PROJECT BASED LEARNING: Using the EMPACTS Interdisciplinary Model to Improve Learning in Community Colleges

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ABSTRACT

The EAST (Environmental and spatial technologies) pedagogical model was developed in a local school in Arkansas. The model was designed to engage at risk students in learning by allowing them to develop their own community-based projects. The emphasis of this model is on the development of skills, especially those involving the application of high end technologies and teamwork in a community-based problem. Faculty at NorthWest Arkansas Community College adapted this pedagogical model to the adult learner. College-level students use the EAST model of engagement with college curriculum as the focus. An andragogical model (EMPACTS, Educationally Managed Projects, Advancing Curriculum, Technology and Service) was developed and trialed across the curriculum. College courses like College Algebra, Physics and Human Affairs, Physics for Elementary Teachers (PET), Technical Writing, Probation and Parole, Introduction to Turfgrass Management, Introduction to Hospitality, Introduction to Education, Physical Geology, and Environmental Science engaged students in a semester-long community-based project. Preliminary attitude surveys suggest that non-traditional students at the community college level are frightened of technology and failing. Traditional students are more comfortable with the use of technology, but lack time management skills. A twelve – fifteen week logical process was developed to help guide students through the EMPACTS process. Over 200 student-led, content-based, community projects have been completed. A website of these student projects was developed to show progress of the program. Formal assessment of the efficacy of the program is still under development and the model will be formally assessed this coming year.

Keywords: curriculum, project based learning, student directed, community, technology, andragogical

1) EAST: Environmental and Spatial Technologies

EAST is a pedagogical model designed to engage students in student-directed, performance-based, active learning projects. The EAST process is designed to “develop capable people” through teamwork, application of technology and community partnerships. Students work collaboratively in teams to design and solve community-based projects, while learning and applying high-end technology (GIS, GPS, Graphic Design, Web Design, Animation, and CAD design). EAST classes are elective courses and students have an entire year to form teams, learn technology and work on projects.

The EAST learning model is rooted in Kilpatrick’s adaptation of “Bloom’s Taxonomy.” Students take content and apply the content in an intrinsic way, where the student initiates the discovery. According to EAST Initiative research, 70% or greater of the content learned in the process is retained, as opposed to only 25 – 30% retained using traditional methods that include rote memorization (http://www.EAST project.com).

After APA adaption of Anderson, L.W. & Krathwohl, D.R. (Eds.) 2001

Pillars of the EAST Process: The EAST process encourages personal and professional growth in students, as they assume ownership of their project objectives and outcomes. Interaction between students, as team members, teaches students important time management and interpersonal communication skills. Students gain self confidence and an increase in self esteem as they engage in collaborative problem solving and the use of technology.

- Personal Growth
- Team Building
- Community Partnerships
- Technology

The Role of Technology: after
(http://www.eastproject.com)
- Technology is used to promote collaboration, higher-order thinking, and problem solving
- Professional development is an important component of the education technology program
- Technology is effectively integrated into the curriculum
- Students are allowed to select appropriate technology tools to obtain, analyze, synthesize and assimilate information
- Effective use of technology allows the creation of new learning environments
- Home/school connections are enhanced through technology
- There is adequate access to technology for all students
- Teachers encourage students to utilize technology to find and make sense of information

Students in EAST are given the opportunity to receive free formal training in the use of technology, through the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas in Fayetteville, as well as from the EAST Initiative training center in Little Rock, AR.
EAST involvement in public schools ranges from Kindergarten through the 12th grade. Skills developed include the following and are not limited by grade level. The course instructor is referred to as a “facilitator.” The facilitator does not teach technology, but facilitates in the learning process and assists students in setting achievable goals and expectations.

Skills developed in the process:

- Problem solving
- Team Building
- Technology
- Communication
- Community Service

The EAST Initiative is part of the curriculum in over 200 schools across the US and is quickly becoming a leading model for student development (http://www.eastproject.com).

2) EMPACTS-Educationally managed projects, advancing curriculum, technology and service

The EMPACTS model is an adaptation of the traditional EAST model and includes a curricular focus. Adult learners take traditional college courses that have an EMPACTS component. Each EMPACTS class is a traditional core course with the addition of a final project. The EMPACTS project is included in the final assessment for a grade (25 – 30% of total grade).

The EMPACTS Model


Students have 12-15 weeks to network in their community, develop and complete projects, form teams, apply content in a meaningful and relevant way and learn technology. Teams of students are seen as learning communities where each student views themselves and others as essential to the success of the project. Course instructors allow students the freedom to formulate their ideas within the framework of the curriculum. Students are either given specific course objectives or are allowed to determine which content objectives are relevant to their specific project.

EMPACTS Project Core Objectives:

- Mastery of Course Content
- Reliance on Teamwork
- Involvement in a Community problem
- Use of Technology

The EMPACTS model has three basic components. The first component is the EMPACTS process, where students have an experience. The second component involves the generation of a product (project). Students use technology to communicate the results of the process experience. The third component is the application of course content (knowledge). All components are an essential part of the entire large scale, inquiry based, learner experience, but neither one stands alone in the assessment of learning.

The Role of the College Facilitator: A college-level facilitator is a faculty member, who also facilitates in the EMPACTS process, with the adult learner and other EMPACTS faculty. This person divides his or her time between teaching courses and facilitating in student projects across the curriculum. Every college course with an EMPACTS component is an EMPACTS class. The instructor of this class is responsible for content and may wish to actively facilitate for their students. The model developed at NWACC, by participating EMPACTS faculty, is proprietary but includes multiple levels of engagement for faculty who are interested in the learning model. All students interact with the primary EMPACTS facilitator regardless of the level of involvement of participating faculty.

The Role of the Course Instructor: The course instructor is responsible for delivery and management of course content objectives as well as assessment of knowledge and development of skills. EMPACTS project objectives are set by the Course Instructor. All student led components of the project must be cleared through the Course Instructor and the EAST/EMPACTS Facilitator. Grading rubrics and grading of projects, as well as all other course content, is left to the Course Instructor.

The EMPACTS Process: The EMPACTS process begins with an introduction to the EAST process.

- Introduction to the EAST Process
- Brainstorming about potential projects, teams and technology
- Team development and working with faculty
- Project Research
- Networking within the community
- Project Development
- Initial Proposal
- Project Implementation
- Skill Building
- Team Dynamics and problem solving
- Finishing Project
- Project Presentation
- Final Report

Students are familiar with learning experiences that involve individual effort and assessment. Collaborative learning experiences, with grades based on group achievement, are intimidating and lead to fear of the entire process. The most important steps in the
EMPACTS process are the steps leading up to the initial proposal. These early steps are essential to the success of the process and the completion of a project. It is during these early steps that students formalize and conceptualize their projects. The initial proposal allows them to clarify all essential components of the project (EMPACTS objectives).

Students are given an EMPACTS outline for the initial proposal and initial Power Point presentation. Once students have finished the initial proposal, they are then free to expand and discover their own potential. The process and assessment outlines are vehicles for focusing teams and facilitating in essential time and personnel management. Course instructors also have the freedom to design empirical outlines and grading rubrics that meet the assessment goals for the students.

Students are self-directed learners in their projects and division of labor is left to each team. The EAST/EMPACTS Facilitator is available for consultation and guidance if needed. All projects are student-designed and implemented. A support network, that includes the course instructor, EAST/EMPACTS Facilitator, college technology support personnel and EAST Initiative on-line services, is available for the teams and individuals if they seek help.

Skills developed through the process:

- Team - collaborative
- Technology
- Organization – time management
- Networking in community
- Service
- Academic
- Communication

Service learning projects heighten the students’ awareness of community and their role in service to the community. With only 12 – 15 weeks to complete a project, students learn how to manage time, personnel and resources. Learning time management increases their performance in other classes as well as workplaces.

Community Outreach: EMPACTS student projects are impacting the community in several ways:

- Educational Outreach (Public Schools)
- Partnership with area architects and landscaping firms
- Community Leaders, mayors, city councils, etc.
- Partnership with Law Enforcement
- Partnership with area Youth Programs
- Environmental Agencies and Park Services
- Partnerships with area college faculty
- Animal Shelters

Many of the students enrolled in EMPACTS classes at NWACC are in the Elementary Education degree program. EMPACTS projects generated by these students usually include interaction with area public schools and involve design of classroom activities. EMPACTS education students work in the community to raise money for supplies and contribute educational materials (activities) and information to assist teachers in educating students. Students in Introduction to Education, Physics for Elementary Teachers (PET), Physics and Human Affairs, Honors Geology, etc. have designed web pages posting projects to be used by area schools and teachers (see http://faculty.nwacc.edu/EAST_original/projects.htm.)

Course Content and Community Aspect: The course content objective is dictated and managed by the course instructor. Sometimes the course objectives are set after the community project problem has been identified. Examples constructing a project around course content include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Community Aspect</th>
<th>Content Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Algebra</td>
<td>- Animal Shelter and Pet Adoption</td>
<td>Data must be collected and specific analytical applications may be required by the instructor – linear regression, exponential growth and decay, probabilities, projections, etc.</td>
</tr>
<tr>
<td></td>
<td>- Organ Donation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Deer Populations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Housing needs in area</td>
<td></td>
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<tr>
<td>Physics and Human Affairs</td>
<td>- Energy-efficient home design</td>
<td>Laws of Thermodynamics Newton’s laws of motion Galileo, gravity, force</td>
</tr>
<tr>
<td></td>
<td>- Physics activities for area school children</td>
<td></td>
</tr>
<tr>
<td>Physical Geology</td>
<td>- Field guide to state of Arkansas</td>
<td>Geology of Arkansas Stratigraphy Geologic History of area Surficial Weathering processes Fossilization Process</td>
</tr>
<tr>
<td>Probation and Parole</td>
<td>- Web pages to connect parolees with future employers Youth Mentoring Program</td>
<td>Ethics Mechanics of Parole system Probation rules and regs Existing programs for youth</td>
</tr>
</tbody>
</table>

EAST/EMPACTS Lab Technology: Technology used by EMPACTS students has no limit but time. College students do not have an entire year to complete a project and they do not have the luxury of missing classes for formal training. Software used must be “user friendly” and engaging for the novice or they will give up. Some examples of software used in EMPACTS projects at NWACC are listed below. Software used ranges from the Microsoft suite to AutoCad and Revit architectural and mechanical design packages.

The individual projects may be viewed at http://faculty.nwacc.edu/EAST_original/projects.htm.

- Adobe Suite – Graphic Design
- Arc GIS / GPS – Map building
- Google Sketchup – Architectural Design
- AutoCad – Architectural and Mechanical Design
- Macromedia Suite – Web Design, Animation and Graphic Design; Flash, Dreamweaver, ….
- Front Page – Web Design
- Fruity Loops – Music Composition and Design
- Microsoft Movie Maker – film editing
- Microsoft Movie Maker – videos within power points
- Microsoft Slide Shows – slides show design
3) EMPACTS TECH CORP

An extension of the EMPACTS model is the development of a corps of students who act as “Peer Instructors.” These students come from a diverse background and are selected based on their technology skills and their desire to learn more about technology through serving their peers. This model is used to engage potential and current EMPACTS students in building technology skills, through technical support positions in the EAST lab environment.

The EMPACTS Tech Corp is a hybrid of the original “Tech Corp” that began in the IT department at NWACC under the leadership of Pat Kelly, Instructional Technology and Webmaster for NWACC. Students from different technology backgrounds and courses received scholarship money as they served as technology assistants in the general access labs on campus.

The NWACC Tech Corp became the EMPACTS Tech Corp in response to the needs of the growing EAST program. The EMPACTS TECH CORP management model was developed. EMPACTS Tech Corp students receive EMPACTS scholarships and serve as peer instructors in the EAST/EMPACTS and General Access labs.

One of the pillars of the EMPACTS process is the self directed nature of community service projects. Students have ownership in their projects and collaborate within the framework of a TEAM of peers. The student led EMPACTS Tech Corp model brings experienced EAST high school and NWACC EMPACTS students together to form a TEAM of students dedicated to learning and supporting technology. Their presence in the EAST/EMPACTS lab fosters an environment of learning and support for all NWACC students.

Students are attracted to the EMPACTS program by four separate scholarship opportunities. Each scholarship opportunity is designed to recruit students from either high school EAST programs or from the college level EMPACTS program at NWACC.

EMPACTS Proposed Scholarship Opportunities

- **EAST/EMPACTS Recruitment Scholarship** – Awarded to incoming students, who participated in a traditional EAST program in High School, and are looking for a continued EAST experience as an adult learner.

- **EMPACTS Scholarship** – Awarded to NWACC students who have taken EAST component (EMPACTS) courses and wish to continue taking EMPACTS courses.

- **EMPACTS Technology Scholarship** - Awarded to EMPACTS students, who wish to do independent study in the use of particular technology(s).

- **EMPACTS Tech Corp Scholarship** – Awarded to experienced EAST/EMPACTS students, who have the basic and specialized technology skills necessary to assist peers working in the EAST/EMPACTS lab. Specific criteria listed above.

EMPACTS Tech Corp Scholarship: The EMPACTS Tech Corp Scholarship recruits students, with specific skills, to act as peer support for the EMPACTS courses at NWACC. The EMPACTS Tech Corp is made up of students who share a common interest in learning technology and in supporting the use of technology. Students in the EMPACTS Tech Corp are a team of self-directed students, who come in at scheduled times to learn new technology, hone existing technology skills, and offer assistance to students working on EMPACTS projects.

One or two students are selected, based on experience and leadership qualities, to be the “Head” EMPACTS Tech Corp student(s). These students are responsible for training new comers and monitoring the material needs of the lab. All EMPACTS Tech Corp students report to the EAST/EMPACTS Facilitator.

EMPACTS Tech Corp team members receive a one year scholarship and receive elective MPAX course credit for their work. Students give a report each semester of their professional development. Some have portfolios; others provide skills reports, depending on their specific needs and duties performed within the Tech Corp.

Specific Duties of an EMPACTS Tech Corp Student:

- Monitor use of the lab and report improper use of hardware or internet
- Report maintenance needs of the lab
- Ensure lab rules are followed
- Record data of lab use throughout the day
- Maintain the printer by refilling paper and cartridges as needed
- Render technology assistance to students using the lab
- General Access as well as EAST/EMPACTS students
- Update software and load specific academic software for instructors
- Use any time possible in the lab to learn new technology or hone technology skills

Specific Duties of the Head EMPACTS Tech Corp Student:

- Same as above
- Maintain Excel spreadsheet documenting lab use
- Provide weekly report of lab usage including statistics for that week.
- Report to the EAST/EMPACTS Facilitator
- Maintain EMPACTS Tech Corp staff sheet
- Train new recruits in proper procedures and lab maintenance

4) uGRO, UNDERGRADUATE RESEARCH OPPORTUNITIES

The EMPACTS model was extended to an NSF funded undergraduate research experience in the geosciences. Students from NWACC joined faculty mentors from the University of Arkansas, Fayetteville, in geospatial data collection in NW Arkansas and in Central America. Students worked as valuable members of research teams as they learned geospatial data collection techniques and applications. The focus of the grant was to engage students from diverse backgrounds in a learning experience in the geosciences. Two of the six students selected are going on to four year programs in the geosciences. The others have an increased global view of the world around them and an experience of a lifetime.

5) SUMMARY AND CONCLUSIONS

The first three years of the EMPACTS program has generated over 200 successful, collaborative, student-directed, content-based, service learning projects. Partnerships have been made between NWACC students, local businesses and professionals and with neighboring college professors and programs. Recruitment of students from high school EAST programs and from within the EMPACTS courses has generated a successful student led, peer driven technology corp.

Informal, anecdotal assessment of student attitudes and project outcomes indicate that students gain confidence and self esteem, as well as increased interest and knowledge of course content. Individual students report an increase in ability to work as a team
member and to interact with peers. All report an increased awareness of community and service to the community. Attitudes toward the use of technology are mixed and seem to be based on comfort with technology before beginning the projects. Nontraditional students report a decrease in fear of using technology. Traditional students tend to hone skills they already have in specific software. Individual students occasionally express a desire to learn and become the expert in using particular software. The majority of the students do not feel they have time to learn “new” technology in 12-15 weeks.

EMPACTS students start out generally fearful of the process, yet change their attitudes later in the process. Many students enroll in future EMPACTS classes, after completing a project in a first EMPACTS class. NWACC students who engage in the EMPACTS experience have developed skills that will help them to be successful after graduation.

Formal assessment of the EMPACTS learning model is being conducted. C. Dianne Phillips, EAST/EMPACTS Facilitator, along with EMPACTS faculty members, adapted the Traditional EAST process to the adult learner. The EAST/EMPACTS Facilitator worked with EMPACTS faculty and students in implementation and trialing of the process. Dr. Regina Ryel, EAST Curriculum Coordinator, has written a formal curriculum for the program. Under the administration of Dr. Marvin Galloway, EAST Coordinator, Dean of Math and Science at NWACC, the EMPACTS learning model will be further developed and assessed. Future goals for the EMPACTS program include the development of a Faculty Training model to train college faculty interested in implementation of the EMPACTS model at their school.

6) REFERENCES


