Clinical Laboratory Sciences Curriculum Redevelopment: An Application of Change Theories

LILLIAN MUNDT, JANET VANIK

The Department of Clinical Laboratory Sciences at Rosalind Franklin University of Medicine and Science (RFUMS) experienced a steady decline in the number of applicants for the Clinical Laboratory Sciences (CLS) Program, even though the department regularly received inquiries from qualified students. The faculty recognized the undergraduate-degreed prospects' desires for both an advanced degree and the procurement of entry-level clinical laboratory knowledge and skills. To address this perceived need, the CLS department developed and implemented a new degree option, the entry-level master's. The new curriculum resulted from a transformational process incorporated into the normal developmental process of curriculum change. This article explores various change theories that were manifested during this transformation process, along with barriers to change and how to overcome them. In addition, the authors demonstrate the need for creation of this entry-level program and provide a curriculum outline.

ABBREVIATIONS: CLS = clinical laboratory science; CLT = clinical laboratory technician; RFUMS = Rosalind Franklin University of Medicine and Science (RFUMS).

INDEX TERMS: change theories; clinical laboratory science; curriculum development.

Clin Lab Sci 2007;20(2):72

***Lillian Mundt MHS CLS(NCA)SpH MT(ASCP)SH** is **associate professor, acting department chair, and program director**, Clinical Laboratory Sciences Program, Rosalind Franklin University of Medicine and Science, North Chicago IL.*

The peer-reviewed Clinical Practice Section seeks to publish case studies, reports, and articles that are immediately useful, are of a practical nature, or contain information that could lead to improvement in the quality of the clinical laboratory's contribution to patient care, including brief reviews of books, computer programs, audiovisual materials, or other materials of interest to readers. Direct all inquiries to Bernadette Rodak MS CLS(NCA), Clin Lab Sci Clinical Practice Editor, Clinical Laboratory Science Program, Indiana University, Clarian Pathology Laboratory, 350 West 11th Street, 6002F, Indianapolis IN 46202. brodak@iupui.edu

***Janet Vanik MS MT(ASCP)** is **associate professor**, Clinical Laboratory Sciences Program, Rosalind Franklin University of Medicine and Science, North Chicago IL.*

***Address for correspondence:** Lillian Mundt MHS CLS(NCA)SpH MT(ASCP)SH, associate professor, acting department chair, and program director, Clinical Laboratory Sciences Program, Rosalind Franklin University of Medicine and Science, 3333 Green Bay Road, North Chicago IL 60064. (847) 578-3303, (847) 578-8651 (fax). lillian.mundt@rosalindfranklin.edu.*

BACKGROUND

The Clinical Laboratory Sciences (CLS) Department at Rosalind Franklin University of Medicine and Science (RFUMS) historically provided entry-level training at only the undergraduate level for students desiring a career in laboratory medicine. Located in North Chicago, IL, the traditional target market for this undergraduate program consisted of students from local associate degree clinical laboratory technician (CLT) programs and other science students attending junior or four-year colleges who transfer to RFUMS. RFUMS only provides upper-division courses in clinical laboratory science as well as graduate and medical degree programs. The department of CLS also offers an advanced degree (MS in CLS) for students already possessing CLS/MT certification.

Closure of CLT/MLT programs at junior colleges has lead to a decline in the availability of CLT applicants. NAACLS saw an eight percent drop in CLS/MLT program accreditations from 1992 to 1996.[1] Figure 1 demonstrates the trend in these program closures bringing the current number of accredited CLT/MLT programs down to that seen in 1980. Three of the four CLT programs within close proximity to RFUMS closed. Recruitment efforts at these schools decreased as the number of faculty was cut and budgets reduced due to low enrollment. Remaining faculty attempted to recruit students with associate degrees in other sciences, but with little positive results.

In addition, counselors at four-year colleges desire to keep students enrolled in their degree programs and may not

be encouraging students to transfer to RFUMS for their junior and senior years. Prospective students graduating from four-year colleges with a biology or chemistry degree who want to obtain entry-level job skills in laboratory medicine usually have no other avenue but to pursue a second bachelor's degree. Most of these applicants express that they wish to obtain the entry-level skills contained in RFUMS's undergraduate curriculum but desire a higher degree. In the past, these students went elsewhere to meet their needs.

Figure 1. CLT/MLT program information supplied by NAACLS (personal communications April 13, 2006)

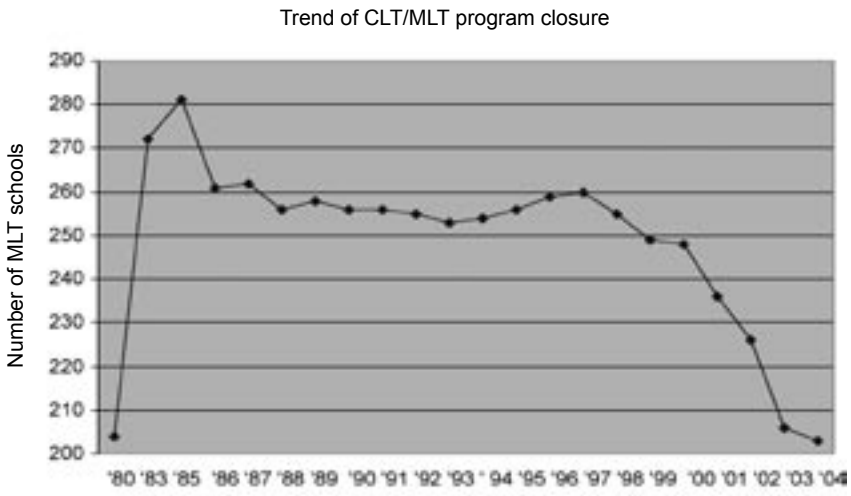
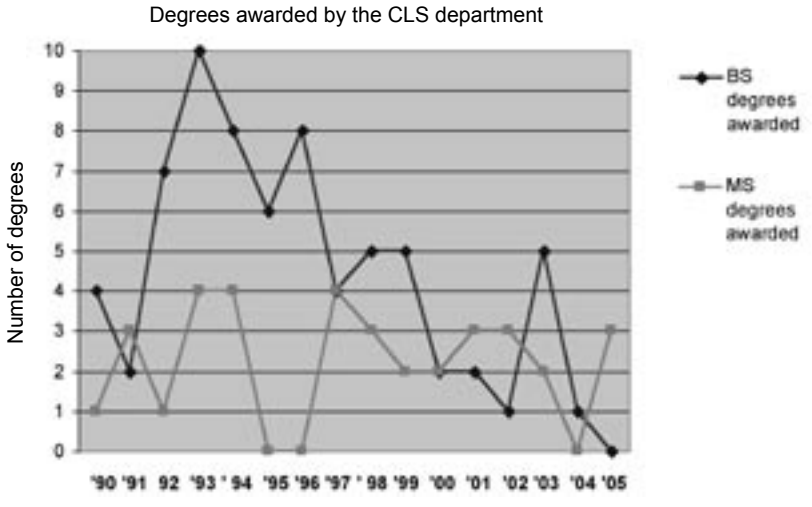


Figure 2. Number of BS and MS degrees awarded from 1990 through 2005



Typically, very few medical technologists continue their education by obtaining advanced degrees. The bachelor's degree remains the entry-level degree into the MT/CLS profession and even for promotion into laboratory leadership positions. Though some institutions suggest that supervisory-level laboratory personnel obtain a master's degree, few require it. Laboratory and hospital administrations claim that the demand for master's trained personnel is not yet a reality.[2,3] However, applicants already possessing a bachelor's degree in science ignore the fact that job entry into the CLS profession requires them to either complete a certificate program or an additional bachelor's degree program in CLS. Prior to 2005, approximately five applicants per year declined acceptance into the CLS program (Registrar's office, personal communication, April 17, 2006). Most of these declining applicants stated that they were seeking a master's degree, even though they still wanted entry-level skills. These applicants did not qualify for the advanced master's degree in CLS, because the advanced master's degree was designed for baccalaureate-level, certified CLSs and MTs; entry-level skills are not in the scope of the advanced degree.

COMPELLING PROBLEM

In 2005, the CLS department awarded no bachelor's degrees and the typically low number of advanced master's degrees. Figure 2 displays the trend of declining BS degree graduates along with the consistent low numbers of MS degree graduates from 1990 to 2005. Considering current economic forces, it is difficult to justify continuation of a program that cannot sustain enrollment. Change was imminent in order to guarantee the department's survival.

Institutions of higher education have unique characteristics that require the use of more than one model or theory for change.[4] Past models most descriptive of the CLS department's change history include developmental and transitional change. These models are used to make improvements or fix problems in an organization. More recently transformational change has been employed, which is necessary in survival situations. Table 1 presents an overview of the theories of each of these change models.

The CLS department, as any in higher education, changed slowly by adding new courses to the curriculum and updating existing courses. This process of continually adding to an existing framework is called accretion and results in greater complexity and differentiation (fragmentation).[4] Differentiation and accretion helped to maintain homeostasis as the department adjusted to environmental forces introduced to the profession such as new technologies, test procedures, and new information on existing and emerging diseases. This developmental/evolutionary model suited the CLS department in its time of slow progressive growth.

Transitional or teleological change involves change that is designed to meet specific criteria and focuses on systems, structure, and processes.[5] None of the teleological changes made at the university level—mission, vision, or strategic plan—prepared the CLS department for the impending doom of its current state. A more drastic approach, the revolutionary state of the dialectical model, initiated the needed transformational change.

Dialectical models imply the presence of a bipolarity of opposing states. These states are either evolutionary (slow processes occurring over time) or revolutionary (short periods of extreme change).[5] The recent enrollment crisis coupled with external forces dictated a need for revolutionary change. Typical in revolutionary models, involvement in the change process did not include all entities of the university.[4] Neither the dean of the College of Health Professions nor the non-CLS acting chair of the CLS department initiated or were involved in the change. Rather, fear for their own survival stimulated the CLS faculty to initiate the change as well as use substitutional leadership.[6] *The leadership substitutional theory contends that a "subordinate's ability, experience, and knowledge reduce the impact of instrumental leadership".*[7] Without including the department chair in the design and implementation of change (although keeping the chair informed), the CLS faculty assumed responsibility for the dialectical model's revolutionary state for this needed transformational change.

Transformational change is essential in change-or-die scenarios. The outcome of transformational change "is not

Table 1. Overview of change models

Developmental/ Evolutionary	Used to make small improvements over time, focused on content (knowledge, skills) using skill development and training.[5]
Transitional	Used to remedy problems, focused on redesign of strategies, structures, and systems using controlled processes and timelines.[5]
Transformational	Used in survival or thrival scenarios (change or die), focused on complete renewal of culture and mindsets, using an emergent process.[5]
Dialectical	Explores the bipolar relationship inherent in long periods of evolutionary change interspersed with short periods of revolutionary change.[5]
CLIMB	Create a compelling future, Let the customer drive the organization, Involve every mind, Manage work horizontally, Build personal credibility.[11]
Multiple model approach	Change leaders examine a problem from all perspectives before taking action and employ a combination of change models.[4]

initially known…[and] is created through trial and error".[5] This outcome criterion describes the experimentation occurring with a new faculty-designed CLS curriculum. However, the focus of changes in the CLS scenario included not only the creation of new curriculum but also redesigning existing curriculum. This redesign aspect to change is transitional rather than transformational. In addition, components of both curricula follow design criteria prescribed by the CLS profession's accrediting body—another transitional characteristic. Furthermore, developmental change proceeds concurrent with these transitional and transformational models, as faculty acquire knowledge for the new courses offered, and new skills for the advancing technology at the university. The intertwining of all three change models, developmental, transitional, and transformational, exemplifies the concept of multiple models.

Using multiple models allows the change agent to incorporate the most appropriate principles of several approaches.[4] The multiple model approach requires that leaders broaden their perspectives of a problem before taking action. Delay of action on the part of leadership provides the time necessary for the manifestation of self-correcting mechanisms prevalent in evolutionary models of change. However, a revolutionary dialectical state acted as the force by which the CLS faculty initiated developmental, transitional, and transformational changes.

IMPLEMENTING CHANGE

Responsibility for change lies with the people who have the vision for change.[8] This implies that the change agent may not always be recognized as an organizational leader. Other members of the organization often take the lead during times of change. In the CLS case, substitutional leaders arose from within the ranks of the faculty.

Several steps in the process are needed for successful change implementation. Implementation of effective change, multiple models or otherwise, involves careful investigation into the most appropriate processes for the type of model selected as well as for the organizational culture. The steps common to many change processes include planning, implementation, and review.[4, 9, 10]

The CLIMB model for leading change uses five leadership strategies: "Creating a compelling future, Let the customer drive the organization, Involve every mind, Manage work horizontally, and Build personal credibility".[11] The CLIMB model characteristic of creating a compelling future suggests that change agents present the intended change in such a way as to compel people to want to change. A compelling future requires a vision that is clearly communicated,[12, 13] shared throughout the organization,[14, 15,16, 17, 18] understandable,[19] and realistic and adaptable,[20] yet "stretches the organization beyond its current limits and capabilities".[21] Several authors concur with this view and emphasize that a lack of vision causes the demise of many failed change efforts.[10, 22, 23]

The urgent condition of the CLS department presented a compelling need. The creation of a new compelling future direction for the department needed to come from many sources. Changing the CLS curriculum first required a change in the way CLS educators viewed the educational system.[24] The vision seen by the CLS faculty included offering an educational program that responds to the changes in the healthcare system, counteracts the high vacancy rate in major specialized laboratory areas, and provides a fast-track opportunity for individuals to become credentialed healthcare professionals.

With a compelling vision in hand, the next step for the CLS faculty required obtaining support. Acquiring support involves increasing everyone's understanding of the proposed changes.[24] Open communications with all internal and external stakeholders—involving every mind[11]—will assure that there is buy-in regarding the need for change and an avenue for idea sharing and feedback. The process for soliciting input from all stakeholders involved private conversations with members of the clinical laboratory community and open forum clinical affiliate meetings. These meeting generated a sense of ownership in the change process for all involved. In addition, open communications builds personal credibility [11] and helps to reduce the unexpected surprises that occur when changes are implemented.

A major impetus for the change is the market demand for a new product. The CLIMB concept of let the customer drive the organization[11] suggests that the changes an organization makes should be driven by the needs of the customer or target market. The target market for the CLS department was the prospective student population that the faculty had failed to attract and secure. Although the current laboratory environment is not crying out for master's-trained individuals,[1] the prospective students' perceived needs became the driving force for the change.

Change begins with a change agent. Since the faculty of the CLS department created the vision for change, they share

the role of change agent. Co-ownership of the vision and task of implementation is an example of managing the work horizontally,[11] which assumes an equality of commitment. The CLS faculty engaged in a ballet of complimentary skills and same-mindedness in carrying out the change process. The result of this process was the entry-level master's in Clinical Laboratory Sciences. Students choosing this curriculum complete their degrees through the one-year, fast-track or a two-year, full-time route. In addition to taking the traditional CLS/MT certification examinations, graduates of this program may be eligible to take the Molecular Biology Categorical examination. Table 2 outlines the sample curriculum for this entry-level degree.

The entry-level master's differs from the advanced master's because the focus of the prior is on development of entry-level skills and includes clinical rotations. The advanced master's program (traditional degree) is designed for the certified CLS with a bachelor's seeking a higher degree with emphasis on research, education and management. The courses for the advanced degree are delivered online; and while some of these courses are included in the entry-level curriculum, many advanced topics are not. This traditional advanced master's program curriculum is displayed in Table 3. No entry-level courses are included in this curriculum, because students enrolling in the advanced master's program are usually practicing CLS/MTs.

In addition, the entry-level master's differs from the bachelor's program with the inclusion of advanced courses in interprofessional healthcare teams, management, and molecular biology as well as the expansion of clinical rotations into the areas of management and molecular biology. The introduction of the entry-level master's degree in CLS provided for the needs of our target market as well as maintaining the viability of the department. Figure 3 illustrates the resultant increase in the number of graduates from the Department of CLS at RFUMS. In addition, this figure illustrates the projected number of graduates for the next two years, which are based on current enrollment numbers and the number of applicants and inquiries for future enrollment.

BARRIERS TO CHANGE/NEGATIVE INFLUENCES

In spite of the CLS faculty's enthusiasm and capabilities for initiating change, barriers delayed the implementation process. Change influences work behavior by threatening employees' sense of purpose, identity, and mastery. "If change is aligned with a person's sense of purpose, they will engage in a positive fashion", otherwise they will resist.[19] The threat of loss of meaning and purpose is an effective change barrier.[25]

Table 2. Sample entry-level master's in CLS curriculum (accelerated option)

Fall		Winter	
Advanced medical terminology	2 qh	Clinical biochemistry II	4 qh
Body fluid analysis	2 qh	Hematology II	4 qh
Clinical biochemistry I	4 qh	Microbiology II	4 qh
Hematology I	5 qh	Intro. to molecular biology	2 qh
Immunology	4 qh	Practical statistics	3 qh
Microbiology I	4 qh	Teaching strategies	3 qh
Interprofessional healthcare teams	1 qh	CLS practicum I	2 qh
Total	22 qh	Total	22 qh
Spring		**Summer**	
Immunohematology	4 qh	Evaluating professional competence	3 qh
Molecular biology	4 qh	CLS practicum III	6 qh
Intermediate molecular practicum	3 qh	Advanced molecular practicum	4 qh
Research theories	3 qh	Management practicum	2 qh
Leadership skills	3 qh		
CLS practicum II	6 qh		
Total	23 qh	Total	15 qh

Identity correlates with personal consistency. "This demand for personal consistency is one of the major forces working against the implementation and stabilization of organization change".[19] "Loss of clarity and stability [along with] confusion and chaos" and feelings of disempowerment also create barriers to change.[25] Change often makes people feel incompetent. The perception of incompetence together with anxiety and uncertainty establish change barriers in the human resource frame.[25] Furthermore, a threat to a person's mastery—a real or perceived gap in required skills during and after the change process—poses a threat to employees' survival.[19]

OVERCOMING CHANGE BARRIERS

The CLS faculty recognized these barriers in themselves as well as in administration. Examining the purpose, identity, and mastery of employees prior to implementing change provides leaders with an insight into any potential negative influences. Planning strategies to overcome these influences includes workforce "purpose mapping", "develop[ing] a very compelling reason for change", and analysis of skill gaps coupled with creation of learning opportunities.[19] This process revealed a need to increase staffing. However, budgetary constraints in light of the decreased enrollment prohibited the justification of additional faculty. An alternative approach was for current faculty to obtain additional training. The concept of stretching a faculty's knowledge base often meets with resistance due to the threat of self-imposed imitations and barriers to change.

Overcoming self-imposed barriers requires a change in mind-set and acquisition of new skills. The desperate state of the CLS department allowed for greater acceptance by the faculty for the need to change and stretch beyond current levels of expertise. The CLS faculty participated in courses at other institutions to gain the knowledge and skills they needed in order to offer advanced courses at the master's level and to become familiar with the organizational change process.

Once these internal barriers are overcome, the next step is facing external barriers. Overcoming external barriers often requires the garnering of support from stakeholders. The support of external stakeholders, such as the clinical affiliates and prospective students, provides additional justification for the changes introduced to curriculum committees.

SUPPORT FOR CHANGE-POSITIVE INFLUENCES

Market demands for change bring with them support. However, conflicting opinions exist. Laboratory administrators do not support the need for master's degree clinical laboratory scientists.[2, 3] Nevertheless, prospective student requests for an entry-level master's degree in CLS helped to garner support for the development of such a

Table 3. Advanced master's in CLS curriculum (a minimum of 40 qh. is required)

General core	Critical skills in cyberspace	3 qh
	Professional communications	3 qh
	Practical statistics	3 qh
Research core	Research theories	3 qh
	Professionalism in research	3 qh
	Thesis	10 qh
Leadership electives	Leadership skills	3 qh
	Evaluating professional competence	3 qh
	Healthcare informatics	3 qh
(students select at least	Marketing healthcare	3 qh
one leadership elective)	Healthcare law	3 qh
	Risk and quality management in healthcare	3 qh
	Financial management in healthcare	3 qh
Education electives	Teaching strategies	3 qh
	Creating self-instructional units	3 qh
(students select at least	Designing simulations	3 qh
one education elective)	Clinical teaching practicum	3 qh
Other electives	Clinical pathology correlation	3 qh
	Laboratory safety	3 qh
	Fundamentals of epidemiology	3 qh

program. In addition, the program's clinical affiliates expressed interest in students who would be pursuing additional coursework in management and molecular biology. Another positive influence toward change was the CLS faculty. Their collective expertise and survival instincts served as the vehicle by which the change process occured. Therefore, change progressed because of the faculty's willingness to change and by addressing the needs of prospective students—*letting the customer drive the organization*.[11]

CONCLUSION

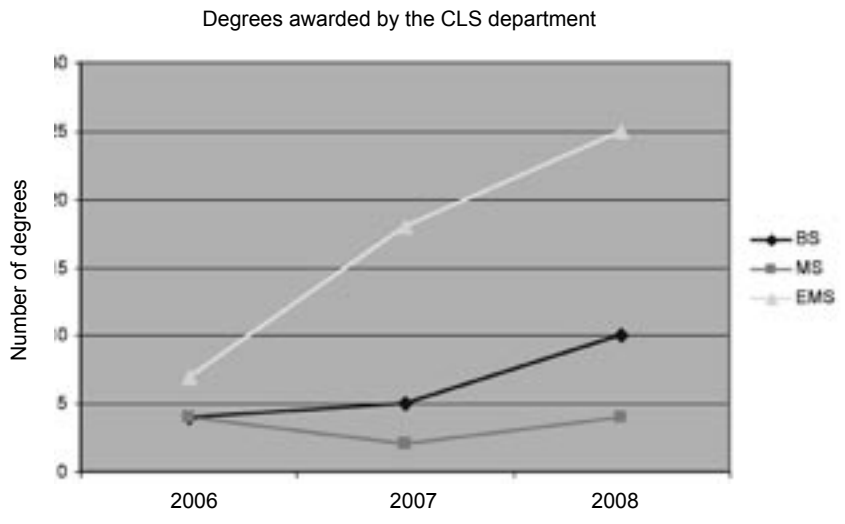
A change leader's early recognition of the forces driving the need for change is vital to the survival of a department or organization. Appropriate selection of a compatible change model is often crucial to the success of affecting the change. Though something of a paradigm shift, the process currently producing a new curriculum in the CLS department appears to be a blend of developmental, transitional, and transformational change models. Involving all stakeholders in the process creates ownership and buy-in for those who support it. In addition, this type of involvement reduces the surprise factor for both supporters and non-supporters.

Clear consistent communications subverts fears and helps to minimize resistance. Identifying the potential for resistance and taking precautionary steps to overcome negative influences provides the change leader with more amenable change partners. Together, the CLS faculty recognized external and internal change forces and continue to apply appropriate change models to transform the department.

REFERENCES

1. Johnson NC. Multisite case study of CLT/MLT-AD program closures. NAACLS News. 1996;65:9-10.
2. Beck SJ, Doig K. An entry-level MS degree in clinical laboratory science is it time? Clin Lab Sci 2002;15(3):167-76.
3. Kotlarz VR. CLS education at a new crossroad. Clin Lab Sci 2000;13(2):66.
4. Kezar A. Understanding and facilitating organizational change in the 21st century. San Francisco: Jossey-Bass; 2001.
5. Anderson D, Anderson LA. Beyond change management. San Francisco: Jossey-Bass; 2001.
6. Podsakoff P, MacKenzie S. Kerr and Jermier's substitutes for leadership model: background, empirical assessment, and suggestions for future research. Leadership Quart 1997;8(2):117-32.Available from University of Phoenix EBSCO database. Accessed 2004 Feb 24.
7. Yagil D. Substitution of a leader's power bases by contextual variables. International Journal of Organization Theory and Behavior 2002;5(3&4):383-99. Available from University of Phoenix ProQuest database. Accessed 2004 Apr 12.
8. Henry PK. Overcoming resistance to organizational change. JADA 1997;97(10): S145. Available from University of Phoenix InfoTrac database. Accessed 2005 Jul 13.
9. Mylen J. Strategic safari. Leadership 2002;31(3):16-20. Available from University of Phoenix EBSCOhost database. Accessed 2005 Jun 6.
10. Powell Jr. WR. Organizational change models. Futuric 2002;26(3/4):20-45. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
11. Bergmann H, Hurson K, Russ-Eft D.Introducing a grass-roots model of leadership.SL 1999;27(6):15-20.
12. Birrell JR, Ostlund MR, Egan MW, Young JR, Cook PF, DeWitt PF, Tibbitts CB. Collaboration, communities, and covey: a model for personal and professional change. Clearing House 1998;71(6):359-362. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
13. Horne III JF. The coming age of organizational resilience. Bus Forum 1997;22(2-3):24-8. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
14. Craig CM. Higher education culture and organizational change in the 21st century. The Community College Enterprise. 2004;10(1):79-89. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
15. Gill R. Change management - or change leadership? RJCM 2003;3(4):307-18. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
16. Hughes-Hassell S. Implementing change. Knowledge Quest 2001;29(3):11-5. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.

Figure 3. Number of graduates in 2006 and two-year projections



17. Hutchison, S. Communicating in times of change. SCM 2001;5(2):28. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
18. Zimmerman J. Leading organizational change is like climbing a mountain. The Educational Forum 2004;68(3):234-42. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
19. Moran JW, Brightman BK. Leading organizational change. Career Dev Int 2001;6(2/3):111. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
20. Bruhn JG. Leaders who create change and those who manage it: how leaders limit success. HCM 2004;23(2):132. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
21. Chapman JA. A framework for transformational change in organizations LODJ 2002;23(1/2):16-25. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
22. Kotter JP. Leading change: why transformation efforts fail. Harvard Bus Rev 1995;73(2):59-67. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
23. Schwahn C, Spady W. Why change doesn't happen and how to make sure it does. Educ Leadership 1998;55(7):45-47. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
24. Anderson BL. The stages of systemic change. Educ Leadership 1993;5(1):14-17. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.
25. Bolman LG, Deal TE. Four steps to keeping change efforts heading in the right direction. Journal of Quality & Participation 1999;22(3):6-11. Available from University of Phoenix ProQuest database. Accessed 2005 Jun 6.