GREEN IT:

A Project within the Computer Information Technology Learning Community Seminar, IT Problem Solving

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PROJECT ABSTRACT:

Green IT
The Green IT project has four parts. The first part of the project focuses on defining Green IT and the goals and methods of achieving greater sustainability through the use of computers. The second part of the project seeks to allow students to test their own energy consumption along with the consumption of the college. In the third part students visit a local recycling center. The fourth part students learn about and research Green IT as a career option consistent with the goals of Learning Community courses.

Firstly, students will be engaged in a discussion regarding what they know about sustainability and Green IT to establish a beginning point for student understanding of the topic. Then the students will be shown a video and presented materials which seek to define Green IT for them, including introducing cloud computing.

Next, students will complete a laboratory experiment in which they use Watt Power Meters to measure the amount of energy (watts) that is being consumed by computers, monitors, printers, and other electronic devices and appliances through the college and their homes. This data will be entered into an Excel spreadsheet from which students will calculating the cost of supplying energy to these various devices on an annual basis, and generate an informative chart. In addition, students will analyze the data and in a Word document report their findings and provide recommendations indicating how the college might save money and decrease energy consumption thereby increasing the college's commitment to become more sustainable.

Further, students will visit a local electronics recycling facility to learn about software and hardware, challenges and procedures specific to electronic recycling, the cost and benefits to sustainability of recycling, and the impact to the earth of failing to recycle these items. During the visit students will be encouraged to ask questions and take pictures of their visit (provided that the facility grants permission of the student to take photographs). After this visit, students will be assigned a reflective writing piece about their experience and what they learned at the recycling center. Further students will be assigned a task to create a document in Word recommending a policy for the disposal of outdated computer equipment for the college.

Finally, students will be asked to research Green IT as an emerging job field and will be asked to visit the BHCC Community Center for Entrepreneurship to learn about Green IT opportunities or companies in the local area. Consistent with the goals of the Learning Communities, students must consider whether this is a career field they might be interested in and create a PowerPoint presentation about the field.

PROJECT SIGNIFICANCE:

As a charter signatory of the American College & University Presidents Climate Commitment (ACUPCC) Bunker Hill Community College has pledged to eliminate its contribution to global warming over time. The college has created the Presidents Climate Commitment and Sustainability Committee which has selected 7 goals for the college. Specifically this project will be consistent with the BHCC goal to integrate sustainability into the curriculum and make it part of the educational experience as well as to proffer data to support the goal of the college to evaluate measures that the college can take to achieve no net greenhouse gas emissions. The project will enable students to learn about sustainability and an emerging field in information technology, Green IT. Further, this project adds a sustainability component to the coursework while furthering the goals of the course such as to teach problems solving through computational thinking, computer concepts such as hardware, software, and cloud computing, and the use of software applications and an eportoflio tool, and the goals of the Learning Community courses such as career exploration.

PROJECT PLAN:

I. Learning Objectives for Green IT:
Learning Objectives for the project include students being able to:
- Demonstrate the use of the Kill a Watt Power meter
- Measure amount of Amps and Watts in the selected device
- Convert Watts to kWh for the selected device
- Calculate cost per kWh for the selected device
- Demonstrate the transformation of data into useable information through data analysis and Excel chart creation
- Demonstrate the use of software applications such as Excel, PowerPoint, and Word
- Demonstrate the use of an eportfolio tool
- Demonstrate understanding of computer concepts such as cloud computing, hardware, software, and basic computer security
- Demonstrate an understanding of sustainability, energy efficiency and computer recycling
- Demonstrate an understanding of the Green IT career opportunities in the metro Boston area

II. Project Summary for Green IT:
Part 1:
To establish a baseline understanding of the concepts of sustainability and Green IT students will be engaged in a discussion regarding what they already know of the topics. Then the students will be shown a video and presented materials which seek to help define Green IT for them, including introducing cloud computing.

Part 2:
Students must complete the Kill a Watt Lab (adapted from the Green IT Presentation by the Convergent Technologies Center in Frisco, Texas). This lab tasks students with using a Watt Power Meter and recording in an Excel spreadsheet the Amps, Watts, and kWh of electricity for the assigned items. Students then must convert the watts to kWh by moving the decimal point three positions to the left and calculate the cost per year of each item using a factor of .12 per kWh. Students must visit several assigned offices throughout the college and take measurements of the watts used, the device, the type of device, the operating system being used (if applicable) for computers, monitors (flat panel and CRTs), printers, lamps, and other devices. Students must also use the wattmeter at home on at least 5 different devices/appliances which may include:

1. TVs
2. refrigerators
3. DVD recorder/player
4. air conditioners
5. Wireless routers
6. Microwaves
7. Cell phone chargers
8. lamps
9. Other household devices

These measurements will be recorded in an Excel spreadsheet from which students will analyze the data by calculating the cost of supplying energy to these various devices on an annual basis. To effectively analyze the data students have collected, they must briefly research the cost of 1 kWh of electricity in their region/area/state and research/calculate the energy savings in one year by replacing ten 15-inch CRTs with ten 15-inch LCDs. In addition, students must use Excel to generate a chart demonstrating their ability to use the software. In addition, students must analyze the data and in a Word document report out their findings and provide recommendations indicating how the college might save money and decrease energy consumption thereby increasing the college's commitment to become more sustainable. These documents must include insights about cloud computing and how it can be used to reduce energy costs.

Part 3:
Students will take a pre-arranged field trip with their instructor to visit a local electronics recycling facility to learn about software and hardware, challenges and procedures specific to electronic recycling, the cost and benefits to sustainability of recycling, and the impact to the earth of failing to recycle these items. During the visit students will be encouraged to ask questions and take pictures of their visit (provided that the facility grants permission of the student to take photographs). After the visit, students will be assigned a reflective writing piece about their experience and what they learned at the recycling center. Student will be asked to share their writing in their eportfolio along with their photos of the visit so that other BHCC students may learn or benefit from their experience. Students must then take the knowledge they compiled from their visit to the recycling center along with additional independent research and generate a Word document recommending a policy on how the college disposes of outdated computer equipment.

Part 4:
Finally, students will be asked to research Green IT as an emerging job field. Students will work with the assigned Learning Community Seminar Success Coach to explore the career field. Further, the students and the instructor will visit the BHCC Community Center for Entrepreneurship to learn about Green IT job opportunities and companies in the local area. Consistent with the goals of the Learning Communities, students must consider whether this is a career field they might be interested in. Finally students must create a PowerPoint presentation about the career field of Green IT including specific opportunities and companies in the metro Boston region. These PowerPoint presentations will demonstrate the students' ability to use the PowerPoint application as well as their understanding of what they learned about the Green IT field.

III.   <u>**Roles and Responsibilities for Green IT:**</u>
The professor for the spring 2011 course, CIT 113: IT Problem Solving, is Jaime L'Heureux. Professor L'Heureux will be responsible for working with Director of Sustainability, Paul Wolff to schedule and make arrangements associated with the field trip to the local recycling center. Professor L'Heureux will likely need financial and coordination assistance to acquire transportation for herself and her students to and from the recycling center. Further, Professor L'Heureux will be responsible for scheduling a visit to and coordinating content delivery from the BHCC Community Center for Entrepreneurship. As the instructor of the

course, she will be responsible for teaching the course, facilitating student research, and evaluating all student work submitted under the Green IT project. Professor L'Heureux will use project rubrics to complete the grading of all deliverables.

IV.   Specific Course and Students Affected:
The Green IT project will become one project in the spring 2011 course, CIT 113: IT Problem Solving. The current course description states that the course will give students hands-on experience in a wide range of modern information technology. Several IT concepts will be introduced that will provide a basis for further study in Information Technology.   Students will work on a number of projects that will give perspectives on areas of IT including but not limited to: visual and/or robotic programming, social networking tools, web design and networking. Issues of security, privacy and ethics will also be examined. Students will leave the course with an understanding of the components of modern IT systems and the scope of knowledge needed to become an IT professional.

The major goal of the course is for students to acquire a technical overview of modern information technology. The objectives of the course are for students to be able to:
- Understand many aspects of Information Technology and their role in modern Information Technology implementations
- Understand the pedagogy of Problem Based Learning and the PBL Lifecycle
- Work in teams to produce solutions.
- Research and learn about technology
- Present solutions in writing and spoken presentations
- Demonstrate knowledge of key IT foundational skills
- Demonstrate programming concepts through program execution

In the fall 2010 semester, three sections of the course were run with a total of approximately 45 students enrolled. In the spring 2011 semester, only one section of the course is being run, and it currently has 18 enrolled students. The impact on students at the college has the potential to be much greater however. All student deliverables from this project will all be uploaded to their eportfolios enabling all eportfolio holders at the college to view their work, thus resulting in the enrichment of the larger BHCC community about Green IT. Further, several of the student generated deliverables will be shared with the Director of Sustainability, Paul Wolff, as information to support the goal of the college to evaluate measures that we can take to achieve no net greenhouse gas emissions.

V.   Timeline:
Ideally, the Green IT project will begin about mid-February with Part 1 of the project and continue until almost the beginning of April, concluding with Part 4. However, the timeline is flexible and other than Part 1, each part of the project can be reordered to meet the needs of the external parties. All final deliverables will be due from students prior to the end of the semester with the project completing at the conclusion of the semester.

ENHANCEMENT OF STUDENT OUTCOMES:

CIT 113: IT Problem Solving has student outcomes specific to the pedagogy being used in the course. This pedagogy is the problem solving methodology with an emphasis on generating computational thinking in students. This pedagogy is expressed in the style and format of the course. For example, projects or problems are the main focus of all course activities, including discussions and labs. There will be several projects during the semester, including a final project.

A typical week will include:

- A short discussion that introduces a problem, and some tutorial on how to approach this sort of problem.
- Lab time where students work on the problem (having started on their own).
- A wrap-up discussion where students address their own and each others' solutions.

Further, CIT 113 is a Learning Community seminar with student learning outcomes for the course including:

- Understand the role that learning styles play in the learning process and make use of appropriate study strategies based on their identified learning styles.
- Identify areas of interest, work values and strengths and match these to potential career paths.
- Access a range of resources to set and meet academic goals, solve academic and personal problems, and overcome barriers to success.
- Read, write, speak and listen more critically, reflectively, and effectively.
- Determine what information is needed, sort and organize it, and evaluate and apply what is selected from a range of source materials.
- Practice disciplined inquiry, including the construction of appropriate questions, interpretation and evaluation of arguments and evidence, and formation of reasoned conclusions.
- Work collaboratively in a team and appreciate a diversity of perspectives
- Apply classroom learning to the local and global community.

Lastly, the course is designed to replace CIT 110 Applications and Concepts for Information technology majors and the student learning outcomes from CIT 110 are also applicable, including:

- To familiarize each student with modern computer concepts
- To make each student more competent in using Windows
- To make each student more competent in using Office
- To make each student more competent in using Internet applications
- To familiarize each student with the importance of employability and soft skills
- To give each student experience in group collaboration and team work
- To make each student competent in using problem solving skills
- To familiarize each student with self management and motivation
- To make each student more competent in using an online college course website
- To provide a good foundation for additional computer information technology courses

Thus, adding the Green IT project to the CIT 113 course will enhance the many existing student learning outcomes by building off the principles already being taught in the course. The unique value this project adds however, is the opportunity for BHCC students to explore a new field of information technology for which the college does not, as of yet, have a certificate program or other course work for.

STUDENT DELIVERABLES AND ASSESSMENT PLAN:

The specific student deliverables for this project includes:

1. An Excel spreadsheet and graph/chart which estimate what the school is spending on the computer power cost
2. A Word document indicating how the college might save money and decrease energy consumption thereby increasing the colleges commitment to become more sustainable which must include insight about cloud computing and how it can be used to reduce energy costs
3. Journal entry reflection in response to what they learned about recycling computer hardware and software from the recycling center visit (include photos if applicable)
4. A Word document recommending a policy for the disposal of outdated computer equipment for the college
5. A PowerPoint presentation about the Green IT career field including specific opportunities and companies in the metro Boston region

Grades will be based on performance in a number of projects. Project grades will be based on project reports and presentations. The professor will assess student learning outcomes and deliverables using a project specific rubric.

BUDGET WORKSHEET:

ITEM	COST
Faculty Stipend	$500
Transportation to Recycling Center for Students and Faculty Member*	$800
TOTAL	$1300

* Depending upon availability of the BHCC bus/shuttle bus and/or the distance to and/or location of the recycling center this cost could be less by virtue of using public transportation or paying for only a bus driver. This cost does include lunch for all participants.