### Budget

Lake County ESC (047860) - Lake County - 2015 - Straight A Fund - Rev 0 - Straight A Fund - Application Number (159)

#### U.S.A.S. Fund #:
[Plus/Minus Sheet (opens new window)]

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<th>Purpose Code</th>
<th>Object Code</th>
<th>Salaries 100</th>
<th>Retirement Fringe Benefits 200</th>
<th>Purchased Services 400</th>
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#### Adjusted Allocation

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Please respond to the prompts or questions in the areas listed below in a narrative form.

A) APPLICANT INFORMATION - General Information

1. Project Title:
Lake County Economic Growth for Generations - Digital Fabrications, Computer Writing, and Medical Sciences Network

2. Executive summary: Please limit your responses to no more than three sentences.
Lake County's economic growth depends on its ability to grow highly skilled workers particularly in digital fabrications, computer writing, and medical sciences. Our consortia of K-12, higher education, and business partners has identified these three areas as significant workforce needs. This grant would be the first step to develop a county program of Economic Growth for Generations (E.G.G.) that would include advanced business incubators and software development.

This is an ultra-concise description of the overall project. It should not include anything other than a brief description of the project and the goals it hopes to achieve.

3. Total Students Impacted:
This is the number of students that will be directly impacted by implementation of the project. This does not include students that may be impacted if the project is replicated or scaled up in the future.
15000

4. Please indicate which of the following grade levels will be impacted:

<table>
<thead>
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<th>Grade Level</th>
<th>Pre-K Special Education</th>
<th>Kindergarten</th>
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5. Lead applicant primary contact: - Provide the following information:
First Name, last Name of contact for lead applicant
Jovette L. Hiltunen
Organizational name of lead applicant
Lake County Educational Service Center
Address of lead applicant
382 Blackbrook Road, Painesville, OH 44077
Phone Number of lead applicant
440-350-2563
Email Address of lead applicant
jhiltunen@lakeesc.org

6. Are you submitting your application as a consortium? - Select one checkbox below
- Yes
- No
If you are applying as consortium, please list all consortium members by name on the "Consortium Member" page by clicking on the link below. If an educational service center is applying as the lead applicant for a consortium, the first consortium member entered must be a client district of the educational service center.
Add Consortium Members

7. Are you partnering with anyone to plan, implement, or evaluate your project? - Select one checkbox below
- Yes
If you are partnering with anyone, please list all partners by name on the “Partnering Member” page by clicking on the link below.

Add Partnering Members

B) PROJECT DESCRIPTION - Overall description of project and alignment with goals

8. Describe the innovative project: - Provide the following information

The response should provide a clear and concise description of the project and its major components. Later questions will address specific outcomes and the measures of success.

<table>
<thead>
<tr>
<th>The current state or problem to be solved; and</th>
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| Currently Lake County has many highly skilled jobs going unfilled. Manufacturing and medical sciences are proliferating our county. Also, it is estimated that there will be 1,000,000 jobs in coding, also known as programming, by the year 2020. Our Alliance for Working Together (AWT) members (manufacturers with 200 or fewer employees) report that they have difficulty finding and filling positions as many parents and students believe that a four year degree is necessary to get a good paying job. Only two of our high schools offer advanced computing. Two years ago we surveyed employers in Lake County who told us that many workers do not have the soft skills to retain a job. Our advanced manufacturers say that they need a highly skilled labor force. Many industrial arts and business programs have disappeared from our high schools. Most high schools don't offer advanced computing classes. Many of our courses at the middle and high school level are sorted by discipline and rarely offer students a chance to apply their skills from one discipline to another through project based learning. And, STEM careers are sorely underrepresented in our minority populations. A new industrial revolution has begun. And we need our students to be innovative, creative thinking, problem solving employees. In our region, we have identified three areas that project to have large workforce needs in the near and distant future. They are: (1) Coding - Coding means the transformation of data into a form understandable by computer software; (2) Advanced Manufacturing; and (3) Medical Sciences. We are fortunate to have a community college, Vanderbuilt University, says the United States is behind globally in the race to educate computer programmers. Schmidt states “there will be approximately 1 million unfilled jobs in computer technology in the U.S. over the next 10 years, jobs that will go to foreign workers unless they can be filled by American workers.” Our students will be more college and career ready. In order to work with the small businesses they will need to build communication and marketing skills as well as use their technology, math, science, and design (engineering) skills. We are currently participating with two universities to ensure our students can pass up to 20 college credits in high school. Our students will be more college and career ready. If you are partnering with anyone, please list all partners by name on the “Partnering Member” page by clicking on the link below.

<table>
<thead>
<tr>
<th>The proposed innovation and how it relates to solving the problem or improving on the current state.</th>
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<tbody>
<tr>
<td>This project would provide each high school with an onsite digital fabrication laboratory and accompanying curriculum, a hands-on medical sciences anatomy instructional tool, and a curriculum for implementing coding in high school math and science classrooms. Students would have real life problems to solve as they interact with our business and industry to develop solutions using these innovative and creative technologies. The fabrication laboratories would give students a global network with M.I.T. fab labs around the world. Learning how to use these tools and technologies would make our graduates competitive for the jobs of today as well as in the next several years. The tagline for our anatomy in clay instructional technology is &quot;The Mind Never Forgets What the Hand Has Touched.&quot; This is indicative of our project. We realize that our students often do not have any real experiences with hands-on problem-solving and that many of our teachers do not have access to the tools to help the students. This grant would give our teachers tools that enhance excellent instruction. These technologies can be used to give students a chance to try out their critical thinking skills and to help students realize that reading something in a book is just part of the whole picture. Right now, many of the project based lessons are reserved for students enrolled in our technical center. But all students could have access to these tools regardless of the courses they are taking. Imagine that a math teacher asks students to design the most efficient box to hold 300 matches. Not only could the students use their math skills to design this box but they could send their 2D design to the 3D printer in the fabrication lab and get a prototype of their design. And anatomy is one of the most difficult things for medical science students to learn. It is estimated that students using the anatomy in clay mannequins can learn anatomy in 1/3 the time - and they don't forget it! The largest software companies claim that no person should be unable to code. Almost nothing we use would be possible without coding and we have eliminated most programming languages from our high schools. This project would give high schools relevance to teaching code. And code like so many other disciplines is best taught through real life experiences. Students would learn how to code their responses to a problem using the open source software available and access to a web based notebook.</td>
</tr>
</tbody>
</table>

9. Which of the stated Straight A Fund goals does the proposal aim to achieve? - (Check all that apply)

Applicants should select any and all goals the proposal aims to achieve. The description of how the goals will be met should provide the reader with a clear understanding of what the project will look like when implemented, with a clear connection between the components of the project and the stated goals of the fund. If partnerships/consortia are part of the project, this section should describe briefly how the various entities will work together in the project. More detailed descriptions of the roles and activities will be addressed in Question 16.

[ ] Student achievement (Describe the specific changes in student achievement you anticipate as a result of this innovation (include grade levels, content areas as appropriate) in the box below.)

The Third International Mathematics and Science Study (TIMSS) revealed that levels of science achievement could be correlated to the type of activities done in science classrooms, with laboratory investigations increasing achievement (House, 2002). This is borne out in studies from 1997 on. Much research has been done on motivation and science and when science is fun, students do better. Northeast Ohio and all of Ohio, like much of the nation, is in a STEM crisis. Many industrial arts and business programs have disappeared from our high schools. Many of our courses at the middle and high school level are sorted by discipline and rarely offer students a chance to apply their skills from one discipline to another through project based learning. And, STEM careers are sorely underrepresented in our minority populations. A new industrial revolution has begun. And we need our students to be innovative, creative thinking, problem solving employees. In our region, we have identified three areas that project to have large workforce needs in the near and distant future. They are: (1) Coding - Coding means the transformation of data into a form understandable by computer software; (2) Advanced Manufacturing; and (3) Medical Sciences. We are fortunate to have a community college, Vanderbuilt University, says the United States is behind globally in the race to educate computer programmers. Schmidt states “there will be approximately 1 million unfilled jobs in computer technology in the U.S. over the next 10 years, jobs that will go to foreign workers unless they can be filled by American workers.” Our students will be more college and career ready. In order to work with the small businesses they will need to build communication and marketing skills as well as use their technology, math, science, and design (engineering) skills. We are currently participating with two universities to ensure our students can pass up to 20 college credits in high school. Our students will be more college and career ready. If you are partnering with anyone, please list all partners by name on the “Partnering Member” page by clicking on the link below.

Add Partnering Members
also looking to add a middle school robotics course of study. This will be a great segue into the high school STEM classes. As noted later, schools that have implemented the fab lab have found that their students score higher in mathematics than their counterparts who do not have a fab lab. The research behind our medical sciences "Anatomy in Clay" shows that students learn anatomy in 1/3 the time of traditional methods and that "the mind never forgets what the hand has touched." The following is the conclusion of one research study comparing two groups of students who used dissection to learn anatomy. "Testing showed that the group using clay modeling had a significantly better ability to identify the muscles on their human models compared to the same test performed by students who had learned the material using the cats. "This study demonstrated that clay modeling is more effective than cat dissection for learning human muscles at the community college level." We will have more students prepared for college/career readiness in the medical sciences if they have mastered anatomy in high school. Lastly, the research regarding fab labs is tremendous but perhaps the following story from MC2 STEM High School graduate is the most compelling: "When I went to college, they talked a lot about things and some of them were difficult for me to understand. Whenever I had difficulty visualizing what I was learning in my engineering courses, I would return to the MC2 Fab Lab and make examples, prototypes, etc. It is definitely the best way to learn." Andreha. If our students can learn how to solve problems with their hands, these experiences will help them be problem solvers and innovators in their future work. We will have been successful in changing how instruction is delivered, how success is measured, and how students are assessed.

**Spending reductions in the five-year fiscal forecast or positive performance on other approved fiscal measures (Describe the specific reductions you anticipate in terms of dollars and spending categories over a five-year period in the box below or the positive performance you will achieve on other approved fiscal measures. Other approved fiscal measures include a reduction in spending over a five-year period in the operating budget approved by your organization's executive board or its equivalent.)**

Each district will reduce its Full Time Equivalent by .25 each year to cover maintenance costs of the equipment.

**Utilization of a greater share of resources in the classroom (Describe specific resources (Personnel, Time, Course offerings, etc.) that will be enhanced in the classroom as a result of this innovation in the box below.)**

We propose to work with local start-up businesses through the E.G.G. (Economic Growth for Generations), developed in partnership with the Port Authority, as well as established businesses and AWT to offer internships for students in several ways - virtual, blended learning, and onsite. We will place learning/teaching hubs at three locations each devoted to a specific strand: Lake Erie College Medical Sciences Technology Suite, Lakeland Community College Coding and Computer Sciences Hub, and Auburn Career Center Digital Fabrication Laboratory Hub with open access to our start-up businesses as well as adult students and students in our high school programs. For the first year, the hubs and TIES team will work with the high schools to build an internship communication plan. After that the opportunities will be posted, and students will be encouraged to apply for the right to develop the business need through closed crowd sourcing. All students who "intern" online and send examples of their ideas to the start-up business will receive learn and earn credit as devised by the LCC pathways coordinator accessing the alternative pathways now allowed by the Board of Regents. This will give the start-up business many choices, and give students a chance to apply their skills to real world problems and safely compete in a global environment. Each high school will receive a digital fabrication lab, mobile coding lab, and anatomy in clay lab where students can learn the equipment and then train other students. Students will use the Fab Lab equipment, anatomy mannequins, and coding/geospatial mapping materials to envision, create, and refine their ideas. Current technology teachers in the high school will work with Lakeland Community College to become adjunct professors and offer dual enrollment courses to students in the computer sciences. This grant will hire four consultants on a one year contract for each of the following: medical sciences hub, technology hub, pathways articulation, and fabrication laboratory. These consultants will be hired by the ESC and will produce scalable global curricular deliverables that will make the project self-sustaining. All materials developed will be accessible to all consortium and partner members. Open source e-portfolio software as well as open source reference and teaching materials from providers such as Code.org will be used throughout this grant. Google Apps, free to educators, will be used to drive collaboration.

**Implementing a shared services delivery model (Describe how your shared services delivery model will demonstrate increased efficiency and effectiveness, long-term sustainability, and scalability in the box below.)**

10. Which of the following best describes the proposed project? - (Select one)

- New - never before implemented
- Existing: Never implemented in your community school or school district but proven successful in other educational environments
- Mixed Concept: Incorporates new and existing elements
- Established: Elevating or expanding an effective program that is already implemented in your district, school or consortia partnership

**C) SUSTAINABILITY - Planning for ongoing funding of the project, cost breakdown**

11. Financial Documentation: - All applicants must enter or upload the following supporting information. The information in these documents must correspond to your responses in questions 11-14.

* Enter a project budget in CCIP (by clicking the link below)

Enter Budget

* If applicable, upload the Consortium Budget Worksheet (by clicking the link below)

* Upload the Financial Impact Table (by clicking the link below)

* Upload the Supplemental Financial Reporting Metrics (by clicking the link below)
The project budget is entered directly in CCIP. For consortia, this project budget must reflect the information provided by the applicant on the Consortium Budget Worksheet. Directions for the Financial Impact Table are located on the first tab. Applicants must submit one Financial Impact Table with each application. For consortium applications, each consortium member must add an additional tab on the Financial Impact Tables. Applicants are not required to submit a Financial Impact Table.

Applicants with an “Ohio School Report Card” for the 2012-2013 school year must upload the Supplemental Financial Reporting Metrics to provide additional information about cost savings and sustainability. Directions for the Supplemental Financial Reporting Metrics are located on the first tab of the document. If your organization does not have an “Ohio School Report Card” for the 2012-2013 school year, please provide an explanation in the text box about how your grant project will impact expenditures per pupil or why expenditure per pupil data does not apply to your grant project.

Educational service centers, county boards of developmental disabilities, and institutions of higher education seeking to achieve positive performance on other approved fiscal measures should submit the budget information approved by an executive board or its equivalent on the appropriate tabs of the Financial Impact Table. Educational service centers should use the “ESC” tab and county boards of developmental disabilities and institutions of higher education should use the “non-traditional” tab.

13. Will there be any costs incurred as a result of maintaining and sustaining the project after June 30th of your grant year?

Sustainability costs include any ongoing spending related to the grant project after June 30th of your grant year. Examples of sustainability costs include annual professional development, equipment maintenance, and software license agreements. To every extent possible, rationale for the specific amounts given should be outlined. The costs outlined in the narrative section should be consistent and verified by the financial documentation submitted and explained in the Financial Impact Table. If the project does not have sustainability costs, applicants should explain why.

Yes - If yes, provide a narrative explanation of your sustainability costs as detailed in the Financial Impact Table in the box below.

There will be maintenance agreement costs for the equipment each year equal to .25 FTE to be eliminated by every district. When an established entity starts a Fab Lab, such as a school or school system, there are existing staff positions that are already in the annual operating budget of that entity whose descriptions easily translate to becoming the guru of the entities new lab. The long term sustainability of equipment in a Fab Lab is based upon the ability of a lab to maintain and repair the equipment they have, as well as to replace equipment that is outdated and/or broken beyond repair. It is often not possible (especially for international labs) or financially feasible for a Fab lab to have maintenance contracts on all of their machines. To work around this current Fab Labs employ gurus who are capable of repairing and
maintaining their equipment and who only have to use costly technical support in extreme cases. Fab Lab gurus with these capabilities are trained through programs like Fab Academy and/or years of experience working with and in Fab Labs or other Digital Fabrication-based maker spaces. The Public Private Partnerships established by a Fab Lab can contribute to the sustainability of personnel in many ways. In kind donation of personnel time to a Lab can provide free staffing of the Fab lab. If the personnel is trained appropriately these in kind staff members can also provide free machine maintenance. Partnerships can also provide funding for staff positions and/or staff training. Labs that host Fab Academy courses become concentrated sources of talent and provide potential staff members that are capable of teaching courses and seminars and capable of managing the lab and providing basic machine maintenance. When a Fab Lab deploys, installs, and provides initial support to new Fab Labs, they not only have the potential to receive revenue for this service but also are building a human capital network. If this is done locally a lab then is establishing the partnerships that build regional networks. The Anatomy in Clay purchase is a one-time purchase and the clay is reusable. The mannequins can be used in a variety of courses and should clay need to be ordered, it is a staple of any high school art class. Although we are looking at one cart of mobile computing devices for this start-up year, they are just to get coding underway. We do not intend to replace these computers before the end of the grant or most likely after the grant. Our county schools are presently working on bring your own device technology and/or 1-1 technology already to drive the paperless classroom. This one cart in each high school will be used to introduce the concept of using coding in a variety of courses and to help students see the relationships between coding and everything material in their world. The success of all of these technologies revolves around job embedded professional development and just in time support. As we develop this model the first year, we will intentionally train the consumers (teachers and students) to fix minor problems on the equipment. We will also train them to use Google Docs for all their applications and to share their work on a Google Docs platform. Once everyone is trained, Google Docs is absolutely free to the schools and we will not have ongoing costs in this area. Existing technology teachers, consultants, and others who troubleshoot technology issues in the district will be trained in all new technologies so they can continue to do this work.

14. Will there be any expected savings as a result of implementing the project?

Yes
No

Applicants with sustainability costs in question 13 or seeking to achieve significant advancement in spending reductions in the five-year forecast must address this response. Expected savings should match the information provided by the applicant in the Financial Impact Table. All spending reductions must be verifiable, permanent, and credible. Applicants may only respond "No" if the project will not incur any increased costs as a result of maintaining and sustaining the project after June 30th of your grant year. The Governing Board will use the cost savings as a tiebreaker between applications with similar scores during its final selection process. Cost savings will be calculated as the amount of expected cost savings less sustainability costs relative to the project budget.

0.00 If yes, specify the amount of annual expected savings. If no, enter 0.

If yes, provide details on the expected savings (i.e. staff counts and salary/benefits, equipment to be purchased and cost, etc.). If no, please explain

We are not anticipating any immediate savings from this project but we do think that there will be discussions about how service is delivered to students - instructionally, format, etc. We do not have recurring costs because we do not intend to replace the computers should they break (this is a start-up and in five years these low level computers will not be usable). We are using the mobile labs expressly to augment teachers’ desires to use coding for a special project in their classroom. Districts are moving to 1:1 devices and bring your own device. The clay mannequins should last for many years to come. The clay is a part of an art curriculum’s normal supplies so we are not adding to the costs - most art teachers report that they have not used all their clay and it is reusable. As for the fab labs, please see our sustainability paragraph. This equipment is used in many third world countries where the concept of maintenance agreements is foreign. The equipment is meant to be used to make replacement parts etc.

15. Provide a brief explanation of how the project is self-sustaining.

All Straight A Fund grant projects must be expenditure neutral. For applications with increased ongoing spending as documented in question 11-14, this spending must be offset by expected savings or reallocation of existing resources. These spending reductions must be verifiable, permanent, and credible. This information must match the information provided in your Financial Impact Table. Projected additional income may not be used to offset increased ongoing spending because additional income is not allowed by statute. Please consider inflationary costs like salaries and maintenance fees when considering whether increased ongoing spending has been offset for at least five years after June 30th of your grant year. For applications without increased ongoing spending as documented in questions 11-14, please demonstrate how you can sustain the project without incurring any increased ongoing costs.

For educational service centers and county boards of developmental disabilities that are members of a consortium, any increased ongoing spending at the educational service center or county board of developmental disabilities may also be offset with the verifiable, permanent, and credible spending reductions of other members of the consortium. This increased ongoing spending must be less than or equal to the sum of the spending reductions for the entire consortium.

Explain in detail how this project will sustain itself for at least five years after June 30th of your grant year.

We intend to use the following for self-sustaining this Fab Lab and accompanying Fab Ed Curriculum: Public Private Partnerships, Repurposing of Existing Staff Positions, Affiliation with our local community college, four year college, and career center to acquire students as highly trained personnel. Students will serve as volunteers for our summer camps and as open-lab assistants. In return, they will be able to use the labs for the cost of materials for their projects. A win-win proposal for both entities. Our instructors will become Fab lab Gurus through certification with the Fab Academy and other similar experiences. A lab must be able to maintain and repair its own equipment - the equipment in a fab lab includes tools for making parts for the equipment. Part of the training with the Fab Academy includes certification of repair of tools in the lab. With our connections to local universities and career center, our labs will host Fab Academy courses that will become concentrated sources of talent and provide potential staff members capable of teaching courses and seminars and capable of
managing the lab and providing basic machine maintenance. All students learn basic machine maintenance as a part of the Fab Ed training as well. Fab labs can offer classes in design and business development to our partnering businesses. In-kind contributions of volunteers to man the lab, repair equipment, etc. can be leveraged as a result of this lab partnering. Although we do have a cart of mobile devices for each high school, we do not intend to replace them. They are intended as start-ups to help teachers learn to use Google Docs, to participate in global conferences and unconfferences, and to teach some coding. Many if not all of our schools are moving to a "bring your own device" or their own 1:1 paperless computing classroom. After set-up and intense professional development for all teachers to collaborate with Google Docs, Google Docs is free. We will have spent this first year setting up the parameters (using NORT2H and our part-time pathways consultants to help us set up the following: repository for tracking professional development and curriculum development; articulated pathways for students including certificates, badges, and degrees; electronic portfolios for all students; internship/externship database.

D) IMPLEMENTATION - Timeline, scope of work and contingency planning

16. Please provide a brief description of the team or individuals responsible for the implementation of this project, including other consortium members and/or partners.

This response should include a list of qualifications for the applicant and others associated with the grant. If the application is for a consortium or a partnership, the lead should provide information on its ability to manage the grant in an effective and efficient manner. Include the partner/consortium members' qualifications, skills and experience with innovative project implementation and projects of similar scope.

Enter Implementation Team information by clicking the link below:

Add Implementation Team

For Questions 17-19 please describe each phase of your project, including its timeline, scope of work, and anticipated barriers to success.

A complete response to these questions will demonstrate specific awareness of the context in which the project will be implemented, the major barriers that need to be overcome and the time it will take to implement the project with fidelity. A strong plan for implementing, communicating and coordinating the project should be outlined, including coordination and communication in and amongst members of the consortium or partnership (if applicable). It is recognized that specific action steps may not be included, but the outline of the major implementation steps should demonstrate a thoughtful plan for achieving the goals of the project. The time line should reflect significant and important milestones in an appropriate and reasonable time frame.

17. Planning - Activities prior to the grant implementation

* Date Range9/2013-11/2015

* List of scope of work (activities and/or events including project evaluation discussions, communication and coordination among entities).

9/2013 - series of meetings scheduled with consortium members and partners to discuss STEM Blueprint developed in the 2013-14 school year and how Straight A fund might have impact 10/2013 - presentations, communication, and signatures acquired by consortium members and partners to develop Fabrication Network as outlined in blueprint 10/2013 - collaboration with Port Authority, local businesses, legislators to hear about the importance of fabrication labs and to discuss needs in the county 11/2013 - 3/2014 - review of other grants, discussions continued with AWT and local colleges; monthly STEM meetings at the ESC; presentations of mobile fab lab, 3D printers, robotics, and electronic portfolios 4/2014 - writing, editing, and resubmission of grant; updating with conversations and research discovered 4/2014-6/2014 - look for other supporting grants for pieces of project; STEM Speaker Series to enlighten consortium members and partners (NorTech, Lubrizol, Great Lakes Biomimicry, Lake County Entrepreneurs, etc.) 6-8/2014 - meet with advisory board to schedule equipment deliveries, etc. 8-10/2014 - monthly check-in meetings with representative from every district, partnership 10-12/2014 - project evaluation; mid-course correction 1-3/2015 - develop coursework, Professional development activities, 3-6/2015 and beyond - begin working with businesses and teachers to find internships and problems students can work on 5/2015 - summative evaluation

* Anticipated barriers to successful completion of the planning phase

Change in administration in any district requiring time to discuss the project and get buy-in Possible back orders on equipment Difficulty finding right people as pathways consultants Access to all the existing networks; firewalls that may prohibit easy access for set-up

18. Implementation - Process to achieve project goals

* Date Range8/2014-6/2015

* List of scope of work (activities and/or events, including deliverables, project milestones, interim measurements, communication, and coordination).

8/2014-10/2014 - work with TIES on designing each space within the individual high schools; identify teachers who will directly work with coding in each high school; provide professional development on Anatomy in Clay,Google Docs, and setting up a fab lab 8/2014 or receipt of grant - hire consultants to begin work on pathways 9/2014-10/2014 - work with TIES on professional development for the Fab ED piece of the curriculum and connections to fab labs; order equipment 11/2014-2/2015 - install fab labs in all high schools; monthly meetings with part-time consultants regarding internship and pathways work 2/2015 - develop 8th grade course for middle school 4/2015 - Open houses for parents, teachers; Google repositories, blogs, wikispaces (or comparable) rolled out 4/2015-6/2015 - enroll students in courses, assign teachers, determine hours of fab lab 6/2015 - Final evaluation of hub installation, curriculum, etc.; first problems delivered to our fab labs

* Anticipated barriers to successful completion of the implementation phase.

Back orders on supplies/equipment Problems with installation

19. Summative Evaluation - Plans to analyze the results of the project

* Date RangeJanuary 2015-June 2015
The response should illustrate the critical instructional and/or organizational changes that will result from implementation of the grant and the impact of these changes. These changes can include permanent changes to current district processes, new processes that will be incorporated or the removal of redundant or duplicative processes. The response may also outline the expected change in behaviors of individuals (changes to classroom practice, collaboration across district boundaries, changes to a typical work day for specific staff members, etc.). The expected changes should be realistic and significant in moving the institution forward.

Please enter your response below:

We anticipate that our teachers and students will have access to STEM education in ways they have never even dreamed. "Of course, not every student is destined to become an engineer, but every high school graduate should master enough STEM skills to pursue engineering if she wants to. Equal opportunity is not only a moral promise we make to every child, it is the foundation of U.S. prosperity." (www.changetheequation.org) They will connect to an experiential education environment, develop partnerships with industry, and collaborate with others around their county sometimes without ever physically meeting them. We believe that we will be working with industry to develop a local workforce and give students the ability to demonstrate competency and mastery of 21st Century skills. We will be preparing students for the jobs that are here and encourage them to build their skills to meet these jobs. With three identified career pathways - computer sciences, medical sciences, and manufacturing - we know that more of our students will receive the training needed to fill these jobs. We are charged with college and career readiness for all students and yet many of our practices are outdated, do not access current technologies, or are irrelevant in today’s economic development. With the help of our business partners, students will try out their ideas in the context of real problems and receive feedback from entrepreneurs hoping to build real world small businesses. Currently most of our students do not participate in true internships. We will be accessing more global technologies by using fabrication laboratories and medical research technologies to help students apply what they have learned in school. Using our business partners as third party reviewers, students will have authentic audiences and feedback for their work. This project embraces members of our community as partners in the work, not as people who will give us money or resources to do what we wish to do. They will help us to understand what economic growth needs there are in Lake County and give our students much needed specific feedback on their work. Teachers and administrators will have to think carefully about the kinds of soft skills our students will need in these roles and courses will be embedded with those expectations as well as opportunities for students to improve upon them. Recognizing that our students may need encouragement to work in these areas, we have designed an eighth grade opportunity for all students to work with engineering design as well as competitions such as Lego League.

E) SUBSTANTIAL IMPACT AND LASTING VALUE - Impact, evaluation and replication

The responses in this section are focused on the ability to design a method for evaluating the project’s capacity for long-term sustainable results. Therefore, the questions focus on the method of defining the problem(s) the project hopes to solve and the measures that will determine if the problem(s) have been solved.

21. Describe the rationale, research or past success that supports the innovative project and its impact on student achievement, spending reduction in the five-year fiscal forecast or utilization of a greater share of resources in the classroom.

The response should provide a concise explanation of items which provide rationale that will support the probability of successfully achieving the goals of the project. Answers may differ based on the various levels of development that are possible. If the proposal is for a new, never before implemented project, the response should provide logical, coherent explanations of the anticipated results based on some past experience or rationale. For projects that have been implemented on a smaller scale or successfully in other organizations, the response should provide the quantifiable results of the other projects. If available, relevant research in support of this particular proposal should also be included.

Please enter your response below:

As the number of Fab Labs in schools grows year after year the oldest of these schools are beginning to see the very real impact of the Fab Lab on student achievement across the full spectrum of disciplines both STEM and non STEM. Additionally, Fab Labs in the Community College space are collecting data on the impact of Fab Labs on catalyzing innovation and entrepreneurship that’s driving economic development and regional vitality. The Great Lakes Innovation and Development Enterprise (GLIDE), founded in 2001, is a comprehensive regional innovation center, resource hub, and business incubator that supports all facets of the start-up, development, and growth of enterprises. Created by a partnership between the Lorain County Commissioners, Lorain County Community College, and the Ohio Department of Development, GLIDE’s objective is to grow jobs and spearhead economic growth in both Lorain County and the Northern Ohio region and their Fab Lab is a key component of the program. Lorain County Community College GLIDE Program Impact - 2,600 Entrepreneurs Assisted - 105 Client Companies - 50 Companies physically incubated - 21 Currently incubating inside Entrepreneurship Innovation Center - 700 Jobs created by GLIDE client companies - $48,000 Average Salary - $60 Mil Revenue Growth $81 mil Follow-on Investments When the Early College High School at Lorain County Community College implemented a math program that used the Fab Lab to complement student’s classroom work 100% of the participating students passed the math portion of the Ohio graduation test. This was an improvement over previous years student performance on the OGT and an exceptional improvement over the scores from the students home districts, Lorain City and Elyria, who had pass rates of 64.7% and 81.3% respectively. Public Schools with Fab Labs: 10 in-school labs 3 district mobile labs that service multiple district schools California: East Palo Alto Academy, East Palo Alto, CA Kansas: Overland Park Blue Valley School District's Center for Advanced Professional Studies Kansas city, KS Michigan: Berrien Springs Public Schools Parent partnership (Homeschoolers) Berrien, MI Detroit Incite Focus Schools Detroit, MI (3 Fab Labs on 3 Campuses) Minnesota: Mahtomedi High

* List of scope of work (activities and/or events, including quantitative and qualitative benchmarks and other project milestones).

**Qualitative and Quantitative Measures - In-depth interviews - exit interviews with the pathways consultants - Focus groups - small group **
Listening session - Concept maps - Student work - Teacher observations - Open-ended questionnaires or reflection forms Quantitative Measures Number of internships (summer) Fab Lab Usage (second semester usage across each high school) Number of students enrolled in the programs at each high school (April for next year)

* Anticipated barriers to successful completion of the summative evaluation phase.

any missing information from the measures common collection format not enough enrollment at a site equipment not installed correctly, faulty equipment calamiy days during scheduled professional development meetings
22. Describe the overall plan to evaluate the impact of the concept, strategy or approaches used in the project.

This plan should include the methodology for measuring all of the project outcomes. Applicants should make sure to outline quantitative approaches to assess progress and measure the overall impact of the project proposal. The response should provide a clear outline of the methods, process, timelines and data requirements for the final analysis of the project's progress, success or failure. The applicant should provide information on how the lessons learned from the project can and will be shared with other education providers in Ohio.

* Include the name and contact information of the person who will be responsible for conducting the evaluation and whether this will be an internal or external evaluation.

**External Evaluator:** Justin Perry, Center for Urban Education Cleveland State University 2121 Euclid Avenue Cleveland, OH

* Include the method by which progress toward short- and long-term objectives will be measured. (This section should include the types of data to be collected, the formative outputs and outcomes and the systems in place to track the project’s progress).

Our project will be measured by initial surveys of teachers, students and administratorsProfessional development will be assessed through teacher practice as self-reported by teachers, observed by administrators during walkthroughs, and through online surveys geared to ask how instruction has changed as a result of the professional development. Graduates from our high schools will be asked to complete an exit survey that will include: how many courses did you take in coding?, do you have any knowledge of a fab lab?, have you used a fab lab in any of your classes? If so, which classes?. Fab ED and Fab Labs bring their own metrics of success since this is not a new project. The TIES consultants will be administering surveys, questionnaires, and overseeing development of lessons. This third party will act as "on the ground" consultants to help us make sure our equipment is properly installed, fab lab gurus are trained, and the curriculum and professional development attached to this work is delivered on time.

* Include the method, process and/or procedure by which the project will modify or change the project plan if measured progress is insufficient to meet project objectives.

Progress monitoring will be used to determine enrollment and guidance counselors will report number of students not on track to receive a C or better in the courses. If we see any school, class, or teacher with more than 10% of the students not receiving a C or better, an onsite visit will be made to the classroom to determine how we can help. If enrollment is not increasing each semester (or yearly in the case of yearlong courses), then we will work as a consortium to determine what marketing strategies we need to encourage more enrollment. Input by our TIES consultants will be discussed at our team meetings and we will modify our sites as needed. The hubs of Lakeland, Auburn, and Lake Erie College will be the direct liaisons for our students who wish to work with businesses as interns in their chosen field. The ESC will build a website to support the work of all the districts and link the schools to the hubs.

23. Describe the substantial value and lasting impact which the project hopes to achieve.

The response should provide specific quantifiable measures of the grant outcomes and how the project will lead to successful attainment of the project goals. Applicants should describe how the program or project will continue after the grant period has expired.

Please enter your response below.

"The mind never forgets what the hand has created" (Anatomy in Clay) should be the title of this proposal. All three areas of this grant rely on adding hands-on materials for all students to master the work. It also requires teachers and students to develop inquiry based models of classroom instruction and assessment and lends itself to performance based assessment. We are looking for students to be more college and career ready and we will be working with the area guidance counselors to determine our progress in this area. Lakeland Community College keeps track of our students and their rate of graduation from Lakeland - within specified time periods. We will access this information and chart it for our members. Again, this type of database takes time to create, but once it is created, maintenance is not a big issue and can be done by clerical staff in the guidance offices.

24. Describe the specific benchmarks, by goal as answered in question 9, which the project aims to achieve in five years. Include any other anticipated outcomes of the project that you hope to achieve that may not be easily benchmarked.

The applicant should provide details on the quantifiable measures of short- and long-term objectives that will be tracked and the source of benchmark comparative data points. Responses should include specified measurement periods and preliminary success points that will be used to validate successful implementation of the project. If a similar project has been successfully implemented in other districts or schools, identification of these comparable benchmarks should be included.

* **Student Achievement**

Throughout the 6 year period student achievement will be tracked by certification in using the various equipment in the fab lab (placed in electronic portfolio), passage of coding classes, and anatomy in clay performance based assessments. We will use year to year grades to determine how students are doing as compared to students on the same assessments without the fab lab. Teachers will meet in collaborative groups to discuss the outcomes, determine strategies for those students not meeting the targets and plan for small group enrichment when students already have mastered the work. Fab labs have had great effect on mathematics achievement so we would expect students to be meeting the targets on the new assessments in the areas of mathematics and science. Changes in teacher instruction will have an impact on how students are able to answer the new types of PARCC assessments - problem solving and critical thinking is a large part of the new assessments.

* **Spending Reduction in the five-year fiscal forecast**

We reduced .25 FTE's from each district and salary related benefits for each district to sustain the equipment maintenance costs for the life of the grant. Lab gurus etc. will be able to man the labs.
This project is almost completely in the classroom. Teachers receive embedded professional development - you have to be using the tools and technology to show competency and the tools are for every school in our county. Having common technology and global access to one another and all others in the fab lab environment will help teachers develop their strengths and weaknesses in innovative practices. Students will be asked to solve a problem and teachers will need to be facilitators rather than have the answer to the problem. The power of observation and reflective practice will give teachers a chance to share what they are working on across districts and classrooms.

This project is an exciting networkable project and could be replicated across regions and districts anywhere. The networked fab lab concept has been used in other areas and has been successful. Students and teachers will work alongside business and higher education to impact college and career readiness. Developing pathways that help students realize their dreams is important for all districts but giving them the opportunity to experience a variety of internships and projects will be supported by any higher education and business consortium. The original outlay of funding for the equipment is large, but the fab labs could be done one piece of equipment at a time. As students learn how to use each piece of equipment, the local community college or career service center would certify the student's accomplishments. Building an electronic portfolio and sharing work through Google Docs is free with the right technology person on board.

By virtue of applying for the Straight A Fund, all applicants agree to participate in the overall evaluation of the Straight A Fund for the duration of the evaluation time frame. The Governing Board of the Straight A Fund reserves the right to conduct an evaluation of the project and request additional information in the form of data, surveys, interviews, focus groups and other related data on behalf of the General Assembly, Governor and other interested parties for an overall evaluation of the Straight A Fund.

PROGRAM ASSURANCES: I agree, on behalf of this applicant, and any or all identified consortium members or partners, that all supporting documents contain information approved by a relevant executive board or its equivalent and to abide by all assurances outlined in the Straight A Assurances (available in the document library section of the CCIP).
<table>
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<tr>
<th>First Name</th>
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## Implementation Team

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<tr>
<th>First Name</th>
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<th>Responsibilities</th>
<th>Qualifications</th>
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<tbody>
<tr>
<td>Jana</td>
<td>Holwick</td>
<td>Vice President, Academic Affairs, Lake Erie College</td>
<td>Oversee the medical suites hub and help our team see its impact on future medical planning</td>
<td>20 years of experience in education and health services fieldpast owner of HigherEd Strategy in Lee's Summit, Missouri and has been a Chief Financial officer and director of human resources at the Cleveland Chiropractic College System</td>
<td>Education and Health Care Professional</td>
<td></td>
</tr>
<tr>
<td>Jovette</td>
<td>Hiltunen</td>
<td>Director of P-16/STEM</td>
<td>Convene implementation team to discuss implementation throughout the projectSet up budgets for purchase ordering Coordinate professional development Work with administrative secretary to make a professional development calendar, monitor the documents on the website</td>
<td>Superintendent's License; 26 years working in education including principal and curriculum directorGrant coordinator for several grants in the past - Martha Holden Jennings, Venture Capital, Race to the Top Early College High School, Race to the Top general grant, McGinty Foundation Technology Grant</td>
<td>Successful implementation of several large grants</td>
<td></td>
</tr>
<tr>
<td>Dione</td>
<td>DeMitro</td>
<td>Academic Advisor</td>
<td>Coordinate with other members of the team Prioritize Lakeland's activities Set up coding meetings with district representatives</td>
<td>Dione has worked in K-12 education and is now working closely with students entering college at LakelandDione has been on many committees and run strategic planning, written grants, etc. for many Lake County entities</td>
<td>Written and implemented many grants at the higher education levelScience teacher at high school level</td>
<td></td>
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