Learner-Centered Education Program

Arizona Board of Regents

Attachment A

INSTITUTIONAL SUPPORT FORM

Proposal Title: The Learning Strategies Toolbox: Supporting students' career identity development

Institution: Arizona State University Main Dept/Unit: Division of Psychology in Education

Multi-Campus/University Projects (check other campuses or universities participating)

__**X**_ **ASU Main** ___ UA

__**X**_ **ASU East** ___ UA

____ ASU West ___ NAU

List other participating agencies:

Mesa Airlines

Briefly describe the program and the development plan.

Nation wide both teachers and pilots are in short supply. A motivated, student centered learning environment will support both recruiting and retaining students. The primary goal of the Learning Strategies Toolbox is to assist faculty in creating a motivated, learner centered classroom environment. The Learning Strategies Toolbox will do this by 1) To better understand the individual learning needs and strengths of students in Aeronautics and Education, 2) to use that understanding to develop targeted learning and motivational strategy instruction tailored to the needs of students in each program, 3) to assist faculty in both Colleges in providing strategy and motivational instruction as part of content coursework.

Funding Category

Indicate a primary (P) and, if applicable, secondary (S) funding category:

Professional Development _____

Program or Course Development/Modification __**S**__

LCE Research __**P**___

Improved Assessment of Learning Outcomes _____

Authorizations

Project Director

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Official Authorized to Enter into Contractual Obligations

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Learner-Centered Education Program
Arizona Board of Regents
Attachment A
INSTITUTIONAL SUPPORT FORM

Proposal Title: The Learning Strategies Toolbox: Supporting students' career identity development

Institution: Arizona State University East Dept/Unit: Aeronautical Management Technology

Multi-Campus/University Projects
(check other campuses or universities participating)
__X__ ASU Main ___ UA
__X__ ASU East ___ UA South
____ ASU West ___ NAU

List other participating agencies:
Mesa Airlines

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Authorizations
Project Director

Signature: _____
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Official Authorized to Enter into Contractual Obligations

Signature _____

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The Learning Strategies Toolbox: Supporting Students Career Identity Development
Jenefer Husman and Mary Niemczyk

Abstract

The intellectual and economic growth of Arizona is currently stalled by a shortage of qualified people in several key areas. College students are often hindered by the inability of postsecondary curricula and teachers to accommodate their diverse goals, skills, and background. In this proposal, we will describe a way to take on both of these challenges: by helping faculty provide more flexible, personally relevant, and intrinsically motivating experiences for students in two areas affected by shortages: aviation (commercial pilots) and education (science and math teachers). At first glance, these two might appear quite dissimilar, but they share a number of features. Both have clearly-established and relatively rigid career paths, which can cause student frustration; both can overwhelm students with the challenge of blending technical and scientific knowledge, social skills, and procedural expertise in fast-paced, high-pressure situations; and, both can create romantic and somewhat inaccurate images of the future. When students face the personal sacrifice, stress, and intensive life-long training required, they are unlikely to succeed unless they navigate this difficult period to find a new, realistic but optimistic, positive future self.

An extensive body of research shows that students are most successful when (a) they recognize the utility of their present activities with respect to achieving their desired future selves, and (b) they have specific strategies for academic and emotional self-regulation that help them persist in striving toward that future. In general, post-secondary curriculum focuses on content delivery, and does not include this type of instruction. In addition, it is often difficult for instructors to provide individualized experiences that resonate to each students' particular goals, background, and current situation. There is room for improvement in both helping students envision the future, and in helping them reach it.

Working with ASU East Campus's Aeronautical Management Technology Program, pilots at Mesa Airlines, ASU Main Campus's College of Education, and expert teachers from the BEST program, we will (1) assess students' goals, skills, and images of their future selves, (2) use this knowledge to develop tools for faculty to help students create motivating images and strategies to achieve them, (3) help faculty implement these tools, and (4) assess student outcomes. We believe the results will serve as a model for other domains, as well as providing students with greater academic and job satisfaction, and Arizona with a larger, stronger workforce in these two vital areas.

Needs

Some college students begin their university experience knowing exactly what they want to do with their lives; others see post-secondary education as a chance to explore. Whether their goal is to become a teacher or pilot, or just to figure out where they are going in life, students who can make a clear connections between their current academic activities and their future engage in school activities more enthusiastically, are more efficient in completing schoolwork and are more likely to stay the course when those activities are difficult (Turner & Schallert, 1999; Miller & Brickman, 2004). Educational research has shown that when post-secondary students are faced with difficult academic tasks, understanding how and why they need the information presented to them are more willing to put in the effort and improve how they learn. If students lack this knowledge, they may try at first, but eventually give up because their efforts produce little result (Turner & Schallert, 1999). As teachers, we must not only help students make connections between their current studies and their future goals, but also provide them with the strategies necessary to achieve their dreams.

In short, research shows that if we can use students' current academic experiences to help them build a clearer vision of the future, and a clear, navigable path to that future, they are significantly more likely to reach their goals, and with a higher level of skill and efficiency. Learning strategies instruction and the development of a realistic future are synergistic learning activities. If students are only learning the information so that they can pass a test at the end of the week they are likely to use cheap and easy memorization strategies, which virtually guarantee that they will forget that information after the exam. If students want to learn the information because they believe it will be valuable in their future careers, they are much more willing to use learning strategies which may be harder in the short run, but more rewarding in the end. If students know where they want to go, they will put in the time and effort needed to do it right. By helping them, we can lower attrition rates, improve academic outcomes, and create a stronger workforce.

These needs are no more apparent for Arizona than in aviation and education. The growth of Arizona and the Valley requires safe, efficient transportation for both people and goods; moreover, the success of locally based airlines, such as Mesa Airlines, directly benefits the Arizona economy. At this time, Arizona universities cannot provide enough pilots to fill the needs of the state, and companies are forced to hire from outside of Arizona (FAA, 2002). Our community health and growth also requires a strong teacher workforce, and here, too, we face shortages. Programs for

"emergency" or rapid certification do not provide the same quality of training, and do not serve children as well as full-scale certification (Vandevoort, Amrein-Beardsley, & Berliner, 2004). Especially in the sciences, highly qualified, innovative teachers are vital to sustain economic growth in Arizona, yet there are currently not enough certified science teachers.

The careers of "pilot" and "teacher" may seem quite different, but they share many important qualities. For both, career paths are well established, leading to a specific career rather than providing skills in a loosely defined area. Students who choose either of these paths tend to indicate a strong passion for their field - pilots refer to aviation as an "addiction" or something they cannot get enough of and many successful teachers describe education as a "calling." But the real satisfaction and difficulties of these professions are often unknown to students who dream of a romantic, noble, career. This can create unexpected stumbling blocks for students, who suddenly realize their dreamed-of future may be harder to attain than they thought. Both fields are extremely demanding, requiring great personal sacrifice - scaling those obstacles is difficult but worthwhile, and may even make success more sweet. Finally, both teaching and flying place tremendous responsibility on practitioners - literally, teachers and pilots have people's lives in their hands everyday.

Although the career of a pilot and a teacher look quite different on the surface, from a cognitive and motivational standpoint, they are actually quite similar, and we therefore predict that programs can be designed that will help students in both of these fields achieve their goals. Furthermore, programs that support these students should transfer to other disciplines that have similar features; thus, by creating one core learner-centered program that is built clearly and solidly on decades of educational research, we believe we can help students attain professional status in many disciplines.

Aviation Needs

Students entering collegiate aviation programs with the dream of becoming an airline pilot face unique educational challenges. Learning to operate sophisticated modern aircraft equipped with advanced technologies in the flight environment places intense academic requirements on students; the thrill of flight doesn't necessarily carry students through difficult scientific and technical content. Traditional aviation curricula are comprised of both classroom and flight components. Initially, students are introduced to tremendous amounts of information in the classroom. Before students can perform effectively in the flight environment, it is imperative that they have a thorough understanding of the various aspects of flight. In general, the classroom component is designed to provide students with the principles underlying the application of technical knowledge as well as information regarding meteorology, physics, operations within the national airspace, and governmental regulations. Because of the depth and complexity of the subject matter, students need to use learning strategies that will enable them to become cognitively engaged. They need to invest effort to make connections, elaborate, translate, organize and reorganize in order to think and process deeply. For many, the subject matter covered is unfamiliar, and unlike any topics they may have encountered during their high-school years. The classroom component, however, plays a critical role in providing the student with a strong foundation of knowledge. To be effective, aviation academic programs must ensure that the educational process involves an in-depth, effective transfer of knowledge across a broad spectrum of aviation subjects (Karp, Turney, Green, Sitler, Bishop, & Niemczyk, 2002).

We believe that the intellectual challenge of these courses will be better met and conquered by students if they can clearly see the value of these courses to their vision of themselves as a successful pilot. In addition, we predict that they may actually perform better as pilots because they will have a stronger grasp of these concepts.

Education Needs

For prospective science teachers, the situation is reversed - the challenge is often not so much the scientific content, but the skill component. Students are frequently drawn to science teaching because they enjoy the content, and want to share it with others. Many of them were good students, who have found learning to be an enjoyable experience. Shortly, they will find themselves faced with students who are not as enthusiastic about learning the material, undergo stress from controversies over teaching specific content, such as genomics and evolution (Griffith & Brem, 2004), and manage the challenges of understanding and navigating local, state, and federal policy. They may also begin to question why they have taken such a low paying, high-stress job (Schutz, Chowder, & White, 2001). Many teachers experience rapid, early burnout (Schonfeld, 1990a, 1990b; Schonfeld & Ruan, 1991; Ridley, Reese, Hackett, & Griffith, 2001). It is therefore imperative to determine strategies that will assist student motivation, engagement, and learning. In particular, providing pre-service teachers with a more accurate picture of their future as a teacher should motivate them to acquire skills that will help them teach to a diverse student population, negotiate with parents and administrators, take

policy into consideration as they prepare lessons, and cope with everyday stress. However, it is vital that we not only help them foresee these challenges, but help them create a clear, workable plan for overcoming these hardships without losing the joy and rewards that initially led them to teaching.

We propose to support education and aviation faculty in helping students create vivid and attainable future selves by creating a "toolbox" of strategies and activities that faculty can incorporate into their classes and other encounters with students. We will create these tools based on both assessments of student needs and with input from faculty, train faculty in the use of them, and evaluate their effects as students move through their academic programs and transition into the workforce. We expect to show - over the full course of this initiative - lower attrition rates, improved academic performance, and greater job success and satisfaction among graduates.

This project has four phases. Phase 1 will be partially complete by the time this grant begins. The requested funds will cover the remainder of Phase 1, and Phases 2, 3 and 4 in their entirety. Once the program is in place, we will seek additional sources of funding to support its growth and continue the assessment over a multi-year period.

Phase I	Assess the individual learning needs of students in Aeronautical Management Technology and Education.	Spring, 2005 Fall, 2005
Phase II	Develop specific learning and motivational strategy instruction tailored to those students in each program.	Summer, 2005 Fall, 2005
Phase III	Assist faculty in both Colleges to implement a strategy and motivational meta-curriculum.	Spring, 2006
Phase IV	Assess initial effects on student outcomes.	Summer, 2006

Phase I: Assess the individual learning needs of students

Currently, baseline data is being collected to determine the learning strategies and motivations the freshman students enrolled in the Aeronautical Management Technology department are using in their studies. During the Spring 2005 semester, Junior and Senior students, as well as experienced pilots, will be surveyed to determine the learning strategies and motivational orientation profiles of successful students and professionals. Students in the College of Education will be surveyed during the fall semester of 2005.

Three tools are being used to assess this: Learning and Study Strategies Inventory (LASSI), Motivated Strategies for Learning Questionnaire (MSLQ), and the Perceptions of Instrumentality Scale. The LASSI is a commercially available diagnostic measure of learning strategies and skills. It is currently in its second edition (released in 2002). This scale provides information on ten separate aspects of students learning strategies and skills. The LASSI provides standardized scores (percentile score equivalents) and national norms for ten different scales (Weinstein & Palmer, 2002).

The MSLQ is a self-report instrument designed to assess college students' motivational orientations (Pintrich, Smith, Garcia, & McKeachie, 1991). The motivation section of the MSLQ consists of six sub-scales with items designed to assess students' goals and value beliefs for a course, their beliefs about their skills to succeed in a course, and their anxiety about tests in a course.

The Perceptions of Instrumentality Scale has been frequently used to assess undergraduates' perceptions concerning the importance of college course work for their future goals (e.g., Husman, Derryberry, Crowson, & Lomax, 2004; Tuner & Shallert, 1999). This scale will allow us to make comparisons between students to determine the impact of the students' perceptions of instrumentality on their persistence and academic performance.

Phase II: Develop specific learning and motivational strategy instruction

With the initial assessment and literature review complete, we will begin the construction of the "toolbox." Research with college students has consistently shown that students' learning strategies and skills, motivation, and their belief that college is important for achieving their future goals, contribute to their success and retention (Peverly, Brobst, Graham, & Shaw, 2003; Robbins, et. al., 2004). Because of this, educators need to assist students in understanding how to employ a wide range of learning strategies. Although both education and aviation faculty thoroughly prepare students for a specific career path, they often do not exploit the motivational opportunities this situation can provide. Many instructors and faculty were themselves good students who learned easily. Consciously, or unconsciously, they picked up essential learning strategies on their own, but they may be unable to assist students in diagnosing their strengths and weaknesses in learning and are unaware that they need to teach students to use necessary strategies.

Research has found that the best instructional method to use in teaching students about learning strategies is direct explanation by the instructor as they model the use of a learning strategy (Hadwin & Winne, 1996), followed by guided

practice with corrective feedback to insure that students have the opportunity to implement and refine their use of these strategies (Zimmerman & Schunk, 1998). Thus, instructors need to model a wide variety of strategies and describe their thinking as they use the strategies.

Many universities offer university-wide courses to help students to learn more about managing their own motivation and improving their learning strategies and skills. Two in particular have been shown to be effective, one at the University of Michigan (Hofer, Yu, & Pintrich, 1998) and another at the University of Texas at Austin. (Weinstein, Husman & Dierking, 1999). At UT-Austin, longitudinal research shows that students who take the course, despite lower SATs than the average incoming freshman, are more likely to graduate than the average UT-Austin freshman, and graduate with a higher overall GPA.

Even though these programs have been effective, learning strategies researchers have frequently noted that even greater success might be achieved if these lessons were embedded in content courses. Transfer tends to be most successful when explicit procedural training is combined with a variety of embedded domain-relevant examples (Catrambone & Holyoak, 1987; Cheng, Holyoak, Nisbett & Oliver, 1987). When learning strategies are taught along with traditional course content (as a *metacurriculum*), the learning strategies taught can be tailored to match the subject matter, and students' needs. Students do not have to work as hard to translate the lessons into practical gains (Stahl, Simpson, & Hayes, 1992).

Through assessment of the students individual learning strategies we will be able to determine the students' strengths and weaknesses. We will take the lessons learned about how to properly embed a strong metacurriculum in the Aeronautical Management Technology department and bring it to the College of Education. We will then be able to provide direct instruction and modeling of needed learning strategies, particularly for pre-service math and science education students. Through the emphasis and modeling of learning and motivational strategies, we will be able to support not only the learning of pre-service teachers, we will also support their understanding of how to teach learning and motivational strategies to their own students. In addition, we believe that, knowledge of learning strategies may also be beneficial to career success in teaching and aviation. These professions have heavy continuing education requirements; the need for life-long learning strategies is, therefore, essential.

Phase III: Assist faculty in both Colleges to implement strategy instruction

In the Fall of 2005, the implementation phase will begin with an extensive professional development workshop provided for the aviation faculty, offered with the assistance of the Center for Learning and Teaching Excellence (CLTE). At the start of the semester the faculty will be asked to provide their working syllabi for their spring classes. The implementations developed over the summer will then be refined, taking into account the specifics of the courses. The researchers and CLTE will develop the workshop around the findings from the initial data collection and strategies that these findings suggest will be most relevant to the curriculum. Throughout the Fall training, the researchers will work with the faculty to further refine the interventions for each course.

Phase IV: Assess initial effects on student outcomes (Performance Measures)

During the Spring 2006 semester, the researchers will provide support to faculty as they implement the metacurriculum in their aviation courses. To assess the effectiveness of the interventions, the LASSI, MSLQ, and Perception of Instrumentality scale will be administered at the beginning and end of the semester in those classes. A small number of classes will serve as control classes, in which the metacurriculum will not be used. These will be chosen for their similarity to the classes implementing the metacurriculum. Aviation faculty will also be asked to assess other changes that may have occurred due to inclusion of learning strategy instruction throughout this phase. Possible assessment areas to consider are increased student engagement, student motivation and performance in class activities, and student retention.

Overlapping with these activities, the researchers and the graduate research assistants will begin the process of collecting formative data using the LASSI, MSLQ, and Perceptions of Instrumentality scale in the area of education. In order to match the aviation sampling procedures, the incoming freshman who have declared Education as their major, will be surveyed. Juniors and Seniors in the College of Education, and in-service teachers, will be also be surveyed.

Researchers will analyze the data gathered during the spring semester in the aviation courses and construct a brief but prescriptive and supportive report for each participating instructor, to encourage the instructors to continue to enact the metacurriculum in their classes, and to continue to improve the implementation of this curriculum. Researchers will continue to scale up the program, using the lessons learned in the aviation program to better assist the faculty in the College of Education in the process of refining learning strategies, training in their use, and preparing for their

implementation. Sources of additional funding will be pursued to carry the program in education forward, and further integrate the programs in aviation and math-science education.

Dissemination

This research will deliver a toolbox of learning strategies that are most effective in promoting learning in aviation and education programs, provide faculty with extensive training in their use and support in their implementation. Innovative new courses in aviation and education will be created. Finally, this metacurriculum will enhance student learning, student engagement and motivation and student retention.

In September 2006, we will conduct a series of professional development workshops to ensure the sustainability of the program in both the aviation and education departments, and to discuss the findings and recommendations based on the spring evaluations. Aviation faculty will have an opportunity to share their experiences with education faculty, to help education faculty learn from this prior work, and to encourage further cooperation and integration in the future.

Finally, results of this initial study will also be disseminated through presentations at the annual University Aviation Association (UAA) and American Educational Research Association (AERA) conferences.

Key Personnel

Jenefer Husman is a faculty member in the Division of Psychology in Education, at Main Campus College of Education. Her research and publications have focused primarily on the ways that students' thoughts about their futures can impact their motivation for the present, and on the teaching of learning strategies. She has designed standalone learning strategies courses for the University of Alabama, and as an integrated part of remedial mathematics courses (research funded by the Pew Charitable Trust). Contact information: jenefer.husman@asu.edu.

Mary Niemczyk is a member of the Aeronautical Management Technology faculty. Her research experience has focused on both aviation and education. In aviation, her studies have focused mostly on training and human performance issues in automated aircraft. In education, her research has focused on student self-regulation and metacognition in computer-based learning environments. As an instructional designer, Mary developed a workshop for teachers interested in assisting their students in developing effective learning strategies. Contact information: mary.niemczyk@asu.edu.