02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS

Submit only ONE copy of this form **for each PI/PD and co-PI/PD** identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.C.a. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. ***DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.***

PI/PD Name: King W Nicholson

Gender: ☒ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☒ Not Hispanic or Latino

Race: (Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☒ White

Disability Status: (Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☒ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☐

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☐

Ethnicity Definition:
Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.
Race Definitions:
American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.
Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
Black or African American. A person having origins in any of the black racial groups of Africa.
Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information recieved from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational oppurtunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS

Submit only ONE copy of this form **for each PI/PD and co-PI/PD** identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.C.a. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. ***DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.***

PI/PD Name: Beverly P Price

Gender: ☐ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White

Disability Status:
(Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None

Citizenship: (Choose one) ☐ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☐

Ethnicity Definition:
Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.
Race Definitions:
American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.
Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
Black or African American. A person having origins in any of the black racial groups of Africa.
Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information recieved from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational oppurtunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS

Submit only ONE copy of this form **for each PI/PD and co-PI/PD** identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.C.a. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. ***DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.***

PI/PD Name: Marllin L Simon

Gender: ☐ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White

Disability Status:
(Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None

Citizenship: (Choose one) ☐ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☐

Ethnicity Definition:
Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.
Race Definitions:
American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.
Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
Black or African American. A person having origins in any of the black racial groups of Africa.
Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information recieved from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational oppurtunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:
Not Listed

REVIEWERS NOT TO INCLUDE:
Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 11-1

NSF 11-525 **05/13/11**

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)

DRL - ITEST

FOR NSF USE ONLY

NSF PROPOSAL NUMBER

1139623

DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION
05/13/2011	**2**	**11090000 DRL**	**7227**	**874447246**	**01/20/2012 11:29am S**

EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)

631022757

SHOW PREVIOUS AWARD NO. IF THIS IS
☐ A RENEWAL
☐ AN ACCOMPLISHMENT-BASED RENEWAL

IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES ☐ NO ☒ IF YES, LIST ACRONYM(S)

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE

Central Alabama Community College

AWARDEE ORGANIZATION CODE (IF KNOWN)

0500738000

ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE

Central Alabama Community College
1675 Cherokee Road
Alexander City, AL. 350100000

NAME OF PRIMARY PLACE OF PERF

Central Alabama Community College

ADDRESS OF PRIMARY PLACE OF PERF, INCLUDING 9 DIGIT ZIP CODE

Central Alabama Community College

AL ,350102917 ,US.

IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)
☐ SMALL BUSINESS ☐ MINORITY BUSINESS ☐ FOR-PROFIT ORGANIZATION ☐ WOMAN-OWNED BUSINESS

☐ IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE

TITLE OF PROPOSED PROJECT **A Strategy for The Integration of Robotic Competitions & Activities Into a Rural K12 System Through Partnerships with a Local Community College: A Model for Statewide Expansion**

REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE
$ **1,328,135**	**36** months	**10/01/11**	

CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

☐ BEGINNING INVESTIGATOR (GPG I.G.2)
☐ DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C.1.e)
☐ PROPRIETARY & PRIVILEGED INFORMATION (GPG I.D, II.C.1.d)
☐ HISTORIC PLACES (GPG II.C.2.j)
☐ EAGER* (GPG II.D.2) ☐ RAPID** (GPG II.D.1)
☐ VERTEBRATE ANIMALS (GPG II.D.6) IACUC App. Date _____
PHS Animal Welfare Assurance Number _____

☐ HUMAN SUBJECTS (GPG II.D.7) Human Subjects Assurance Number _____
Exemption Subsection _____ or IRB App. Date _____
☐ INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j)
_____
☐ HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.G.1)

PI/PD DEPARTMENT
Dept. of Science/Physics

PI/PD FAX NUMBER

PI/PD POSTAL ADDRESS
1675 Cherokee Road

Alexander City, AL 35010
United States

NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address
PI/PD NAME **King W Nicholson**	**MS**	**1975**	**205-234-6346**	**nnicholson@cacc.edu**
CO-PI/PD **Beverly P Price**	**DEd**	**2007**	**256-234-6346**	**bprice@alex.k12.al.us**
CO-PI/PD **Marllin L Simon**	**MEd**	**1970**	**256-234-6346**	**marllin.l.simon@gmail.com**
CO-PI/PD				
CO-PI/PD				

Electronic Signature

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the Authorized Organizational Representative or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, lobbying activities (see below), responsible conduct of research, nondiscrimination, and flood hazard insurance (when applicable) as set forth in the NSF Proposal & Award Policies & Procedures Guide, Part I: the Grant Proposal Guide (GPG) (NSF 11-1). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

Conflict of Interest Certification

In addition, if the applicant institution employs more than fifty persons, by electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.A; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Exhibit II-3 of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency? Yes ☐ No ☒

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

The following certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding $100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding $150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:
(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, ''Disclosure of Lobbying Activities,'' in accordance with its instructions.
(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Certification Regarding Nondiscrimination

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:
(1) community in which that area is located participates in the national flood insurance program; and
(2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:
(1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
(2) for other NSF Grants when more than $25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)
(This certification is not applicable to proposals for conferences, symposia, and workshops.)

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research.
The undersigned shall require that the language of this certification be included in any award documents for all subawards at all tiers.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME **Michael A Lovett**	**Electronic Signature**	**May 13 2011 5:08PM**

TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS	FAX NUMBER
256-215-4247	**mlovett@cacc.edu**	**256-234-0384**

* EAGER - EArly-concept Grants for Exploratory Research
** RAPID - Grants for Rapid Response Research

Project Summary

A consortium of K12 School Systems led by a Community College, all located in rural central Alabama, is submitting a **strategy** proposal for consideration by the National Science Foundation for their Innovative Technology Experiences for Students and Teachers (ITEST) grant initiative. The goal of this **strategies** project is to provide resources needed to establish in-class robot activities and after school robot competitions for each school system in order to increase over STEM awareness. The target groups will students ranging from third (3^{rd}) through twelfth (12^{th}) grade.

The grant will provide personnel and resources to establish robot activities and competitions for all participating k12 systems within the service area for the Alexander City campus of Central Alabama Community College (CACC) for all three years of the project. In the second year three more regions will be added, a university &a liberal arts college partners, and another community college. Funds for personnel, robot activities and equipment for one school system in each of these regions for the second year, and two school systems in each of these regions for the third year will be provided. In the third year three more regions of the same components will be added, and funds for personnel and robot activities and equipment for one school system in each of these regions will also be provided. The fully operational program in Region 1 is to provide a "proof of concept example", and data to be studied by all those involved to further improve this project. The gradual introduction of new regions into the project is to insure a solid, quality program in each region.

Intellectual Merit:
Borrowing from the examples of the federally funded HeadStart program, interest in science must be fostered at an early age using hands-on interventions and laboratory experiences in order to grow and develop through high school. The work with robots is grounded in the belief that students learn best when they are engaged in active exploration, interpretation, and construction of ideas. The set of in-class activities for the *WeDo* and *Mindstorm* robots provided are designed to create this kind of involvement and will act as a basis upon which individual teachers can build more materials that can be studied, evaluated, improved, and ultimately shared with the education knowledge base. The after-school competitions offer opportunities to practice the 4C's, (critical thinking, communication, creativity and collaboration) that are needed to foster the STEM workforce for the 21^{st} century.

Broader Impact:
Within our rural service area, many school systems share numerous sad traits: the correlation between student's scores on reading and math for level 4 and the number of students qualify for free/reduced lunch frightening. Coupled with a high school dropout rate exceeding 50%, the future of the STEM Workforce in Alabama is bleak. As has been noted by research, third graders share an equal interest in math and science. It is between grades 5 and 7 that female and minority students begin to lose interest. The continuous nature of our activities and competitions from grades 3-12 is intended to help retain interest in math and science within the student population. As students progress into the more advanced in-class activities and robot competitions in grades 9-12, they are strongly encouraged to engage in cooperative efforts with local industries.

TABLE OF CONTENTS

For font size and page formatting specifications, see GPG section II.B.2.

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

Project Description

The overarching goal of the project is to broaden perspectives of K12 teachers on active learning approaches to stimulate students' interest in science, math, engineering and technology (STEM) through the use of robots in both classroom activities and after school competitions. To meet this goal, the following objectives are noted for the project:

Objective #1: Provide training for 7 Regional Directors, 70 Lead Teachers and 108 Science Team members who will organize, coordinate, and help implement in-class activities and after school competition activities. These individuals will compose the management/leadership team for the duration of the grant.

Objective # 2: Provide a base set of in-class robot based activities and enough robot kits to insure a viable program for each K12 system involved in the project to give teachers a foundation upon which to build a robust set of activities designed to connect robot design and programming activities to learning objectives in math and science in a way that will improve success rates as well as develop interest in and preparation for careers in the STEM and Interactive Communications Technology (ICT) workforce of the future.

Objective #3: Establish an after school robot competition program that will engage students in cooperative competitions requiring further use of the math and science skills in a way that will develop maturity and instill innovative thinking in science and math.

Objective #4: Develop and implement a set of evaluation tools and techniques that will enable a dynamic study of the effectiveness these activities and competitions have toward achieving objective #2.

The grant will provide personnel and Lego equipment for all five of the K12 systems in the service area for the Alexander City campus of CACC for all three years of the project. This will be region 1. In the second year three more regions will be added, and funds for personnel and Lego equipment for one school system in each of these regions for the second year, and two school systems in each of these regions for the third year will be provided. In the third year three more regions will be added, and funds for personnel and Lego equipment for one school system in each of these regions will also be provided. The fully operational program in Region 1 is to provide a "proof of concept example", and data to be studied by all those involved to further improve this project. The gradual introduction of new regions into the project is to insure a solid, quality program in each region. Ultimately, the real goal is to cover this entire state with science teams and robot competitions funded by local communities and the state.

The personnel for this project will include:

- Project Director (Also regional director for region 1)
- Project Administrative Assistant
- Regional Director for each participating college
- 1 lead teacher for each school in each school system (maximum of 4)
- 1 four person Science Team for each K12 school system involved in the project.

Each regional director will be a physics instructor and the science team sponsor at that region's college. Regional directors will recruit their own science team members.

Lead teachers will maintain Lego kits, coordinate use of the Lego kits, and assist teachers in preparing the in-class activities.

The Science Team will be in charge of after school competitions. It is expected they will have parent and/or teacher volunteer assistance. In the fall they will coach First Lego League (FLL) and First Tech competitions for six to eight weeks. In the spring they will coach two 4-week local competitions, one for grades 3 & 4 and one for grades 5 & 6. They will also conduct five in-class science activities each semester with two different third grade classes (total of ten visits each semester).

As was noted in the Journal of Extension (JOE) article A New Model of 4-H Volunteer Development in Science, Engineering, and Technology, April 2009 // Volume 47 // Number 2 // Ideas at Work // 2IAW4,

"What is interesting about these innovative programs of distinction is that they do not rely on the traditional 4-H adult volunteer to deliver the program. For example, the Union County Extension program stated that their program was unique because they do not rely on volunteers, but rather on paid staff, because of the intensity of the program. Other projects use Extension educators, classroom teachers, and university faculty to facilitate these 4-H programs. Overall, five out of the eight programs do not use adult volunteers in their delivery model. While this is not an exhaustive list of projects, it does suggest a general trend away from traditional 4-H volunteer-based delivery."

The science team is a unique, key component of this project. After school robot competition activities are typically organized and operated by a teacher and parent volunteers, and this provides a fatal flaw: depending too much on volunteers allows for it to disintegrate after a few years. The science team will be a constantly renewable, trained, organized, and paid group of students that will provide a solid foundation upon which to build a program. Each science team will directly engage in science activities throughout the year with between 40 and 50 third graders, and in after school competitions with 30 to 50 students involved in each of the four competitions.

> *Information questionnaires were sent out this fall asking how many fifth and sixth graders at Radney Elementary would be interested in a spring competition and twenty-seven (27) students signed up for it. But after observing our trial program this spring, that number could easily double in the future. Eight (8) Mindstorm kits have been loaned to one group of 4th and 5th graders, and seven (7) to another group of 7th & 8th graders to practice logistics and study reactions of teachers and students. A test program is planned for next year in just the Alexander City school system utilizing three (3) volunteer teachers and four (4) paid science team members. The Mindstorm robot kits borrowed from the CACC Physics department will be used for this trial.*

Multiplied by the 4 or 5 science teams for each region and the number of K12 students engaged in these activities in a typical region that is in full operation could easily reach 1000. Regional directors, lead teachers and science team members will attend a three (3) day training workshop held in August each year. In addition, science team members will enroll in the Physics 299, in which their weekly science activities with third graders will be discussed and planned. They must also have taken, or be enrolled in, a two semester sequence of physics courses.

Brief History of the Science Teams

One might ask what evidence exists for the capability and reliability of college students to perform the duties assigned to them. This is the thirteenth year the Principal Investigator (PI) of this proposal has sponsored student science teams. Each year some students select science team membership as their semester project. Each science team may have up to six members, averaging three or four, (one student planning to be a weatherman was a one-man show). Each team must adopt a third grade class and perform five (5) science activities with the class each semester. Not only do they meet their obligations, most teams over the years have adopted 2 and sometimes 3 third grade classes. The PI has accompanied some teams who are met at the front door of the school by a principal requesting the science team do the activities with 50 or more students and they sometimes do if they have enough equipment.) Most add their own activities to the standard set, (frequently at their own expense for materials). In an extreme case, two girls who were working with 3 third grade classes put together 45 Easter baskets which contained, among other things, tie-died T shirts with each student's name on them for their final visit to the school. It is these observations over the years along with discussions with science team members that generated the idea for this proposal and validate this capability for delivery of services.

Third Grade Science Activities

The PI of this project has sponsored a volunteer science team using members of his physics courses for thirteen years. Many of them have also volunteered to assist with the Lego competitions as a part of the CACC summer stem camps (sponsored in part by the NSF CARCAM Grant, DUE 0501328). Over the years the science teams have compiled a complete set of basic third grade science activities that span the entire year of physics, beginning with mechanics and ending with electricity and magnetism. Each year, science teams add their own activities to their programs. Although some of the activities require equipment usually found in standard physics labs, most of them can be done using a box of materials we have made up. The list of activities, a list of materials in the box, and a picture of the materials in the box can be seen at this webpage. http://caccphysics.cacc.cc.al.us/science_team/2000-2001/scienceact/items-in-boxes.html

Most of these items can be found in grocery stores or department stores. Four items in the picture but not visible are the most difficult to obtain, (you have to make them yourself). These are the two metal disks of different diameters and the two metal hoops of different diameters. If necessary, these boxes of parts could be provided, probably for around $50 each.

Sustainability Plan
As a member of the CARCAM Consortium, our experience has allowed us to forge strategic relationships with companies throughout our service area as well as the State of Alabama. After the first year, we will be able to utilize our initial success to formally solicit companies for additional support.

Once the program is underway and proven effective, regional director's cost could be absorbed by their college or university, lead teacher's stipend could be part of their salary from the state. The PI will continue to lobby for state funds to be used for science team participants' stipends.

We do not operate under any illusions, due to the nature of the economy, State, Federal, and corporate resources will be very scarce. We will be forced to be very aggressive in developing continued support to ensure the program's viability.

In-Class Activities
Grades 3 & 4 will use the *WeDo* Lego Kits. These kits come with a set of eleven activities. Teachers will begin with this set as a base set of activities, and add their own ideas. One of the primary objectives of this proposal is to evaluate and collect these generated activities into booklets for each group level. A sample description page of the WeDo activities is included below.

WeDo Activity Sample
"Street Sweeper"
Introduction:
The brick models and the LEGO® Education WeDoTM programs used in this activity are suitable for children from the age of seven and up, but for children at the younger end of this age range to become fully engaged in the learning process they will need to be supported and encouraged by an adult. Much of the written text is directed towards an adult reader, but certain parts of the activity have a more child-oriented approach. It is hoped that adult guidance and support will assist in making this activity a rewarding experience.

Description:
In this activity you will build and program Street Sweeper. The program will change the Street Sweeper's direction and also change the motor power, thus changing the effort used by the Street Sweeper to sweep. The Street Sweeper has a lot to do outside the café, and also when the wind blows it can be difficult to sweep all the litter up. You will also build people eating inside and outside the café.

Objectives:
• Using technology to create and communicate ideas
• Demonstrating knowledge and operating digital tools and technological systems
• Building and testing using feedback and knowledge of simple machines
• Tracing the transmission of motion
• Writing a script with a dialogue for at least two characters
• Acting out a story, storytelling and narrating through characters

Vocabulary
As you have already tried the LEGO Education WeDo Software, the terms used in this activity should be familiar. If you need additional guidance, we recommend referring to the Teacher's Guide, which is included in both 2000097 LEGO Education WeDo Software and 2009580 Activity Pack for LEGO Education for the WeDo Construction Set.
• Start On Key Press Block • Add to Display Block • Subtract from Display Block • Motor Power Block
• Motor That Way Block • Motor This Way Block • Wait For Block • Repeat Block
• Number Input • Random Input • Display Input
The following words will be used in the activity and might need explaining:
• Friction • Belt• Pulley • A café • Litter
LEGO® Materials Required
• 2000097 LEGO Education WeDo Software (alternatively 2000095 LEGO Education WeDo Software + 2009580 Activity Pack for LEGO Education WeDo)
• 9580 LEGO Education WeDo Construction Set • 9311 City Building Set

Grades 5 & 6 as well as grades 7 & 8 will use the Robotics Engineering I with the Mindstorm Kits. Robotics Engineering I has a set of six basic activities utilizing all the features of the Mindstorm kit. These will be used as the basis for in-class activities for grades 5 through 8. These activities are proprietary and cannot be distributed, but a sample description page is included below. Teachers involved are expected to create their own activities to add to the program.

Mindstorm Sample Activity from Robotics Engineering I

Teacher Notes: Faster Line Tracking
Introduction to Mobile Robotics > Faster Line Tracking
Description of the Unit
In the Follow the Guidelines activity, students learned how to program a robot to track a line. The students should have constructed a robot that was successful, but also very slow. In real world robotics projects, speed and efficiency are often important goals. For this reason, the students will learn how programming and engineering can be used together to track a line quickly, without sacrificing accuracy.
Activity summary: students will...
- Alter the Line Tracking program by increasing motor speed
- Study the effects of changing motor speed on line tracking ability
- Learn how the placement of the Light Sensor affects line tracking ability
- Reposition the Light Sensor to improve the robot's efficacy and test it

Prerequisites:
- Set up an area with a black line of electrical tape on a light surface, or have an area ready for students to set up
- Follow the Guidelines Activity
- Present to class the Faster Line Tracking slideshow from Teacher's Curriculum CD and have class discussion (optional)
- Review/teach calculating thresholds and using View Mode (optional)

Central Concepts
Approximate classroom time: 3-4 class periods (45-minute periods)
Approximate homework time: Up to 1 hour (Conclusions section)

Note to the teacher
This Exploration can only be performed with the Taskbot model. The Robot Educator model (REM) has a different wheel configuration, and thus tracks the line in a different way. None of the explanations of the line tracking problems that the robot encounters will make sense if you are using the REM.
There are many reasons why a robot would be unable to track the line. Common problems include an incorrect threshold level, or a threshold level that is correct on one area of the board, but, due to lighting changes, will not work on another side of the board. With the Light Sensor on the front of the robot, it also cannot track the line very quickly, so watch out for students whose line tracking behavior will not work because the motor power levels are set too high.
Math
- Boolean Logic • Comparisons (<,>) • Distance
- Spatial Reasoning • Thresholds and Averages

Science
• Light & Reflectivity Color Perception Observations and Predictions

Technology
- Design Critiquing
- Conditional Statements • Troubleshooting
- Robotic Decisions & Behaviors

Communication
- Explanatory, Summative, & Descriptive Composition
- Brainstorming Possible Solutions for Unexpected Situations

Students may also find it difficult to understand how the light sensor detects colors as opposed to black and white. To help demonstrate this concept, refer to the Light Sensor page in the Basics > NXT Sensors portion of the student CD, or check out this useful animation.

Students will be able to:
1. Follow directions to conduct a guided partial inquiry
2. Learn about how the robot's geometry inhibits its ability to track a line
3. Learn how to speed up the line tracking behavior
4. Experiment with different aspects of the robot's design to come up with an optimal method for line tracking
5. Appreciate tradeoffs and decisions in the design process
6. Write a conclusion that summarizes the information learned in the exploration

Grades 9 – 12 will use Robotics Engineering II with Mindstorm kits. This program includes three studies about engineering, "What is Engineering, Engineering Process, Engineering Example: Red Team" and three engineering projects, "Mine Mapping, Sentry System, and Tree Surveying", which will be used as the basis for in-class activities for grades 9 through 12. These

activities are proprietary and cannot be distributed, but a sample description page is included below. . Teachers involved are expected to create their own activities to add to the program.

Robotics Engineering II Sample Worksheet

Worksheet: Existing Design
Engineering > Tree Surveying > Investigation 1
This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.

Measure: Test the Device

1. Are readings from the same object similar or dissimilar?
2. Are readings from different objects similar or dissimilar?
3. Do larger objects produce higher or lower numeric readings than smaller objects?

(Below are headings of a table for students to fill in.)
Reading #1 Reading #2 Reading #3 Object 1: Object 2:

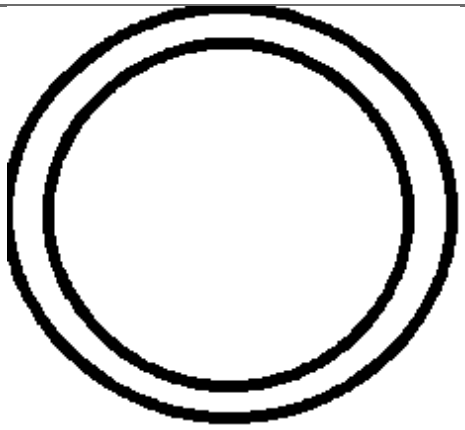
Conclusions and Exercises

4. There are two Touch Sensors used in the caliper. What does each do?
5. Looking at the program:
i. What sensor is used to give the final value displayed on the NXT screen, and what are the units of this value?
ii. Where is this sensor located on the robot?
iii. Based your answer from part (ii) and your knowledge of the arm mechanism, would you expect a larger object to produce a higher or lower reading than a smaller object when measured? Explain why.
iv. Does your prediction align with the actual results that you received when testing?
6. The arm swings outward before swinging inward.
i. How does the program know when to stop the outward motion?
ii. What does this outward movement accomplish for the caliper?
iii. What is the purpose of the Rotation Sensor Reset Block at the end of this behavior?
7. Summarize your findings about the way the existing caliper design works, in a format that you will be able to refer back to later when you are working on the robot.
8. Do you see any areas in the program or on the physical mechanism that could be improved? Identify any such areas, and if reasonable, make the improvements!

After School Spring Competitions
All these competitions will be free.

Grades 3 & 4 will use the WeDo robot kits
Grades 5& 6 competitions will use the Mindstorm robot kits and will be simple competitions made up by the regional teachers. Four of these competitions have already been made up and used in CACC's summer STEM camp for four years. A sample is included below.
Sample After School competition

Race # 1: CACC 5 - A Round Race Course Competition

Each team will have two runs. Teams will be allowed to repair and modify their robots while other teams are making their runs. May the best robot win!	

Rules:

1. The robot's front wheels must start behind the starting line.

2. Robots will be disqualified if any piece falls off during the race.

3. Robots must add a penalty second each time a wheel **completely** crosses a lane marker. (means it's ok to touch the lane line.)

4. Robots will be disqualified if two or more wheels completely cross a lane marker.

5. Robots failing to stop within twelve inches after crossing the finish line will be disqualified.

6. You will place your robot at the starting line and start the program. The robot must be activated to take off when it hears the starting gun.

7. The robot must go around the track 5 laps.

8. The robot with the fastest time of the two time trials wins the race.

Each member of the winning team will receive a winner's certificate and a prize.

Students in grades 5 – 8 will also participate in state FLL competitions in the fall.
Students in grades 9 – 12 will compete in either First Tech or FIRST Robotics competitions in the fall.

Connection Between Academic Concepts and Lego Activities

The following charts are available from Lego Education. Engineering I- Math, Science, and Technology Concepts charts. Engineering II Math, Science, Technology, and Communication Concepts charts, WeDo- Learning Grid. Collectively they constitute 31 pages of information so will not be included here.

Project Time Line

Year One

During the first year the project will only include the five K12 systems in the service area of the Alexander City campus of Central Alabama Community College (CACC). The project team for this system will include :

Regional Director – PI for this project
Four or Five 4-person Science Teams – Students taking physics at CACC
Lead teacher for each school in the k12 system

Year Two

During the second year the project will expand to include three more regions.

Region 1 CACC Alexander City campus Service Area –Regional Director, K. W. Nicholson
Region 2 Jefferson State Community College area schools – Regional Director, Ali Yazdi
Region 3 Huntingdon College or Birmingham Southern College-Jamie Demick (maybe)
Region 4 Auburn University area schools – Regional Director, Marlin Simon

Year 3

Region 5 Southern Union Community College or -Regional Director, not yet determined
Region 6 University of Alabama or University of Alabama in Birmingham– Regional Director, not yet determined
Region 7 Montevallo or Birmingham Southern College-Regional Director, not yet determined

Personnel for this project

PI -K.W. Nicholson, CACC Physics Instructor
Co PI – Marlin Simon, Auburn Physics Instructor and Region 2 Director
Co PI- Beverly Price, Radney Elementary Principal
Evaluator – Regina Halpin

Evaluation Plan

The **Project Goal** is to develop a strategy for integrating robotic concepts into the elementary and secondary school curriculum and partnerships with universities and junior colleges to ensure consistency in preparing college-bound students in the STEM fields. This goal will be achieved by developing a sustaining model using in-class robotic activities and after-school robotic competitions for school systems.

Expected Project Outcomes:

1. Participants (grades 3-12) will demonstrate an increased interest and understanding in robotics
2. Participants (grades 7-12) will understand the math and science required for STEM related careers
3. Science Team Leaders (college students) will develop confidence and leadership skills

4. A model for developing sustainable partnerships between grade schools and universities will be developed
5. Lead Teachers will facilitate the integration of robotic concepts into the state-wide science curriculum using refined classroom activities
6. Participants in grades 4 -8 will annually compete in the First Lego League competition and grades 9-12 will compete in the First Tech Robotics
7. Robotic modules will be developed for use in elementary and secondary science curricula

Evaluation Overview - The evaluation efforts will focus on gathering information about the implementation of project modules consisting of in-class and after-school activities and the progress made toward achieving annual benchmarks regarding student achievement and the participants' interest in robotics and related careers. An *experimental design* will be implemented to assess the attitudinal and career-based knowledge within a school by comparing those participants within this project to those not participating. Sampling and data collection methods will be used such that all participants can be *followed longitudinally* as the project unfolds and becomes sustainable for dissemination. Multiple validated quantitative and qualitative methods (e.g. test scores, surveys, interviews, observations, document analysis) will be obtained from the literature and as needed, modified or developed to obtain valid data regarding the impact of this project. The proposed evaluation plan incorporates *qualitative and quantitative assessments* to assess the overall impact of the project, the development of the partnerships during the three year project, sustainability of the project, and dissemination of the curriculum-based materials. *Triangulation* will be achieved by gathering the qualitative data from and/or about the participants, science team instructors, project and regional directors, and lead teachers as they pertain to the project goals and desired outcomes. *All data will be collected using web-based evaluation instruments and managed using a database.*

Summarizing and Reporting Evaluation Results - All data gathered will be gathered online and managed in a database. The evaluations will be grade appropriate. The unit of analysis will be each school in those systemic changes and outcomes are expected within schools as a result of this project. Therefore, most data will be aggregated at the school level to determine the impact of project initiatives on school-wide curriculum and instructional practices and policies, teacher knowledge, and student achievement. All data will be reviewed and reported anonymously as approved by the *Institutional Review Board* process at Auburn University. Findings will be presented formally (in written and verbal formats) and informally (e.g. progress reports at planning group meetings) on a regular basis. Additional report briefs will be customized according to the intended audience (e.g., school administrators, teachers, parents).

Research Questions:

RQ1: What are the participants' characteristics?

RQ2: After participation in this program, will participants' knowledge, interest, and attitude toward robotics increase?

RQ3: How will participants' evaluations of the in-class and after-school activities relate to their reported interest and confidence in their ability to do math and science?

RQ4: How well does the content engage and maintain the participants' interest?
The purpose is to gather formative data so changes can be made between sessions

RQ5: Will participants' confidence in their math and science skills continue to increase each year until graduation?

RQ6: Do participants understand the math and science courses needed for specific careers, including robotics?

RQ7: Will the Science Team Leaders demonstrate an increase in confidence and an elevation in leadership skills?

RQ8: Will all students participate in the annual robotic competitions?

Students – The students are the primary focus of this project. As the project works toward increasing student achievement, the evaluation will assess other important student outcomes such as the types of courses students are taking, their academic efficacy and the motivation to learn math and science, their attitudes toward school and learning math, science, and robotics, and their orientation toward math- or science-related careers. The evaluator will use psychometrically-sound, grade-appropriate measurement instruments when examining these factors (e.g. Patterns of Adaptive Learning (PALs), Motivation Strategies Leaning Questionnaire (MSLQ), Career Orientation Scale, and the Checklist of Math and Science-related Activities). In addition, age-appropriate journaling by the student participants and observational comments and checklists from the instructors regarding the students' participation, interests, and attitudes will be incorporated. A control and experimental group will be used for comparison.

Lead Teachers – The lead teachers will serve as an important source of information for the project's evaluation. These evaluations will be helpful in determining the extent to which the current teaching force is adequately prepared to integrate robotics in accordance with established best practices in the field and examining the opportunities for teacher professional development needed to impact on teaching and assessment practices and student learning. Through the lead teachers, formative and summative evaluations will include an assessment of teachers' pedagogical and content knowledge and the observation of the skills they are demonstrating in their classrooms. Furthermore, the role that school- and district- teacher leaders are providing in helping teachers and establishing learning communities will be closely monitored by the evaluation through quarterly progress reports and teacher surveys.

Evaluation Plan Timeline

	Module Task	Evaluation Instrument	Completing Evaluation
Year 1			
	Baseline Data (RQ1)	Age-appropriate Demographics Survey	All student participants (with the exceptions

		Needs Assessment Test Scores Pre-Robotic Attitude and Interest Evaluation Pre-Math and Science Confidence Evaluation Pre-Career Knowledge and Interest Evaluation Pre-Leadership Skills Eval.	outlined above for Grades 7-12)/Lead Teachers Student Participants – Control & Experimental Groups Student Participants – Control & Experimental Groups Student Participants – Control & Experimental Groups Science Team
	Module Development	Module Checklist Module Usability Assessment	Lead Teachers, Regional Dirs Lead teachers
	Train instructors	Training Satisfaction Questionnaire	Workshop Participants Workshop Instructors
	Implement activities in classrooms and after school	Formative Instructor Satisfaction Questionnaire (RQ4) Summative Implementation Eval. Robotic Competition Participation (RQ8)	Science Team Lead Teachers, Science Team Student Participants (control group) & Science Team
Year 2	**Module Task**	**Evaluation Instrument**	**Units Completing Evaluation**
	Implement activities in classrooms and after school	Formative Instructor Satisfaction Questionnaire (RQ4) Summative Implementation Formative Robotic Attitude and Interest Evaluation (RQ2)	Science Team Lead Teachers, Science Team Student Participants

		Formative Math and Science Confidence Evaluation (RQ3) Robotic Competition Participation (RQ8)	Student Participants (control group) & Science Team
	Module Task	**Evaluation Instrument**	**Units Completing Evaluation**
Year 3	Summative comparison to Baseline	Test Scores	Lead Teachers
		Post Robotic Attitude and Interest Evaluation (RQ2) Post Math and Science Confidence Evaluation (RQ5) Post Career Knowledge and Interest Evaluation (RQ6)	Student Participants Student Participants – Control & Experimental Groups
		Post Leadership Skills Evaluation (RQ7)	Science Team
		Robotic Competition Participation (RQ8)	Student Participants (control group) & Science Team

Demographics: Data collected will consist of (a) gender, grade, nationality, attended a previous summer academic program to establish baseline, (b) College plans and intended major ***(Grades 7-12 only)*****, (c)** What students feel they will gain by participating: categorize their comments and give % in an effort to characterize STEM and robotic pre-interest of those students attending Math and science courses taken (obtain averages from school counselor for tracking ***-Grades 7-12 only*****),** (d) When have students used journaling and how? – Because journaling will be an evaluation component throughout the project, it is important to make sure the participants are familiar with the process. This information will be used to decide if pre-instructions are needed.
Needs Assessment: An initial needs assessment will be conducted from those all students in grades 7-12 to gather baseline data (e.g. student achievement, curriculum background, STEM and robotic interests) of the participants' characteristics and to identify any additional areas in which the project should target. These identified areas will become part of the *formative evaluations*. This phase will also be useful in providing formative information about school's existing curriculum, instructional methods, professional development needs, and student opportunities to learn science and mathematics so that appropriate goals and benchmarks can be established and disseminated throughout the state.

Module Checklist: To assess the module content, a checklist will be used to evaluate all in-class and after-school activities based on the national science curriculum standards. The Regional Directors, Science Team, and Lead Teachers will cross-examine modules as well as science content and education experts. The lead teachers will provide input on whether the content of each module is complete, clear, and sufficient for meeting curriculum standards and classroom time constraints.

Module Usability Assessment – An assessment designed to determine how well teachers rate each module for applicability and ease of use in their classroom, content clarity, probability they will use the module in the classroom, time and resource limitations, and how to improve the training sessions. For validity purposes, qualitative and quantitative data will be collected.

Training Satisfaction Questionnaire – The specialists teaching the modules will provide data on how to improve upcoming training sessions and lead teachers being trained will provide additional evaluation data after each training session.

Instructor Satisfaction Assessment – The Science Team implementing the activities of the module will provide data on how to improve logistics, activities based on what works and does not work

Summative Implementation Evaluation – After year 1 implementation of the in-class and after-school activities, the teachers will provide a summative evaluation. All data collected will be qualitative. After year 1, this will become the qualitative component of the project's summative evaluation.

Validated evaluations will be obtained from the literature to assess: (1) Attitudes, **(2)** Interest in math, science, and robotics, **(3)** Confidence to complete tasks involving math, science, and robotics, **(4)** Career Knowledge (understanding the math and science skills needed for specific careers), and **(5)** Leadership Skills.

REFERENCES CITED

Journal of Extension (JOE) article A New Model of 4-H Volunteer Development in Science, Engineering, and Technology , April 2009 // Volume 47 // Number 2 // Ideas at Work // 2IAW4

Anca Dragan and Siddhartha Srinivasa, "Learning to Provide Better Examples for Our Robots" Proceedings of the Human-Robot Interaction Pioneers Workshop, March, 2011

Gerald Carter, Larry Lee, and Owen Sweatt, "Lessons Learned From Rural Schools", Auburn University, May, 2009

Principal Investigator – K. W. Nicholson

Received BS in Math Education at Oklahoma State University in 1971 and a Masters of Science in Math at Oklahoma State University in 1975.
Taught math at Barrenjoey High School in Avalon Beach, NSW, Australia 1973 – 1975
Taught Math at Dalton Jr. College in Dalton Georgia from 1975 - 1977
Taught math part time at Brunssum Education Center and at AFCENT School in Brunssum, Netherlands 1985-1987
Assistant director of the Brunssum Education Center 1986-1987
Taught math at CACC from 1977 – 1985, math and physics 1987 – present

Co-PI Dr. Beverly Price

Beverly Pearson Price, Ed. D. Principal of William L. Radney School in Alexander City, AL.

I hold a Bachelor's of Science in Human Resources Management from Faulkner University, a Master's of Education in Elementary Education from Auburn University at Montgomery, an Education Specialist Degree in Educational Leadership from Auburn University at Montgomery, and an Educational Doctorate in Administration of Elementary and Secondary Schools from Auburn University.

I taught elementary school for 4 years, teaching Kindergarten and 6th grade. I have taught 6th grade math, reading, and social studies. I have been an administrator for eight years.

My areas of research interest are in the areas of mentoring and teacher student relationships along with an interest in teaching math across the curriculum. My school employs the strategies and techniques endorsed by the Alabama Math Science and Technology Initiative, the Alabama Reading Initiative, and the Transforming East Alabama Mathematics cohort.

Abbreviated Curriculum Vitae
(Related to Undergraduate Education)
Marlin L. Simon

Professional Preparation

A.A., 1959, Pre-Engineering; Chanute Jr. College, Chanute Kansas
B.S., 1961, Physics & Mathematics; Kansas State Teachers College, Emporia Kansas
M.S., 1962, Physical Science; Kansas State Teachers College, Emporia Kansas
M.S., 1964, Physics; Michigan State University, East Lansing, Michigan
Ph.D., 1972, Physics; University of Missouri, Columbia, Missouri

Academic Appointments

Professor Emeritus	2011
Coordinator of Undergraduate Physics Instruction	2005-2010
Howard E. Carr Endowed Professorship	1998-2008
Associate Professor, Auburn University	1978-Present
Director Of Undergraduate Lab Program, Auburn University	1972-2004
Assistant Professor Auburn University	1972-78
Assistant Professor Southwest Minnesota State College	1971-72
NSF Faculty Fellow, University of Missouri	1968-71
Instructor, University of Missouri at Columbia	1967-71
Assistant Professor, Kansas State Teachers College	1964-67

Publications Related to Teaching

"Physical Science Laboratory Manual", PHS 100-101, Ward, Thompson, Simon; Contemporary Publishing Co., Raleigh, NC, 1st, 2nd and 3rd Edition; 1974, 1981 and 1984.

"Physics - A Laboratory Textbook", Vols I and II, PHS 1500,1510,1600,1610,1607 and 1617, Simon; Contemporary Publishing Co., Raleigh, NC, 1st-8th Editions, 1981-2008.

"Physics-Study Guide to Accompany Buckwalter/Riban", Simon, McGraw-Hill Book Company, 1987

"Physics-Study Guide to Accompany Gettys, Keller and Skove", Simon and Thaxton, McGraw-Hill Book Company; 1st and 2nd edition, 1989 and 1992

Thirty-five online diagnostic tests for introductory physics students. These are on a National site monitored by McGraw-Hill, 2004-present

Instructors Solution Manual and Student Solution Manual Vol 1: Chpts 1–16, Adison Wesley 2007 (with Smith and Kahol) to accompany the Knight, Jones and Field text 1st and 2nd Ed.

Instructors Solution Manual and Student Solution Manual Vol 2: Chpts 17–30, Adison Wesley 2007 (with Smith and Kahol) to accompany the Knight, Jones and Field text 1st and 2nd Ed.

"It Only Takes One" Invited Talk published by the "Science House", North Carolina State University 6th Annual Conference on K-12 Outreach from University Science Departments. Spring 2008.

Honors and Awards

NSF Science Faculty Fellow	1968-1972
Certificate of Merit, Extension Office, A. U.	1988
Authors Recognition Award, Office of the V.P. for Research, A.U.	1989
Governor's Proclamation signing for Science & Technology Week	1989 and 1990
Auburn University Extension Award for Excellence	1990
Science Olympiad National Coordinators Award	1992
College of Sciences and Mathematics Teacher of the Year Award	1992 and 2008
Alabama Science Teachers "Friend of Science" Award	1992
George B. Peagram Medal and Certificate of Excellence in the Teaching of Physics in the Southeast, Awarded by The	1992

Southeastern Section of the American Physical Society

Carr Endowed Professor of physics	1998-2004
College of Science and Mathematics Outreach Award	2006
College of Science and Mathematics Teaching Award	2008
Nominated for Carnegie National Teacher Award	2009

Dr. Regina Halpin
Program Evaluation and Assessment Consultant

ACADEMIC RECORD

Ph.D., Mathematics Education, Auburn University, December 1994.
M.Ed., Mathematics Education, Auburn University, August 1990.
B.S., Applied Mathematics, Auburn University, June 1988
(Minor: Computer Science Engineering)
Teaching Certification: Type A (1990), Type AA (1992)

HIGHER EDUCATION EMPLOYMENT

Mississippi State University, Starkville, Mississippi

Associate Professor	May 1998 – August 2002
Graduate Coordinator	August 2000-August 2002
Assistant Professor	August 1995 – May 1998
Coordinator for Engineering and Sciences Education and Outreach	December 1993 - August 1995

Southern Union State Junior College, Opelika, Alabama

Adjunct Instructor	September 1992 - September 1993
Teacher Training Computer Instructor	June 1990 - August 1991

RELEVANT EVALUATION CONSULTING PROJECTS (A total of 22 consulting projects)

[7] Bringing Global Climate Change Education to Alabama Classrooms. Sponsored by NASA. Develop and implement
assessment plan for 3 year project. Includes assessment instrument development, data analysis, and annual final reports to evaluate the content and delivery of teachers' science modules. 2009-2012.

[6] Auburn University Campus Climate Survey. Sponsored by Auburn University. Prepared final report of data
analysis. 2009.

[5] Advancing Trade with Latin America: Developing a Unique International Business Education Continuum for Community Colleges Through 4 Year Degree Programs and Alabama's Business Community sponsored by the Department of Education. Developed and implemented evaluation plan for the three year project. Included
assessment instrument development, data analysis, and reports. 2006-2009.

[4] ADVANCE Partnerships for Adaptations, Implementation, and Dissemination through "Small Wins" sponsored by
the National Science Foundation. Developed program evaluation plan and assess the "small wins" project; includes assessment instrument development, data collection, analysis, and reports. 2006-2010.

[3] L.I.F.E. in Science: Leadership Institute for Females Exceptional in Science. Developed and implemented
program evaluation plan to assess the project; included data analysis and reports. Held at Auburn University, July 17–21, 2006.

[2] Alternative Energy: A Workshop for Middle School Teachers. Developed curriculum materials for workshop based
on national and state math and science curriculum standards. June 27-28 and July 18-19, 2006.

[1] Boosting Engineering, Science, and Technology (B.E.S.T.). Developed, administered (online), and provided
results for the program evaluation involving 9 regional hubs. 2004-2005.

RELEVANT CONFERENCE PRESENTATIONS ***(A total of 23 conference presentations)***

[3] Bobrowski, P., Marshall, B., and Halpin, R. How to Demonstrate Effective Grant Management with a State-of-the-Art Assessment Model. Paper presented at the 2009 NASBITE International Conference, San Diego, CA, April, 2009.

[2] Nelms, R. M., & Halpin, R. F. Experience with an Alternative Energy Workshop for Middle School Science Teachers. Paper presented at the 2007 ASEE Annual Conference, Hawaii.

[1] Nelms, R. M., & Halpin, R. F. Using Problem-Solving Videos in an Introductory Engineering Circuit Analysis Course. Conference Proceedings of the 2005 ASEE Annual Conference & Exposition, June, 2005, 10 pages.

JOURNAL PUBLICATIONS (A total of 11 publications in refereed journals)

[5] Dearholt, D. W., Alt, K. J., Halpin, R. F., & Oliver, R. L. (2004). Foundational Aspects of Student-Controlled Learning: A Paradigm for Design, Development, and Assessment Appropriate for Web-based Instruction. Journal of Engineering Education, 1-10.

[4] Myers, J. M., & Halpin, R. F. (2002). Teachers' Attitudes and Use of Multimedia Technology in the Classroom: Constructivist-Based Professional Development Training for School Districts. Journal of Computing in Teacher Education, 18(4), 133-140.

[3] Sumrall, W. J., & Halpin, R. F. (Fall, 2000). Integrating mathematics and computer skills through science. Science Scope, 68-71.

[2] Halpin, R. F. (1999). A model of constructivist learning in practice: Computer literacy integrated in elementary mathematics and science teacher education. Journal of Research on Computing in Education, 32 (1), 128-138.

[1] Halpin, R. F. (1996). Incorporating Computer Applications Into Inservice and Preservice Education: Mathematics Teachers Explore the World Wide Web. Journal of Technology and Teacher Education, 4 (3/4), 297-308.

RELEVANT FUNDED GRANTS (A total of 26 funded grants totaling $730,332)

[7] Institute for Algebra and Quantitative Literacy for Middle School Teachers. Co-principal investigators: B. Ebanks, Department of Mathematics and Statistics, R. F. Halpin, Department of Curriculum and Instruction, J. Harvill, and B. Scarborough, Department of Mathematics and Statistics. Funded by the Institutions of Higher Learning. Starting date for funding: October, 2000. Project Duration: $75,000 for 1 year.

[6] Technology in the Classroom: Training Institutes for Teachers and/or Administrators - FY2000. Principal Investigator: R. F. Halpin. Funded by the Mississippi Department of Education. Starting date for funding: January 1, 2000. Project Duration: $5,661 for 6 months.

[5] Foundational Aspects of Student-Controlled Learning: A Proposal for Research, Development, and Assessment Appropriate for Web-Based Instruction in Engineering. Principal Investigators: Donald Dearholt & Regina Halpin. Funded by the Waterways Experimental Station (WES). Starting date for funding: August 15, 1998. $31,041.

[4] Teacher Training and Curriculum Integration of Technology. Principal Investigator: Regina Halpin. Funded by Scott County Mississippi Technology Literacy Program. Starting date for funding: June, 1, 1998. Project Duration: $12,750 for 1 year.

[3] Improving the Pedagogical Approach to Teaching Math to Preservice Teachers Using Computer-based Instruction. Co-principal Investigators: K. Walters & R. F. Halpin. Funded by the Schillings Teaching Program, Mississippi State University Office of Research. Starting date for funding: May, 1997. Project Duration: $1,900 for 1 year.

[2] MATH-PLACE (Year 1 & 2) - Measuring and Analyzing Techniques Heuristically: Professionals Learning Assessment, Computers, and Ethnic equity. Co-principal Investigators: P. Freeman & R. F. Halpin. Funded by the Institutions for Higher Learning (IHL). Starting date for funding: May, 1997. Project Duration: $319981, 724 for 2 years.

[1] Power Engineering Research Activities for Mississippi High School Teachers. Co- principal Investigators: S. M. Halpin, R. F. Halpin, & R. L. King. Sponsor: National Science Foundation. Starting date for funding: June 1996. $11,172.

AWARDS

[2] Outstanding Service Award – Presented by the Mississippi State University Department of Curriculum and
Instruction – August, 2001.
[1] Outstanding Researcher Award – Presented by the Mississippi State University Phi Delta Kappa Chapter – March,
2000.

CURRICULUM DEVELOPMENT

PRISMS (1998). Six integrated math, science, and technology lesson units with assessment for grades 1-6 for the Mississippi Department of Education.

COURSE DEVELOPMENT

EDS 8301: Advanced Methodologies for Secondary Technology. Graduate level technology integration and evaluation course for secondary students.

OFFICES HELD IN PROFESSIONAL MATH AND TECHNOLOGY EDUCATION SOCIETIES

Mississippi Council of Teachers of Mathematics (MCTM)
President, 2000-2001
President-Elect, 1999-2000 (responsibilities included serving as 2000 state-wide conference chair)
Executive Board of Directors, Conference Chair, 1998-1999

Mississippi Educational Computing Association (MECA)
President, 2000-2001
President-Elect, 1999-2000
Executive Board of Directors, 1997-1999

SUMMARY PROPOSAL BUDGET

YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Central Alabama Community College

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
King W Nicholson

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **King W Nicholson - PI**	12.00	9.00	3.00	**27,000**	
2. **Beverly P Price - Co-PI**	12.00	9.00	3.00	**10,000**	
3. **Marllin L Simon - Co-PI**	12.00	9.00	3.00	**10,000**	
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**3**) TOTAL SENIOR PERSONNEL (1 - 6)	36.00	27.00	9.00	**47,000**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**36**) UNDERGRADUATE STUDENTS				**90,000**	
5. (**1**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**10,000**	
6. (**30**) OTHER				**117,000**	
TOTAL SALARIES AND WAGES (A + B)				**264,000**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**11,245**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**275,245**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
230 WeDo Kits $ **34,500**					
250 Mindstrom Kits **65,000**					
TOTAL EQUIPMENT				**99,500**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **10,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**10,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**10,000**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**40,300**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**50,300**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**435,045**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **(Rate: , Base:)**					
TOTAL INDIRECT COSTS (F&A)				**0**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**435,045**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**435,045**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
King W Nicholson

ORG. REP. NAME*
Michael Lovett

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Central Alabama Community College

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
King W Nicholson

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **King W Nicholson - PI**	12.00	9.00	3.00	**27,000**	
2. **Beverly P Price - CoPI**	12.00	9.00	3.00	**10,000**	
3. **Marllin L Simon - CoPI**	12.00	9.00	3.00	**10,000**	
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**3**) TOTAL SENIOR PERSONNEL (1 - 6)	36.00	27.00	9.00	**47,000**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**36**) UNDERGRADUATE STUDENTS				**90,000**	
5. (**1**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**10,000**	
6. (**32**) OTHER				**137,000**	
TOTAL SALARIES AND WAGES (A + B)				**284,000**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**11,245**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**295,245**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
Mindstrom kits $ **65,000**					
WeDo Kits **24,500**					
TOTAL EQUIPMENT				**89,500**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **10,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**10,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**10,000**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**40,300**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**50,300**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**445,045**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **(Rate: , Base:)**					
TOTAL INDIRECT COSTS (F&A)				**0**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**445,045**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**445,045**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
King W Nicholson

ORG. REP. NAME*
Michael Lovett

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 3

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Central Alabama Community College

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
King W Nicholson

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **King W Nicholson - PI**	12.00	9.00	3.00	**27,000**	
2. **Beverly P Price - CoPI**	12.00	9.00	3.00	**10,000**	
3. **Marllin L Simon - CoPI**	12.00	9.00	3.00	**10,000**	
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**3**) TOTAL SENIOR PERSONNEL (1 - 6)	36.00	27.00	9.00	**47,000**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**36**) UNDERGRADUATE STUDENTS				**90,000**	
5. (**1**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**10,000**	
6. (**34**) OTHER				**157,000**	
TOTAL SALARIES AND WAGES (A + B)				**304,000**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**11,245**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**315,245**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
Mindstrom Kits $ **55,000**					
WeDo Kits **24,500**					
TOTAL EQUIPMENT				**79,500**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **8,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**8,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**5,000**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**40,300**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**45,300**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**448,045**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **(Rate: , Base:)**					
TOTAL INDIRECT COSTS (F&A)				**0**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**448,045**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**448,045**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
King W Nicholson

ORG. REP. NAME*
Michael Lovett

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Central Alabama Community College**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **King W Nicholson**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **King W Nicholson - PI**	36.00	27.00	9.00	**81,000**	
2. **Beverly P Price - CoPI**	36.00	27.00	9.00	**30,000**	
3. **Marllin L Simon - CoPI**	36.00	27.00	9.00	**30,000**	
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**3**) TOTAL SENIOR PERSONNEL (1 - 6)	108.00	81.00	27.00	**141,000**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**108**) UNDERGRADUATE STUDENTS				**270,000**	
5. (**3**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**30,000**	
6. (**96**) OTHER				**411,000**	
TOTAL SALARIES AND WAGES (A + B)				**852,000**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**33,735**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**885,735**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.) **$ 268,500**					
TOTAL EQUIPMENT				**268,500**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **28,000**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**28,000**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**25,000**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**120,900**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**145,900**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**1,328,135**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				**0**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**1,328,135**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**1,328,135**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **King W Nicholson**

ORG. REP. NAME*: **Michael Lovett**

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

Budget:

Project Director ½ time salary for 3 years = 3x27 000 =
81,000
Project Administrative Assistant 1 day /week 10,000 / yr x 3 =
30,000
7 Regional Directors 3x2x10,000 + 3x10000 =
90,000
108 science team members (20x3 +3x3x4 + 3x4) x 2500
270,000
70 Lead Teachers (total for 3 years) 70x5000 =
350,000
750 Mindstorm x 300 each =
225,000
690 WeDo x 150 each =
103,500
Participant support costs =
30,000
Materials and equipment maintenance =
30,000
Total
1,209,500
Evaluation 10% of total =
120950

Grand Total =
1,330,450

Note: The cost of First Lego League registration is $200 per team and the cost for field setup kits, (which may be shared), is $65.

Each First Tech team will have the following costs.

Program registration	275
2010 FTC competition kit	749 but includes a Mindstorm kit, so without the MS kit it would be about 500.
Event Registration fee	0 – 300 for each event
Additional kit items	0 – 500

A FIRST Robotics Team will have the following costs.

2011 Rookie Teams Registration + Kit of Parts + participation in one event =	6500
Participation in each additional event =	4000

These costs must be met by team members of individual teams*. They will be coached in how to raise funds, either by creating their own businesses, by donations, or some combination.

***Underprivileged students may receive assistance from the Participant Support costs.**

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: King Nicholson

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: None

Source of Support:

Total Award Amount: $ 0 Total Award Period Covered: 01/01/00 - 01/01/00

Location of Project:

Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Beverly Price

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: NA

Source of Support:
Total Award Amount: $ 0 Total Award Period Covered: 01/01/00 - 01/01/00
Location of Project:
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Marllin Simon

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: NA

Source of Support:
Total Award Amount: $ 0 Total Award Period Covered: 01/01/00 - 01/01/00
Location of Project:
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Regina Halpin	Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: NA

Source of Support:
Total Award Amount: $ 0 Total Award Period Covered: 01/01/00 - 01/01/00
Location of Project:
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

FACILITIES, EQUIPMENT & OTHER RESOURCES

FACILITIES: Identify the facilities to be used at each performance site listed and, as appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Use "Other" to describe the facilities at any other performance sites listed and at sites for field studies. USE additional pages as necessary.

Laboratory:

Clinical:

Animal:

Computer:

Office: Space for offices, development labs, and instructional rooms are provided by the host institutions (CACC) in accordance to the to the terms provided to the State of Alabama in accordance to the grant award at no cost.

Other:

MAJOR EQUIPMENT: List the most important items available for this project and, as appropriate identifying the location and pertinent capabilities of each.

OTHER RESOURCES: Provide any information describing the other resources available for the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.

Data Management Plan

All the materials generated by the participants of this project as well as all the evaluation results will be shared with the public. For the duration of the grant, these materials will be placed on the Central Alabama Community College (CACC) physics department web server and maintained by the CACC physics department. After the project is finished and all data has been compiled and placed on the web server, it probably should be also deposited on the web server of some NSF archive or a one of the major universities involved in the project.

There is the possibility of making presentations at regional and/or national meetings of the American Association of Physics Teachers either discussing the evaluation outcomes or providing instructions for building Science Team Networks.

These data will be organized in the following categories:

Grades 1 – 4
Activities
Evaluations

Grades 5 & 6
Activities
Evaluations

Grades 7 & 8
Activities
Evaluations

Grades 9-12
Activities
Evaluations

Workshop materials for the three day instructional workshops organized by year.

WILLIAM RADNEY ELEMENTARY SCHOOL

140 ALISON DRIVE • ALEXANDER CITY, ALABAMA 35010 • 256-234-8636

MRS. BEVERLY PRICE
PRINCIPAL

MR. JAMIE FORDUS
ASSISTANT PRINCIPAL

December 15, 2010

To Whom It May Concern:

My name is Beverly Price and I am the principal of William L. Radney School in Alexander City, AL. My school services students in the 5th and 6th grades. I am pleased to partner with and support Mr. Nick Nicholson in his quest to initiate STIMITS (Science teams instilling maturity and innovative thinking in students).

I have seen the lack of interest and knowledge in science by students at my school. I welcome any program that will open the eyes of my students to the wonders of science while teaching them thinking skill that they may employ in all areas of their academic career and beyond.

I know that it is not programs that make students successful but the people that administer the program. I have seen the passion with which Mr. Nicholson is pursuing the foundation of STIMITS and have every confidence that he will be successful in passing that passion on to the participants.

I pledge my full support to STIMITS and Mr. Nicholson. I will work toward the success of the program in whatever capacity I am needed. Should you desire additional information, please feel free to contact me at (256)234-6894 or by email at bprice@alex.k12.al.us. I look forward to hearing from you.

Sincerely,

Beverly Price

Beverly P. Price, Ed. D.
Principal
William L. Radney School
Alexander City, AL 35010

ALEXANDER CITY MIDDLE SCHOOL

359 STATE STREET · ALEXANDER CITY, ALABAMA 35010 · 256-234-8660

MR. TRACY MCGHEE
PRINCIPAL

December 16, 2010

To Whom It May Concern:

My name is Tracy McGhee. I am the principal of Alexander City Middle School in Alexander City, Al. My school services students in the 7th and 8th grades. I am pleased to partner with and support Mr. Nick Nicholson in his quest to initiate STIMITS (Science teams instilling maturity and innovative thinking in students).

As educators, we are always looking for new and innovating ways to support learning. I really think these hands-on interventions and laboratory experiences will be very helpful to our students.

I pledge my full support to STIMITS and Mr. Nicholson. I will work toward the success of the program in whatever capacity I am needed. Should you desire additional information, please feel free to contact me at (256)234-8660 or by email at tmcghee@alex.k12.al.us. I look forward to hearing from you.

Sincerely,

Tracy McGhee

Tracy McGhee
Principal
Alexander City Middle School
Alexander City, AL 35010

Horseshoe Bend School

10684 HWY. 22 EAST
NEW SITE, ALABAMA 36256
(256) 329-9110
FAX: (256) 329-9119

CASEY D. DAVIS
PRINCIPAL

JAMES AULNER
JOYCE COKER
VICE PRINCIPALS

Dr. Nicholson,

I feel that after reading this grant proposal this will be a great program for CACC, Tallapoosa County, and the surrounding schools. You have my support as principal of Horseshoe Bend School.

Thanks,

Casey D. Davis

NATHANIEL STEPHENS ELEMENTARY SCHOOL

851 LAUREL STREET • ALEXANDER CITY, ALABAMA 35010 • 256-234-8631

KIM SMITH
PRINCIPAL

January 3, 2011

To Whom It May Concern:

I am writing this letter on behalf of Mr. K. W. Nicholson and the Central Alabama Community College Science Team in support of their proposed project. The project, Science Teams Instilling Maturity and Innovative Thinking in Students, will correlate with elementary science course of study objectives, as well as increase science vocabulary, critical thinking skills, and foster creativity in our students.

This will afford our students an opportunity to experience science on a level they have only seen in movies and in television. As the principal of a Title I elementary school, I believe this experience will be invaluable.

Regards,

Kim Smith
Principal
Stephens Elementary School

HOUSE OF REPRESENTATIVES

ALABAMA STATE HOUSE
MONTGOMERY, ALABAMA 36130

HOUSE DISTRICT NO. 81
TALLAPOOSA & LEE COUNTIES

MARK M. TUGGLE
110 CALHOUN ST., SUITE 108
ALEXANDER CITY, AL 35010
256-392-2006 (C)
LEGISLATIVE OFFICE 524-C
mark.tuggle@alhouse.org
LEGISLATIVE PHONE 334-242-7219

COMMITTEES:
WAYS AND MEANS EDUCATION
- K-12 APPROPRIATIONS SUBCOMMITTEE

STATE GOVERNMENT
- GOVERNMENT REGULATIONS SUBCOMMITTEE
- GOVERNMENT SERVICE SUBCOMMITTEE

TECHNOLOGY AND RESEARCH
- BIO MEDICAL AND MANUFACTURING

LEE COUNTY LEGISLATION

To Whom it may concern:

I am pleased to offer my full support Michael Lovett and K. W. Nicholson in their quest to provide in- class robot activities and competition in the K12 school systems in CACC's service area. I think these hands-on robotics activities and competitions will be very helpful to our students. I am especially pleased that this robotics program is designed to impact most of the students in our K12 system in the in-class activities and gives all the students from grades 3 through 12 an opportunity to engage in after school competitions.

I will work toward the success of the program in whatever capacity I am able. Should you desire additional information, please feel free to contact me. I look forward to hearing from you.

Sincerely,

Mark M. Tuggle

Mark M. Tuggle

Jefferson State
COMMUNITY COLLEGE
jeffstateonline.com
2601 Carson Road – Birmingham, Alabama 35215
Phone (205) 856-7799 Fax (205) 856-7798
E-mail ayazdi@jeffstateonline.com

Associate Dean, Jefferson Campus

May 13, 2011

RE: Mr. Nick Nicholson, Central Alabama Community College

To Whom It May Concern:

I have been observing Mr. Nicholson's professional activities for many years as we have worked together on many physics projects. In addition to his responsibilities as a physics instructor, in the community college setting, at Central Alabama Community College, he is very interested in helping foster an interest in the field of science with young students across our state.

Mr. Nicholson has a unique opportunity to be involved with an in-class robot activity K12 project called *A Strategy for Integrating Robot Activities into a K12 System by Partnering it with a Local College and a Model for Expanding the Program Across an Entire State*. It is worthwhile to mention his enthusiasm and commitment in mentoring both students and teachers in a combined effort of cooperation. He very quickly embraces opportunities such as this grant to reach the goal of expanding knowledge in this area of study. It is apparent he is not afraid of new challenges or changes.

I am excited to partner with Mr. Nicholson in this innovating venture. As educators in the field of science, we understand the urgency of looking for ways to promote interest among the students in the K12 system. Considering all of these facts and his energetic attitude toward his profession and his leadership ability, I pledge my full support and partnership with Mr. Nicholson and this project.

Sincerely,

ali yazdi

Ali Yazdi, Associate Dean
Transfer General Studies, Jefferson Campus

Central High School Coosa County

Rt. 2 Box 62
Rockford, Alabama 35136
Ph. 256-377-4384
Fax 256-377-4658

KEITH BULLARD
Principal

CALVIN McKINNEY
JOCELYN MARBURY
Assistant Principal

May 12, 2011

To Whom It May Concern:

This letter is in support of the NSF project proposal, *A Strategy for Integrating Robotic Activities Into a K12 System by Partnering It with a Local College and a Model for Expanding the Program Across the Entire State*. I am pleased to partner with Dr. Nicholson and Central Alabama Community College in this endeavor. I believe that this program will be an asset and valuable opportunity for the students of Central High School Coosa County. I will support Dr. Nicholson and the program to the best of my ability.

Sincerely,

Keith Bullard
Keith Bullard
Principal