions).

Grades

Unavoidably, grades for coursework are important assessment tools. Numerous factors are considered in determining grades. Again, the approach to grading is intended to match the objectives and the philosophy of TENRM. Criteria for particular subject matter are discussed in the next section of this paper.

An important part of the TENRM approach to grades is (as previously discussed) that they are based on work completed, not work that should have been completed. A student will not receive a grade in a course until sufficient work is finished. This principle is supported by the non-abandonment principle: everything possible is done to help students complete courses, and eventually the program, even if the time period required is considerably longer than the intended two years. Students, therefore, are not penalized for delays in completing work or getting through the program; instead, they are rewarded for the quality of the work they eventually produce.

This practice has encountered some reluctance on the part of other faculty at NWIC and at Western Washington University, where most of the students have transferred to complete four-year degrees. However, the faculty at NWIC realize that it is part of a critical non-abandonment policy. Those teaching in the program have eventually accepted it.

Individual Faculty and Teams

Individual faculty members have responsibility for particular subject matter and courses. In addition, one faculty member serves as program coordinator each term to assist and complement course instructors. Faculty meet weekly (and more often if necessary) to share information on student progress, among other topics. This helps in assessing students' overall group participation and contributions. For example, a student may have difficulty attending a particular class due to family or work commitments but otherwise may have good attendance; the faculty then can collaborate to develop with the student a way to compensate for missed class time.

Student assessments for particular courses are communicated to students by the individual faculty teaching those courses. For overall performance or for

problems that may cut across multiple courses, assessments are communicated to students by the faculty coordinator or by faculty teams. Feedback from a student's own cohort group also is encouraged.

The overall approach to assessment in TENRM is depicted in the model below (Figure 2), including identification of skills and qualities that are assessed, methods of assessment, forms of assessment, and contributions of various members of the TENRM learning community.

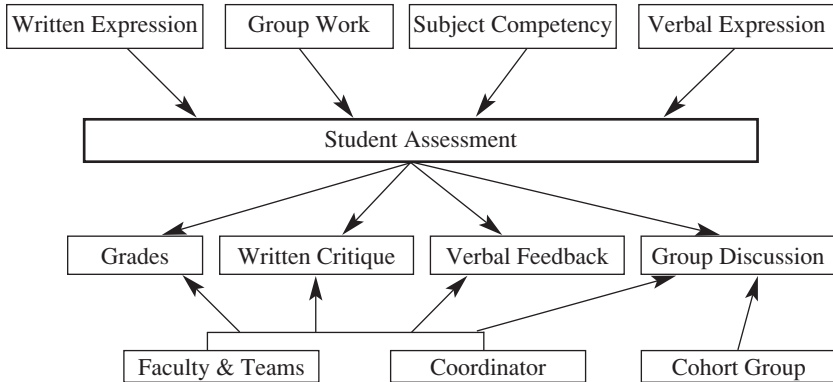


Figure 2. Model of student assessment in TENRM

The criteria for student assessment in TENRM are founded on the program's philosophy, principles, and objectives. Criteria are of two general types: specific subject matter competencies, and more basic, cross-subject standards rooted in the program's overall approach. Examples of basic, cross-subject criteria are the following:

- Stay grounded in cultural values
- Maintain self-respect and a healthy sense of self within community
- Use critical and integrative abilities to solve problems and imagine creative solutions
- Improve significantly in four basic skill areas: writing, reading comprehension, speaking, and computation

In assessing students according to criteria such as these, each student must be treated as an individual. The criteria must be tailored to each student's present state of learning, level of skills development, and educational needs.

Subject matter criteria are specific to each subject. Examples of criteria for evaluation, in terms of expected competencies in particular subjects, are identified below.

Biology: understand complexity as an emergent property of self-organizing systems; understand that living systems and their environments form a web of interacting complex systems which in turn generate more complexity; understand the taxonomy of living systems, and know the possible reasons for extant biological diversity; and, understand the theory of evolution and principles of populations.

Chemistry: understand the origin of elements; know current theories of atomic structure; understand chemical bonds, molecular structure, and the chemistry of water; understand that chemistry and biology are different sides of the same reality, know the major macromolecules common to all living systems, understand the specific chemistry of DNA molecules; and, know the chemistry of oceans, soils, and air.

Computer Applications: be comfortable using computers and learning new computer skills; develop proficiency in using certain software for word processing and creating spreadsheets and be able to apply these skills to natural resources and other academic areas; and, develop proficiency in using the Internet for communications and research.

Economics: understand the principles of macroeconomics including pricing, demand, and private and public economic decision-making as a tool for understanding free-market dynamics and the inherent contradictions with tribal economic principles; understand the same concepts as a basis for exploring natural capitalism and other economic resources and approaches.

English: be able to research and write different styles of environmentally-oriented papers; be able to write papers that are grammatically correct, focused, and readable; use styles that include observation, exposition, comparison, persuasion, argumentation, and research.

Humanities: understand the role of the environment and Indian and Alaska Native perspectives in the disciplines defined as “humanities,” including art, drama, music, philosophy, literature, and dance.

Mathematics: be proficient in basic algebraic computation and manipulation skills; understand the language of functions (linear, exponential, and polynomial) and be able to use them in natural resources applications; be proficient in using technology (computer software and graphing calculators) to aid mathematical computation, modeling, and graphing; understand how mathematics can be used to model complex systems and be able to perform simple modeling of environmental systems.

Indian History and Culture: understand the character of Indian and Alaska Native cultures and know the major historical events, motivations, and power relations between the U.S. government and states and tribes, and understand the student’s own place within that history.

Physical Geography or Geology: be able to describe the four spheres of the Earth, understanding their connections and providing examples of processes that operate at global, regional, and local scale; know basic map reading and

interpretation skills; describe electromagnetic radiation and describe its relationship to other phenomena such as temperature; describe the types of plate boundaries and the relative motion associated with each; name the three major classes of rocks and describe the origin of each; and, discuss the impacts of mass wasting of natural resources.

Political Science: understand the structure and function of the U.S. government and the nature of federal treaties with Indian tribes.

Speech: demonstrate knowledge of the oral communication process through in-class activities and discussions; be able to prepare and deliver informative and persuasive speeches related to natural resources and issues of concern to Indian and Alaska Native people.

Spiritual/Cultural Study: be able to explicate environmental science from Indian and Alaska Native perspectives and demonstrate how to apply it to natural resource management in the context of tribal community culture; demonstrate an understanding of the fundamental differences in ideology and practice between mainstream environmental science (and science education) and traditional Indian and Alaska Native science (and science education); demonstrate an understanding of how indigenous science, which recognizes the intimate relationship of all things, applies a holistic healing approach to solving environmental problems; demonstrate how an indigenous understanding of the natural world influences virtually all areas of community and individual life; and, recognize and respect the value of traditional Indian cultures, including the importance of sacred sites and the role of ceremony, and demonstrate self-esteem, pride, and identity.

Statistics: understand and be proficient in using the fundamentals of descriptive and inferential statistics, including measures of central tendency and dispersion; be proficient in using technology as an aid to statistical computation, modeling, and graphing; understand and have basic proficiency in using statistics to describe natural systems, such as plant and animal populations; and, understand the limitations of statistics as a tool for natural resource management.

Conclusion: Integration of Assessment in TENRM

The TENRM program has grown from our belief that tribal colleges must lead the way in providing an education—especially in environmental science—that is grounded in American Indian and Alaska Native perspectives. Teaching both indigenous and “western” science as two parallel systems of knowledge is daunting but not impossible, especially with the ready availability of tribal Elders and the ease we have found in attracting Indian and Alaska Native scholars to guest teach in the program.

Such education is especially important in the tribal college context where a premium is put on high-context education (context refers to how individuals and social groups perceive information and communicate with one another). Educating tribal students in rich, high-context, place-based environments is critical

to their success in working for their tribes—either after their two-year program, or upon completion of four-year degrees.

Tribal colleges should be active in promoting unity, not the separateness that often is found in discipline-based, compartmentalized education in four-year institutions. Rather than filtering out all conditions surrounding an event and presenting only “facts,” tribal colleges value the integrated, multidimensional problem-solving, place-based learning that is so critical for solving environmental problems today.

In this paper we have repeatedly stressed that student assessment is intended to be consistent and compatible with the rest of the TENRM program, and to contribute to achieving the objectives and the basic purpose of TENRM. This means assessing aspects of performance that match educational objectives, using methods of assessment that are able to reflect achievement of those objectives, and using means of assessment that themselves contribute to the students’ education.

TENRM was initiated with the basic goal of preparing students for tribal environmental and natural resources work. This entails bridging the two realms of tribal and “western” science and knowledge, and also helping tribal students to discover their full potential for this kind of professional work. The program and its academic curriculum are integrative and multidisciplinary at many levels, in terms of cultures and ways of knowing as well as in terms of multiple subject matters.

Assessment must fit this set of knowledge and skills, dealing with integrative abilities as well as specific information. The need for TENRM arises from a shortage of adequately prepared tribal environmental professionals, and assessment in TENRM must also be fitted to overcoming reasons for that shortage. One way to do this is to make the basic commitment to support students to complete the program—the TENRM principle of “*non-abandonment*.” Assessment, therefore, stresses finishing irrespective of the start date, and achievement of competency rather than penalties for inadequacy.

In practice, this means grading only completed work, and giving as much feedback and support as possible to complete work and to develop skills and gain knowledge. The TENRM learning community—students in a single cohort and faculty together, in the context of the larger community—contributes to assessment. Key traits of the TENRM learning community include developing and maintaining capacity, interdependency, informality, traditions, celebration, coming together after tragedy, spirituality, modeling and teaching character education and moral education, taking responsibility, and identifying group members who can act as guides or problem-solvers.¹⁴

The foundation of the TENRM philosophy and principles also means starting from where the students are—“developmental education.” Previous competencies are not assumed or expected. The TENRM program builds on the skills and personal experiences the students bring. This approach also requires

tailoring education—and assessment of that education—to the individual skills and situation of each student.

Student assessment, thus, is an integral part of the overall framework of TENRM. It is intended to perform an essential role in TENRM's success in contributing to the vital education of tribal members and environmental professionals. An educational system such as the TENRM program, with its emphasis on multiple dimensions and understanding of the complexity of systems, is needed to prepare students to solve complex environmental problems in coming years. The cultural foundation of the program helps student succeed in it.

It is clear is that students need more than recruitment, good facilities, and strong academic programs to succeed. Professional education programs must be rooted in tribal culture and values, as part of a learning community of scholars. For, as one TENRM faculty member has said,

[The] hardest lesson to learn as a people is how to be a group, not chemistry or biology. Tribal people have paid the cost of 200 years of having to learn how to be individuals and not how to be a people. The cohort concept is an old value, which should be incorporated into more programs at the college. The cohort is traditional, part of a value of working together—a process of refining adult behavior and creating ability to make decisions as a group. Lummi [people] struggle with this—learning how to finish things, and to trust others and ourselves—how to relate to each other in different communication styles.

Gigi Berardi received her PhD in Resources, Policy, and Planning at Cornell University. She is a core faculty member in the Tribal Environmental and Natural Resources Management program and is associate professor and chair of Environmental Studies at Huxley College, Western Washington University.

Dan Burns received his Master's degree in Environmental Science from Huxley College. He also served as the first director of the TENRM program and as the dean of science and mathematics at Northwest Indian College. He currently is program officer (off-site), Tribal Colleges and Universities program, National Science Foundation.

Phillip H. Duran (Tiwa) has served as the dean of science and mathematics and director of the Tribal Environmental and Natural Resources Management (TENRM) program at Northwest Indian College. He holds MS degrees in physics from the University of Texas at El Paso and computer science from Washington State University.

Roberto Gonzalez-Plaza holds a Ph.D. in Cell and Molecular Biology from the Universidad Catolica de Chile, Santiago, Chile. He is currently a member of the faculty at Northwest Indian College and adjunct faculty at Huxley College, Western Washington University.

Sharon Kinley (Lummi) graduated from Northwest Indian College. She also holds degrees from Western Washington University. She is currently director of the Native Studies program at NWIC.

Lynn Robbins received a Ph.D. in Anthropology from the University of Oregon, and is currently a professor at Huxley College, Western Washington University. He teaches political science and Native treaty law. He has conducted numerous studies on the social impacts of energy development on Native American communities.

Ted Williams has an MS in Astronomy from the University of Arizona, and an MA in Applied Behavioral Science, Systems Counseling, from Bastyr University. He serves currently as the dean of science and mathematics and director of the Tribal Environmental and Natural Resources Management (TENRM) program at Northwest Indian College.

Wayne Woods received his MAT in Speech and Theatre from Lewis and Clark College. He is currently faculty at Northwest Indian College, where he works in the areas of career development, developmental studies, speech, and leadership, as well as academic advising. He also directs the Tribal College University program, which incorporates learning communities throughout the college.

Endnotes

¹TENRM has been supported primarily by NSF Grant No. DUE-9752076.

²At the time of this writing, Gigi Berardi, Roberto Gonzalez-Plaza, Sharon Kinley, Lynn Robbins, and Ted Williams.

³A “learning community” or community of learners involves a variety of approaches that link or cluster classes during a given term, often around an interdisciplinary theme, that enroll a cohort of students. This represents an intentional restructuring of students’ time, credit, and learning experiences to foster more explicit intellectual connections between students and faculty, and between disciplines.

⁴We also continue to learn from the expanded experience of the TENRM model (disseminated via conferences, a video, and a handbook for tribal colleges ([see <http://www.nwic.edu/tenrm>]) as it is applied in other tribal colleges. We, therefore, welcome feedback and comment from readers and other tribal college faculty, administrators, and students on these approaches to student assessment.

⁵See the review of literature on improving academic performance among Native American students by William Demmert (2001). In this document, he discusses the importance of Native language and cultural programs in schools, and community and parental influences, among others, leading to successful academic performance. See also Bordeaux (1995), which examines the use of standardized, nationally normed testing in assessing the progress of American Indian and Alaska Native students. It describes the inadequacies of these assessment methods as well as theories that attempt to explain the poor performance. It also describes performance-based assessment—recommended by Native and non-Native educators.

⁶See also Howard (1999); Jensen (1998); Madison (2001); Smilkstein (1999).

⁷This issue of the *Tribal College Journal* contains information related to “culturally-aware” assessment, a critical component of the accreditation process for tribal colleges. It also discusses a W. K. Kellogg Foundation and Fond du Lac Tribal and Community College program that brought together five tribal colleges to discuss culturally aware assessment strategies. It is also noted in this issue that the tribal colleges, with little time or money (due to chronic underfunding), continue to tackle difficult questions concerning how to measure students’ critical thinking abilities.

⁸This volume also cites the Lummi Tribal School Board in discussing the concern tribes have for education. Articles in other volumes of *The Tribal College Journal* discuss many aspects of student performance, curriculum development, and the integration of culturally appropriate education with standard academic approaches in tribal colleges. Such research can provide useful information to educators striving to develop programs to suit their own particular situations.

⁹This approach was suggested by external evaluator Joan LaFrance.

¹⁰For a discussion of scientific ecology complementing traditional knowledge, from an academic perspective, see Berkes (1999) and Damasio et al. (2001).

¹¹See Demmert (2001) in which he reviews studies showing the importance of traditional values and practices, as well as contact with community tribal members, in successful student education. Particularly interesting are studies regarding cultural identity and community support (James, Chavez, Beauvais, Edwards, & Oetting, 1995; Gage & Robson, 1984; Huffman, Sill, & Brokenleg, 1986; Vadas, 1995) to successful college education. Note also Aikenhead’s (2001) insightful discussion of aboriginal material as a critical asset in the science classroom.

¹²See Demmert (2001) for a review of research exploring a foundation of basic skills in successful Indian education.

¹³TENRM employs the services of Joan LaFrance (enrolled, Turtle Mountain Band of Chippewa), Ed.D., Mekinak Consulting (Seattle, WA), as external evaluator.

¹⁴To date, tribal affiliations and/or languages of TENRM students and faculty include Lummi, Cowichan, Nooksack, Penobscot, Jamul/Rincon, Makah, Nisqually, Sioux/Colville, Yakima, Nez Perce, Caddo/Kiowa/N. Arapaho, Choctaw, Lakota/Flandreau Santee, Navajo, Mojave, Tiwa, Tlingit, Athapaskan, and Aleut.

REFERENCES

- Aikenhead, G. S. (2001). *Cross-cultural science teaching: Rekindling traditions for aboriginal students*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, St. Louis, March 26-28. (Also accepted for publication in the *Canadian Journal of Science, Mathematics and Technology Education*)
- Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers* (2nd ed.). San Francisco: Jossey-Bass Publishers.
- Bean, J. C. (1996). *Engaging ideas: The professor’s guide to integrating writing, critical thinking, and active learning in the classroom*. San Francisco: Jossey-Bass.
- Berardi, G., Burns, D., Duran, P., Gonzalez-Plaza, R., Kinley, S., Robbins, L. (and colleagues). (2001). *Handbook for facilitators: Principles and adaptation of the Tribal Environmental and Natural Resources Management (TENRM) model for tribal colleges*. Bellingham: Northwest Indian College.
- Berardi, G., Burns, D., Duran, P., Gonzalez-Plaza, R., Kinley, S., Robbins, L. (and colleagues). (2002). Profile and rationale for the Tribal Environmental and Natural Resources Management (TENRM) program at the Northwest Indian College: An innovative, interdisciplinary Native American curriculum. *American Indian Culture and Research Journal*, 26(3), 45-62.
- Berkes, F. (1999). *Sacred ecology: Traditional ecological knowledge and resource management*. NY: Taylor & Francis.

- Bordeaux, R. (1995). Assessment for American Indian and Alaska Native learners. *ERIC Clearinghouse on Rural Education and Small Schools Digest* (EDO-RC-95-6). Retrieved June 29, 2002, from <http://www.ael.org/eric/digests/edorc956.htm>
- Brookfield, S.D. (1995). *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass.
- Cajete, G. (1994). *Look to the mountain: An ecology of indigenous education*. Durango, CO: Kivaki Press.
- Cajete, G. (1999). *Igniting the spark: An indigenous science education model*. Skyland, NC: Kivaki Press.
- Cajete, G., & Little Bear, L. (2000). *Native science: Natural laws of interdependence*. Santa Fe, NM: Clear Light Publishers.
- Campbell, W. E., & Smith, K. A. (Eds.). (1997). *New paradigms for college teaching*. Edina, MN: Minneapolis: Interaction Book Company.
- Damasio, A. R., Harrington, A., Kagan, J., McEwen, B. S., Moss, H., & Shaikh, R. (Eds.). (2001). *Unity of knowledge: The convergence of natural and human science*. NY: The New York Academy of Sciences.
- Deloria, V., Jr., & Wildcat, D. R. (2001). *Power and place: Indian education in America*. Golden, CO: Fulcrum Resources.
- Demmert, W. G., Jr. (2001). *Improving academic performance among Native American students: A review of the research literature*. Charleston, SC: AEL (ERIC Clearinghouse on Rural Education and Small Schools).
- Finkel, D. L. (2000). *Teaching with your mouth shut*. Portsmouth, NH: Heinemann Boynton Book Publishers.
- Gage, J., & Robson, D. (1984). *Patterns of achievement and self-concept among students in a tri-ethnic community*. Paper presented at the annual meeting of the Northern Rocky Mountain Educational Research Association, Jackson Hole, WY.
- Gardiner, L. F. (1994). *Redesigning higher education: Producing dramatic gains in student learning* (ASHE-ERIC Higher Education Research Report). Washington DC: George Washington University, Graduate School of Education and Human Development.
- Howard, G. (1999). *We can't teach what we don't know: White teachers, multiracial schools*. NY: Teachers College Press, Columbia University.
- Huffman, T., Sill, M. L., & Brokenleg, M. (1986). College achievement among Sioux and white South Dakota students. *Journal of American Indian Education*, 25(2), 32-38.
- James, K. (Ed.). (2001). *Science and Native American communities: Legacies of pain, visions of promise*. Lincoln, NE: University of Nebraska Press.
- James, K., Chavez, E., Beauvais, F., Edwards, R., & Oetting, G. (1995). School achievement and dropout among Anglo and Indian females and males: A comparative examination. *American Indian Culture and Research Journal*, 19(3), 181-206.
- Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, VA: Association for Supervision and Curriculum Development.
- MacGregor, J. (1999). *Strengthening learning communities: Case studies from the National Learning Communities Dissemination Project* (FIPSE). Olympia, WA: The Evergreen State College, Washington Center for Improving the Quality of Undergraduate Education.
- Madison, B. L. (2001, August/September). Quantitative literacy: Everybody's orphan. *Focus Newsletter of the Mathematical Association of America*, pp. 10-11.
- Nichols, J. O. (1995a). *A practitioner's handbook for institutional effectiveness and student outcomes assessment implementation* (3rd ed.). NY: Algora Publishing.
- Nichols, J. O. (1995b). *The departmental guide and record book for student outcomes assessment and institutional effectiveness*. NY: Algora Publishing.

- Palmer, P. (1988). *The courage to teach: Exploring the inner landscape of a teacher's life*. San Francisco: Jossey-Bass.
- Smilkstein, R. (1999, May 20-23, 1999). *How the brain learns: Research, theory, and classroom application*. Paper presented at the Transforming Campuses Through Learning Communities conference of the Washington Center for Undergraduate Education, SeaTac, Washington.
- Smith, B. L., & McCann, J. (2001). *Reinventing ourselves: Interdisciplinary education, collaborative learning, and experimentation in higher education*. Bolton, MA: Anker Publishing Company, Inc.
- Vadas, R. E. (1995). Assessing the relationship between academic performance and attachment to Navajo culture. *Journal of Navajo Education*, 12(2), 16-25.