

THE JOAN AND JAMES  
LEITZEL CENTER *for*  
MATHEMATICS, SCIENCE, AND  
ENGINEERING EDUCATION

STRATEGIC PLAN

UNIVERSITY *of* NEW HAMPSHIRE

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**“MATHEMATICS, SCIENCE AND ENGINEERING EDUCATION  
HAVE NEVER BEEN MORE IMPORTANT TO INDIVIDUALS AND  
TO THE WELL-BEING OF OUR NATION THAN AT THIS TIME.”**

**JOAN R. LEITZEL  
PRESIDENT EMERITA  
UNIVERSITY OF NEW HAMPSHIRE**

THE JOAN AND JAMES LEITZEL CENTER WAS MADE POSSIBLE BY A GIFT FROM THE LATE LESLIE S. HUBBARD '27, ONE OF THE UNIVERSITY'S MOST GENEROUS BENEFACTORS, AND AN ARDENT SUPPORTER OF QUALITY EDUCATION WITHIN THE STATE OF NEW HAMPSHIRE.

October 2004

*Dear Friends:*

*On April 30, 2003 we celebrated the formal dedication of the Joan and James Leitzel Center for Mathematics, Science, and Engineering Education. The day represented for many of us the culmination of over two decades of collaborative research and outreach efforts that will now be centralized and facilitated through the work of the Center.*

*Over the past year and a half we have been engaged in a strategic planning process that has sought input from a variety of stakeholders internal and external to the UNH community. I continue to be impressed with the number of individuals who have been willing to be involved and the depth of their commitment to the mission of the Center.*

*This strategic plan is consistent with the UNH Academic Plan in which engagement and outreach are key themes representing an institutional commitment to being actively engaged in sharing expertise and building partnerships to meet the needs of a variety of constituencies. The Leitzel Center's strategic plan is organized around four strategic themes: inquiry, engagement and outreach, creativity, and sustainability. The Center is committed to inquiry, developing models of research-based practice, engaging in the development and support of reciprocal partnerships, creatively pursuing cross-disciplinary partnerships and projects, and building an infrastructure and a record of successful funding that will sustain the Center over the long-term.*

*Through the implementation of the action steps embedded in this plan, we hope to develop a new model for interactions between institutions of higher education and formal and informal educational agencies in the areas of mathematics, science, and engineering. In our model, we will work "with" rather than "on" our partners and learning will be two-way rather than one-way.*

*Joan Leitzel and her late husband, Jim, provide strong role models as engaged scholars. It is my hope that the Center's mission, goals, and activities will reflect their values and approach to the work of teaching, learning, research, and engagement.*

*The next and potentially harder step will be the process of setting priorities. We welcome your input and invite you to join us in our journey. You may contact us at (603) 862-0718 or visit our Web site at [www.leitzelcenter.unh.edu](http://www.leitzelcenter.unh.edu).*

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STRATEGIC PLAN**

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## EXECUTIVE SUMMARY

The Joan and James Leitzel Center will work to transform education in mathematics, science, and engineering at the University of New Hampshire, in elementary and secondary schools, and in informal settings through high quality research, carefully examined practice, and interdisciplinary collaboration. The Leitzel Center Strategic Plan is structured around a core set of themes that reflect responsibilities related to the Center's mission and stakeholder needs. The goals and action steps related to these themes provide a framework for planning and implementing Center programs and activities. The themes that guide this document are *Inquiry, Engagement and Outreach, Creativity, and Sustainability*.

### *Inquiry*

- The Leitzel Center will provide leadership in engagement through research-based practice in the areas of mathematics, science, and engineering education.

### *Engagement and Outreach*

- The Leitzel Center will serve as a critical University-wide advocate for integrating, coordinating, and promoting educational programs in mathematics, science, and engineering.
- The Leitzel Center will establish and foster a vision based on principles of inquiry, engagement, and creativity.

### *Creativity*

- The Leitzel Center will provide leadership to enhance the ability of stakeholders, policy makers, and community members to advance education in mathematics, science, and engineering.
- The Leitzel Center will create new partnerships among stakeholders in which UNH mathematics, science, and engineering education serve as a bridge.
- The Leitzel Center will develop a strategic approach to contribute to policy discussions about mathematics, science, and engineering education in an ongoing way at a variety of levels.

### *Sustainability*

- The Leitzel Center will develop an infrastructure and a plan that will sustain the Center and its activities over time.
- The Leitzel Center will be actively engaged in establishing both internal and external identities.

# STRATEGIC PLAN FOR THE JOAN AND JAMES LEITZEL CENTER FOR MATHEMATICS, SCIENCE, AND ENGINEERING EDUCATION

## *Mission and Context*

The Joan and James Leitzel Center will work to transform education in mathematics, science, and engineering at the University of New Hampshire, in elementary and secondary schools, and in informal settings through high quality research, carefully examined practice, and interdisciplinary collaboration.

The Center will facilitate partnerships and initiate programs and activities with the goal of developing *educators* with thorough knowledge of science, mathematics, and engineering concepts and of human learning; developing *learners* who experience the joy of discovery and the challenge of understanding and developing *learning environments* that support active and rich intellectual engagement.

The Center activities will take place within a university culture that values the creation and the dissemination of knowledge equally, where the boundaries between research and teaching are low, and where the research enterprise strengthens instruction in the K-12 schools and the University. Science and mathematics researchers of distinction will play critical roles in the development of proposals and related Center activities. In addition, the Center will work to sustain and strengthen existing partnerships between UNH, local schools, and non-formal science settings.

The Joan and James Leitzel Center for Mathematics, Science, and Engineering Education was established by an endowed gift to the University of New Hampshire in June 2002. The establishment of the Center represents more than two decades of commitment and activity on the part of UNH faculty, as individuals and groups, in the areas of science, mathematics, engineering, and education. These faculty shared a vision: effective learning environments can be designed when research informs practice and when practice informs research. We believe that both conceptual understanding and instructional context must be integrated.

The strategic themes, goals, and action steps presented here are consistent with the University's academic plan particularly in the area of engagement and outreach. The plan will guide decisions and Center activities during its initial period of development.

## *Strategic Themes*

The Leitzel Center Strategic Plan is structured around a core set of themes that reflect responsibilities related to the Center's mission and stakeholder needs. (Stakeholders of the Center include preK-12 teachers and students, college and university faculty, extension educators, non-formal science educators, education policy makers, and business leaders.) The goals and action steps related to these themes provide a framework for planning and implementing Center programs and activities. The themes that guide this document are *Inquiry, Engagement and Outreach, Creativity, and Sustainability*.

“TRANSFORMATION: DEVELOPING EDUCATORS WITH THOROUGH KNOWLEDGE OF SCIENCE, MATHEMATICS, AND ENGINEERING CONCEPTS AND OF HUMAN LEARNING; DEVELOPING LEARNERS WHO EXPERIENCE THE JOY OF DISCOVERY AND THE CHALLENGE OF UNDERSTANDING AND DEVELOPING LEARNING ENVIRONMENTS THAT SUPPORT ACTIVE AND RICH INTELLECTUAL ENGAGEMENT.”

## *Inquiry*

Goals and activities within the theme of inquiry are related to conducting research, asking questions about practices, employing valid assessments, and reflecting on outcomes for student learning, professional development, curriculum implementation, and outreach activities. Center activities and programs will be grounded in current research and theory about teaching, learning, and institutional change. In addition, the Center will seek to promote research about the teaching and learning of mathematics, science, and engineering, and about educational change. It will be a resource and learning site for individuals interested in these areas but lacking experience and expertise.

## *Engagement and Outreach*

The Center is committed to developing reciprocal and sustainable partnerships among a variety of internal and external constituencies. Goals and activities within this theme will promote collaboration, generate knowledge, and enhance communication among the UNH extension, education, and research communities; pre-college educators and administrators; education policy-makers; students; and business leaders. Calls for assistance in the education area continue to come from various entities both external and internal to the University. Currently, faculty members with expertise and interest assist and respond as best they can, but there has been minimal University-level coordination of these efforts. Increasingly, many individuals within the University are interested in working on issues in mathematics and science education but may lack the appropriate experiences and expertise. The Center will provide a coherent organizational structure that promotes integration, communication, and strategic planning within the University and with external communities in the area of mathematics, science, and engineering education.

## *Creativity*

The Center will be pro-active in fostering cross-disciplinary activities among University faculty and other stakeholders to cultivate relationships, explore creative ideas, and position the Center to respond to local and national opportunities. In its selection of projects and programs, the Center will promote interdisciplinary approaches to teaching and learning at all levels and in a variety of settings. The Center will seek to position itself as a UNH leader that will respond to the national imperative articulated by a number of federal agencies and foundations to attract more diverse faculty and students (particularly underrepresented minorities) to the science, mathematics and engineering disciplines. Activities will foster a broad view, not a disciplinary-specific approach to learning. Goals and action steps within this theme are based on the assumption that by teaming and sharing expertise we can change the educational culture and improve the teaching and learning of mathematics, science, and engineering.



**“THEMES THAT GUIDE THE CENTER’S WORK ARE INQUIRY, ENGAGEMENT AND OUTREACH, CREATIVITY, AND SUSTAINABILITY.”**

## *Sustainability*

The success of the Center will most likely be judged by its ability to build, support, and sustain a coherent set of programs and activities over time. Sustainability will require the development of a broad-based capacity for fundraising and grantsmanship, a creative marketing and communication plan, and a plan for assessing the Center's effectiveness. Critical to all of these is a strategy for attracting, mentoring, and rewarding faculty and staff who share this vision of integrated research, education, and outreach and who have the capacity to contribute to the science, mathematics, and engineering community at the University and to a national agenda. The same strategy would be employed to recruit, include, and acknowledge external stakeholders who share that vision and capacity.

## *Goals and Action Steps*

The Center's mission, vision, and strategic themes will be implemented through projects and activities designed to address the following goals and action steps.

### *Inquiry*

- I. The Leitzel Center will provide leadership in engagement through research based practice in the areas of mathematics, science, and engineering education.

“CONDUCTING RESEARCH, ASKING QUESTIONS EMPLOYING VALID ASSESSMENTS, AND REFLECTING ON OUTCOMES FOR STUDENT LEARNING, PROFESSIONAL DEVELOPMENT, CURRICULUM IMPLEMENTATION, AND OUTREACH ACTIVITIES.”



#### *Action Steps:*

- a) Identify and develop models of promising science, mathematics, and engineering education research-based practice.
- b) Develop and implement a capacity for assessing and clarifying stakeholder needs.
- c) Conduct and catalyze original research in areas of identified needs.
- d) Engage partners in all phases of the research process including the communication of results.
- e) Enhance ability of Center partners and stakeholders to utilize research-based practices in a variety of educational contexts.



## *Engagement and Outreach*

### **I. The Leitzel Center will serve as a critical University-wide advocate for integrating, coordinating, and promoting educational programs in mathematics, science, and engineering.**

#### *Action Steps:*

- a) Establish an organizational structure that promotes integration, supports coordination, and promotes communication within the University and with external communities concerning education in mathematics, science, and engineering.
- b) Develop a series of ongoing forums with specific emphasis on the inclusion of deans, department chairs, and institute/center/program directors to promote dialogue and increase understanding of engagement in mathematics, science, and engineering education.
- c) Build relationships with other UNH initiatives with a strong outreach scholarship mission such as the Carsey Institute and the Marine Program.
- d) Establish a mechanism by which the Leitzel Center will support educational proposals and programs.
- e) Establish a liaison to pre-college teaching communities in mathematics and science in order to establish linkages and coordinate research.
- f) Create an awareness of the opportunities for outreach engagement, service, and research with a variety of stakeholders including K-12 teachers and students, informal science educators, and business leaders.
- g) Develop and support programs to connect children, community members, parents, and educators with University students, faculty, and extension educators to explore mathematics, science, and engineering education.



### **II. The Leitzel Center will establish and foster a vision based on principles of inquiry, engagement, and creativity.**

#### *Action Steps:*

- a) Develop a common internal understanding of the principles of engagement through research and scholarship.
- b) Work to promote a culture that values and supports the role of UNH faculty and students in outreach scholarship.
- c) Identify, develop, implement, and assess professional development models for individuals who are involved with science, mathematics, and engineering education and engagement through research scholarship.
- d) Develop metrics to regularly define and measure success with engagement activities and to evaluate their impact.

**“DEVELOPING RECIPROCAL AND SUSTAINABLE PARTNERSHIPS AMONG A VARIETY OF INTERNAL AND EXTERNAL CONSTITUENCIES.”**

## *Creativity*

**I. The Leitzel Center will provide leadership to enhance the ability of stakeholders, policy makers, and community members to advance education in mathematics, science, and engineering.**

### *Action Steps:*

- a) Recruit stakeholders into the Center to establish a “web of influence” in the broader educational community at all levels (state, regional, national).
- b) Develop strong linkages with other UNH centers and programs to co-sponsor engaged scholarship activities.
- c) Enhance opportunities for stakeholders to learn about partnership capabilities.
- d) Seek opportunities to capitalize on the strengths of New Hampshire Public Television, Office of Outreach Education and Summer Studies, and Cooperative Extension as vehicles to communicate promising models of engagement.
- e) Seek opportunities to build partnerships with other USNH institutions and institutions of higher education in the state and the region to advance mathematics, science, and engineering education.
- f) Establish a mechanism for building partnerships with UNH academic programs and initiatives such as the Preparing Future Faculty Program and the Discovery Program.
- g) Reward people and existing programs whose activities reflect and advance the vision of the Leitzel Center.



**II. The Leitzel Center will create new partnerships among stakeholders in which UNH mathematics, science, and engineering education serve as a bridge.**

### *Action Steps:*

- a) Systematically develop and strategically sustain partnerships with 1 or 2 more racially diverse universities (such as Historically Black Colleges and Universities or other Minority Serving Institutions) that will capitalize on our mutual strengths in science, mathematics and engineering education. Develop joint research and education proposals and other opportunities to enhance and sustain collaboration and mutual benefit.
- b) Identify appropriate personnel internal and external to UNH for potential collaboration (researchers, scientists, mathematicians, formal and informal educators, leaders in business and industry, and students).
- c) Develop a strategy for matching specific audiences with specific UNH resources.
- d) Stimulate a dialogue among partners to advance mathematics, science, and engineering education.

**“BEING PRO-ACTIVE IN FOSTERING CROSS-DISCIPLINARY ACTIVITIES AMONG UNIVERSITY FACULTY AND OTHER STAKEHOLDERS TO CULTIVATE RELATIONSHIPS AND EXPLORE CREATIVE IDEAS.”**

III. The Leitzel Center will develop a strategic approach to contribute to policy discussions about mathematics, science, and engineering education in an ongoing way at a variety of levels.

*Action Steps:*

- a) Establish productive ongoing relationships with the NH Department of Education and develop connections with appropriate NH legislative committees.
- b) Monitor state and federal legislation with respect to the vision and goals of the Leitzel Center.
- c) Establish a mechanism for regular dialogue with policy makers at local, state and national levels.



*Sustainability*

I. The Leitzel Center will develop an infrastructure and a plan that will sustain the Center and its activities over time.

*Action Steps:*

- a) Create an organizational chart and establish roles for committees (e.g. executive, steering, working), affiliated staff, and advisory boards, to carry out Center activities effectively.
- b) Develop and implement a business plan.
- c) Develop and implement a marketing and communication plan.
- d) Identify and prioritize capital investment needs.
- e) In concert with the University of New Hampshire Foundation, Inc. and the UNH Office of Sponsored Research, develop a broad-based capacity for fund raising and grantsmanship that has financial sustainability as a primary goal.
- f) In collaboration with UNH department chairs and deans, work to recruit, mentor, and retain faculty who value and/or have an interest in engagement through research-based practice.
- g) Establish an executive review process for all operational planning.
- h) Establish a Leitzel Center assessment committee to develop and implement a mechanism for judging Leitzel Center activities and grant initiatives with respect to the core values of inquiry, engagement and outreach, creativity, and sustainability.

II. The Leitzel Center will be actively engaged in establishing both an internal and external identity.

*Action Steps:*

- a) Hire an individual with responsibility for marketing and communication.
- b) Develop a Web site, convenient URL, and brand identity for the Center.
- c) Develop a Leitzel Center communications committee with links to the UNH departments to let them know about the center, its mission, and activities.
- d) Develop means for showcasing Leitzel Center projects.
- e) Sponsor and publish papers under the auspices of the Leitzel Center.
- f) Identify crucial national and regional conferences and symposia to send affiliated Center faculty and staff to present, discuss, and promote Leitzel Center programs.

**“DEVELOPING A BROAD-BASED CAPACITY FOR FUND-RAISING AND GRANTSMANSHIP,  
A CREATIVE MARKETING AND COMMUNICATIONS PLAN, AND A PLAN FOR  
ASSESSING THE CENTER’S EFFECTIVENESS.”**



## APPENDIX

### BACKGROUND OF THE PLANNING PROCESS

During its inaugural year, the Center undertook a strategic planning effort involving more than 80 external and internal stakeholders. A planning committee was charged by Provost David Hiley in September 2002 to develop a statement of mission and scope for the Center's work. The work of this committee included a formal dedication ceremony for the Center on April 30, 2003 and the hosting of a set of focus group meetings with representatives from a variety of constituencies in June and November 2003. The Leitzel Center Strategic Planning and Implementation Council, formed in September 2003, worked with the information gained from these meetings to develop a draft set of initial goals, objectives, and action steps which formed the framework for the final plan. In addition, Arthur Greenberg, Dean, College of Engineering and Physical Sciences, Marilyn Hoskin, Dean, College of Liberal Arts, William Trumble, Dean, College of Life Sciences and Agriculture, Provost Bruce Mallory, and Vice President John Aber provided input to the process and the final plan.

#### Leitzel Center Planning Committee Members (October 2002-June 2003)<sup>1</sup>

Eleanor Abrams, *Associate Professor, Department of Education*  
Christopher Bauer, *Professor, Department of Chemistry*  
Karen Graham, *Co-Chair, Director of Leitzel Center*  
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Barrett Rock, *Professor, Complex Systems Research Center, Earth Sciences*  
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Frank Windsor, *Director, Educational Services, New Hampshire Public Television*

#### Leitzel Center Strategic Planning and Implementation (July 2003 – June 2004)<sup>2</sup>

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Tom Carroll, *Superintendent, Oyster River Cooperative School District*  
Kelly Clark, *Director, Educational Services, New Hampshire Public Television*  
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Barbara Hopkins, *Outreach Director, Leitzel Center*  
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Julie Williams, *Associate Vice President, Research & Outreach Scholarship*  
Frank Windsor, *Retired, New Hampshire Public Television*

<sup>1</sup> Information represents position at time of service on Committee.

<sup>2</sup> Information represents position at time of service on Council.



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“THE LEARNING OF SCIENCE BECOMES THE LEARNING OF  
LEADERSHIP.”

RITA R. COLWELL  
FORMER DIRECTOR  
NATIONAL SCIENCE FOUNDATION

FOR MORE INFORMATION, PLEASE VISIT  
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