HOW TO BUILD A STEM INNOVATION CENTER AT YOUR SCHOOL !

STEM – Science, Technology, Engineering, & Math

ADD "A" for ARTs

And Get:

STEAM

"STEAM from the TEAM" at Blennerhassett Elementary School

Parkersburg, Wood County, West Virginia

COME & VISIT US – Let Us Show You Around

You & Your School – CAN DO THIS, TOO !

YOUR SCHOOL =

PTA

SCHOOL PRINCIPAL

LSIC (LOCAL SCHOOL IMPROVEMENT COMMITTEE)

TEACHERS AND STAFF

Develop a VISION for Great Things – In your School

Research, Development, Fulfillment, Expansion

* BASIC BEGINNINGS – LIKE THE ARTICLE “IT’S ELEMENTARY”

    * INCLUDE INPUT FROM THE TEACHER THAT HAS A “3D PRINTER” IN THEIR CLASSROOM (FROM THE PTA, LAST YEAR)

    * INCLUDE INPUT FROM THE TEACHER THAT WENT TO THE “NASA ROBOTICS TRAINING” AND IS BORROWING KITS FROM NASA, FAIRMONT, WV

STEM: It's Elementary!

Early STEM Education

Expert advice on effective STEM education for elementary school teachers

by Erin MacPherson

Picture a first-grade classroom, maybe even your own.
Kids gather around the sand table, exploring the sand, letting the grains run between their fingers.
The teacher passes out some props—marbles, rulers, boxes and cups—and lets students explore freely for a few minutes.
The kids excitedly dig in, filling cups with sand and pouring it out, burying marbles, and turning the rulers into shovels and rakes.
Then she says: "I have a challenge for you today. How fast can you make the marbles roll?"
Kids start rolling marbles across the sand, only to find the marbles quickly get stuck, hung up on miniature sand dunes.
Then one student tries putting his marble on a ruler. It rolls much faster.
Then another props his ruler up on a cup and the marble flies.
The teacher watches quietly as the kids explore. Afterward, the teacher and her students gather on the rug to talk about their observations.

She asks:
"What did you design out of your tools that make the marble roll fastest?"
"What do you think makes the marble slow down?"
"Why do you think the marble rolls faster on the ruler than in the sand?"
Sand tables have long been a staple of early education. It is the way we plan a classroom activity and the questions we invite children to explore that turn an ordinary play activity into savvy and pointed STEM education. This teacher's methods are not only innovative, but also an essential segue into her students' future academic and professional success.

Why STEM in the Early Years?

STEM—or science, technology, engineering and math—has become a big buzzword in educational circles in the last few years. However, our classrooms have not yet realized this potential as evidenced by a 2008 report, where in which the United States ranked 28th worldwide in math literacy and 24th in science literacy.

Combine that with the fact that in US Department of Commerce research, workers in STEM fields earn 26% more than their counterparts and the job growth rate for STEM-related jobs is almost double that of non-stem occupations, and it's easy to see that STEM education is essential for our future economy not to mention to our kids' future success.

By giving our kids the tools they need to succeed in STEM, we are giving them a huge leg up as they enter the job market.

But when we think STEM, we think middle school and high school, robotics and chemistry—not first graders and the sand table.

Task #1: Change Your Lens

Here's the secret: most don't have to overhaul the way they teach in order to become strong STEM educators. "It's all about changing the lens through which we view our teaching practices," says Green.

"Elementary teachers need the opportunity and the confidence to be engineers alongside their students," says Dr. Green. This can be as simple as changing the kinds of questions we ask our students. "By adding a few words to your classroom questioning vocabulary—words like *design, experiment* and *model*—a whole world of STEM learning can be opened up for students." It's all about tweaking the lessons, activities, homework and language just enough to create an environment where STEM is a natural but effective part of the curriculum.

Task #2: Enlist a Village of STEM Educators

As a teacher, you're always busy innovating, finding new ways and cobbling together resources to help your students learn. But teachers shouldn't have to carry the entire responsibility for STEM education; we need partners.

Recently, President Obama's administration launched the *Educate to Innovate* initiative. The initiative asks communities, companies, parents and teachers to partner with schools to encourage STEM education. "Community partnerships—both with education businesses and higher education institutions," agrees Dr. Green, "are a key factor in the success of STEM programs."

Ideally, school districts should be receiving donated resources from local businesses and higher education institutions should provide hands-on and in-depth training to teachers. "Both have a huge stake in making sure this generation of students can take on the challenges of STEM," says Green.

Of course, if any component of that triangular formula is missing, STEM education suffers. If businesses aren't providing resources that are standards-aligned, effective and affordable, teachers won't have the tools they need to teach. And, likewise, if higher education institutions aren't providing quality training to teachers, then teachers may lose the opportunity to approach STEM teaching with confidence. STEM education is one of those areas where it really does take a whole village to effectively teach a child.

Task #3: Integrate STEM Across the Curriculum

With todays standards, the push to **teach reading and writing across the curriculum** continues to grow. Likewise, the skills developed through STEM learning need to be integrated. If you're familiar with the STEM to STEAM movement, you'll know that many educators believe that true STEM education can only be accomplished by adding art into the mix. By adding art and music concepts like design, rhythm and movement to STEM education, students are able to fully visualize STEM concepts.
Dr. Green recommends taking this idea one step further.

“So much would be gained if all teachers—art, music, reading, social studies, math and science—were able to spend some of their precious professional development time on STEM. The principles of STEM—critical thinking, asking good questions, observation and exploration—are truly at the heart of every discipline,” explains Green. School-wide STEM learning would enable teachers to work together to create unified curricular units that weave STEM concepts into every subject in a meaningful way.

Task #4: Give Kids More than Just Access to Technology

The "T" in STEM stands for technology, but exposure to educational technology is not enough for true STEM learning. Exposing kids to tools like computers, iPads, e-readers and apps early on is important, but it's only through guided learning that these tools become an important part of STEM education, argues Green.

“We need to take a whole-child approach to teaching children about technology,” explains Green. “Teachers can help kids make connections across various technologies to real-world concepts simply by strategic questioning and guided learning, especially if they have had access to research-based STEM education and teacher training.”

Getting Started

So where do you begin?
STEM education will only continue to expand and grow.
Now is the time to seek out professional development in STEM and to start in small ways to make it a larger part of your approach to the classroom.
With good resources and training, you can open up an entire world of STEM learning for your students.
Who knows, the STEM seeds you plant may change their futures.

All you have to do is open the door and reach into the sandbox.

Research, Development, Fulfillment, Expansion

* INCLUDE IDEAS & INPUT FROM THE ENTIRE SCHOOL STAFF

* INCLUDE IDEAS & INPUT AND IDEAS FROM PARENTS, FAMILIES, AND COMMUNITY MEMBERS

* A VISION FROM “RUBBER BANDS TO ROBOTS”

* A VISION TO START SMALL TO MEDIUM

AND GROW – **BIG**

DID WE MENTION THE SCHOOL PRINCIPAL ?

The PRINCIPAL - the Building Administrator, the Person Responsible for everything that goes on in the School, the Person Responsible for all Teachers and Staff, the Person Responsible for IEPs, UTPs, IOPPs, & Ts & Cs -

And Every Thing Else that the County Board and/or the State Board – Can Think Of … As well as many things they can't think of …

Develop a Great Working Relationship with Your Principal.

Discuss Questions, Comments, and/or Concerns

You will find that they appreciate everything you are doing and appreciate your input and efforts

They are really busy – and appreciate all of the proper help they can get !

DID WE MENTION THE TEACHERS ?

Comments from (Elementary) Teachers:

I hope you don't mind us sharing some thoughts.

We looked at all the information you sent concerning STEM / STEAM.

We looked up sample activities and lessons for our respective grade level(s)

This program is extremely intriguing, however, we are concerned about the implementation…

After discussing the possibilities, with several teachers – we have found the interest is there…

But the thought of "One More Thing" to add to the large list of requirements and standards – that we already have difficulty fitting into our schedules – is exhausting.

We find it difficult to get in anything other than math & reading (1st grade) particularly when each year there is an increasing number of students entering our classes, already behind where they "should be".

WE CAN SEE how the STEM / STEAM activities could be cross curricular, by all means, but finding the time to implement and prepare for – particularly in older grades, sounds very overwhelming.

Next year, classroom teachers are being asked to pick up additional health and PE requirements due to staffing cuts.

We are having a hard enough time trying to figure out where and how to add those requirements in.

If there was an additional position made for, or a volunteer type of person whom could be trained to do STEM, we could see great benefits of the program(s).

NBCT (National Board Certified Teacher(s)) of BES

DID WE MENTION THE TEACHERS (VALUED INPUT)?

Comments from (Elementary) Teachers:

I hope you don't mind us sharing some thoughts. (We are communicating)

We looked at all the information you sent concerning STEM / STEAM. (They are interested)

We looked up sample activities and lessons for our respective grade level(s) (They are really interested)

This program is extremely intriguing, however, we are concerned about the implementation…

After discussing the possibilities, with several teachers – we have found the interest is there…

But the thought of "One More Thing" to add to the large list of requirements and standards – that we already have difficulty fitting into our schedules – is exhausting.

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If there was an additional position made for, or a volunteer type of person whom could be trained to do STEM, we could see great benefits of the program(s). (YES – a possible solution – they are being PRO-ACTIVE)

SO, WHAT DID WE DO ?

We developed "The STEAM TEAM"

The Principal, LSIC Members, PTA Members
(There are 3 PTA Members on the LSIC, by WV State Code),
and several **"TECHY TEACHERS".**

- Let's Develop Around LEGOS (every child and most adults – LOVE LEGOS)
- There are LEGO projects for K through 5 (our Elementary School, levels)
- Let's utilize existing assets like:
  - The 3 D Printer and Software that the PTA helped the 5th Grade Classes, acquire.
  - The I-Pads, Leapfrogs, and other devices the PTA helped the School, acquire.
  - The I-Pads, Leapfrogs, and other devices the School has through other funding.
  - The LEGO Robotics kits from the PTA, and other funding sources.
  - The LEGO Robotics Program – from NASA, Fairmont, WV
  - The Computer Labs, already in the School
  - AND – anything else we could think of, to incorporate !

SO, HOW DID WE DO IT ?

We developed “The STEAM TEAM” (Continued)

Our PRINCIPAL is COMMITTED to make it work !

- And allow for “Teacher Training, & Technical Transitioning”
- And provide an area in which to house “The Innovation Center”
- And to provide as much “School Investment & Support” as possible.
  - **BECAUSE – this is the FUTURE for OUR CHILDREN**

Our PTA is COMMITTED to make it work !

- We have Parents, Family, & Community Members – that along with our teachers, are attending STEAM & LEGO Robotics Training.
- We are hosting training courses at Our School
- West Virginia University-Parkersburg is supporting our programs through their STEM Center (As well as area-wide support of LEGO Robotics)
- We have retired teachers that support our PTA and our school (and some are Grandparents) that volunteer for training AND maintaining classes where an additional “Certified Teacher” is required and/or helpful.
- AND – we have Parents, Family, & Community Members, at the School – on an almost, daily, basis.

After we developed "The STEAM TEAM" – And Had A PLAN

The Next thing we did was to personally address each and every teacher's comment(s) and concern(s).

Thank you for taking the time to review the information – and to make comment.

Evaluation, Planning, and Developing ways to overcome obstacles – is so very important in an effective implementation.

We realize the extreme tasks that our current teachers face – everyday (and it seems to not be getting any better).

One should agree that successful implementation would require additional support – not only with additional teacher(s) but, also, additional training, supplies, equipment, and program development.

As we ask our county, state, and other agencies (including private & community) – for additional funding, positions, and abilities – we always keep in mind what is best for our children, and all children.

We agree, for successful implementation – we need additional "Boots on the Ground"…

Thank you, again – for being involved – and providing comment(s) for a successful plan !

SO, HOW DID WE PLAN TO PAY FOR IT ?

Our Plan:

LSIC Funds – as Capital Project (for a combination of 2 years)
PTA Funds – as Capital Project
School Funds – through Technology Funding and other Sources
School Funds – Maintenance Allocations for Set Up
School Equipment – Existing Assets & Computer Cabling

THEN WE PRESENTED TO THE BOARD of EDUCATION:

Board of Education – Request for Support
(as follows – on the next pages)

**(LSIC's HAVE TO PRESENT TO THE BOARD, AT LEAST ANNUALLY –
Take advantage of this PRESENTATION !!!)**

- We are very pleased with our current positioning within the county, and growth achieved from the 2015-2016 schoolyear. Blennerhassett Elementary achieved an average 8% growth this past year in 3rd-5th grades ELA and Mathematics, with 4th grade Science, combined.
- Blennerhassett is very fortunate to have a strong parent and community support system. Last year, a decision was made to build upon our strengths and we called upon RESA V to provide training for many of our parent volunteers. The focus was small group reading instruction. Tisha Wall provided *Alternative Passage Reading Procedures*, *Appropriate Techniques for Teaching the Meaning of Unknown Vocabulary Words*, as well as providing *Beginning, Middle and End Questing Flip Packets*.
- Analyzing individual student achievements and individual teacher results from the GSA, the academic leadership team was able to pinpoint deficiencies in specific classrooms centered on writing. Organizational writing strategies are really the forefront of our 3rd grade weekly collaboration meetings. We have been reviewing as a group, 4 square writing, as well as addressing all of our student's needs.
- Just this past week, a team from the central office has made a presence in our computer labs providing embedded training to assist with IXL mathematics. Areas of focus included data notebook pages, monitoring and supporting students.
- **Blennerhassett Elementary will continue to utilize every possible resource to provide the best instruction, resources and learning environment for our students, our most precious resource.**

It was very difficult for this LSIC to pinpoint one outstanding achievement accomplished this past school year. We discussed:

- Our students' outstanding academic performance on the GSA assessment,
- Read Across America Day Celebration,
- Facility enhancements, &
- Student / Community Engagement.

It was awesome to see a school set individual reading results, compete against fellow classes and come together to celebrate the school wide success on Read Across America Day. This was not just one day, it was several weeks of excitement building upon each other, until yes, the students working collectively to accomplish a great task - **duct taping the principal to the wall**.

This past year, the campus of Blennerhassett Elementary was enhanced inside and out.

Updates included:

- **A fresh coat of bright color throughout - highlighted with murals**
  - **Thank you Wood County Schools for buying the paint**
  - **Thank you PTA for the designs and all of the painting work**
- **A new media center in the library (BES),**
- **New recycled rubber bulletin boards (BES),**
- **Updated landscaping to the front campus (BES),**
- **Enlarged blueprint of the playground and swings (PTA),**
- **New Fun-Fitness equipment (PTA),**
- **New basketball court/hoops and resealed surface (PTA)**
- **Students enjoyed the first annual Trick-or-Trunk this past year (PTA),**
- **Fun Run (PTA)**
- **School carnival (PTA)**
- **Carnegie Museum of Natural History - Dinosaur Visit (PTA),**
- **As well as a special visit by the Columbus Zoo (PTA)**

As you can see our students this past year were very successful

And so to answer your question, this LSIC feels that the most important (outstanding) achievement for our school was the manner in which our Principal managed - Time, Talent, and Treasure - through excellent and proper collaboration with our teachers, staff, parents, community, PTA and LSIC – to positively affect each and every one of our children.

The primary focus for BES, this school year, will be the creation of a LEGO Robotics Classroom / STEAM Lab. From the very popular and innovative development of "STEM" (a curriculum based on the idea of educating students in four specific disciplines - **science**, **technology**, **engineering** and **mathematics** - in an interdisciplinary and applied approach) we will add a fifth component of art, and thus "STEAM". This lab will encourage collaboration and communication while building upon 21st century learning skills, at the same time that we are providing an engaging atmosphere and learning materials. The materials and activities are built upon curriculum standards that will boost student motivation.
LEGO – from bricks to blocks to robotics, are naturally engaging to elementary students.
LEGO Education – engaged experience for elementary teaching solutions, to help lay the foundation for lifelong learning skills like language, math, science, art, technology, and engineering.
Imagine bringing abstract concepts to life with a fun and hands-on approach that really engages students:
LEGO bricks - turn numbers, words, and ideas into real models that can be touched, described, and innovated upon.

> **By making the subjects tangible, they foster collaboration and encourage self-guided learning by creating enthusiasm and giving students the tools they need to overcome challenges.**

All the way up to LEGO Robotics (For elementary students).

> Do you know that 3rd grade at Blennerhassett Elementary School is already participating with NASA IV & V (Fairmont, WV) with LEGO Robotics?
> Did you know that 5th grade at Blennerhassett Elementary School is utilizing our own (from PTA) Three Dimensional (3D) Printer and, among other projects, has been working with the kindergarten classes on technology incentives.

A complete “Innovation Center” for all of our elementary children.

This “Innovation” center will offer innovative stimulation for all ages of our elementary children – and will, also, showcase STEM / STEAM, and many other opportunities.

Upon substantial completion, this “Innovation Center”, will house the latest in technology, video conferencing, robotics, and related items.

Elementary classes, can come to the Innovation Center and work as a class – and various components can be “checked out” to be utilized in the individual classrooms, as well.

We plan to utilize:

Previous remaining BES LSIC Grant Funding as well as current BES LSIC Grant Funding
BES local discretionary funds available
Request to the BES PTA for use of capital project reserved funds

The BES LSIC working in conjunction with the PTA, WVU-P STEM program, BES Administration, Wood County Schools, RESA, State of WV, WV Education Alliance, NASA, and many others, will combine forces to create what we believe is a *First of Its Kind* in our county and surrounding areas. Upon proper approval, BES and its LSIC & PTA will pursue the host of other grants and funding options (STEM / STEAM / Innovation) – utilizing our investment as “Seed Money”.

(AND THEN, WE ASKED – Right Then and There – FOR APPROVAL… And It Was Granted)
(We had to submit the paper work – But everyone knew the “Board” – Was In Approval)

Do You Have – Computer Labs

Do You Have Classrooms

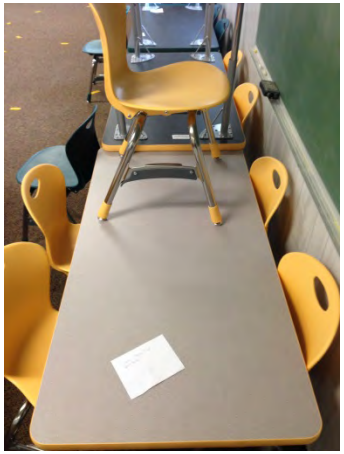
Do You Have Any EXTRA Room(s) ?

Do you have any White Boards – Projectors – TVs – Other Displays – and INTERNET

Do You Know That MANY – Groups, Universities, Companies

(Like BAYER)

– Would LOVE to VIDEO CONFERENCE – With Your Students




1:1 actual size
tamaño real
Originalgröße
tamanho real
dimension réelle
valódi méret
LEGO® Education WeDo 2.0
WeDo 2.0
45300
LEGOeducation.com
Pictured models cannot be built simultaneously
Die abgebildeten Modelle lassen sich nicht gleichzeitig bauen
Les modèles présentés ne peuvent pas être construits simultanément
Les modèles illustrés ne peuvent pas être construits simultanément
Los modelos ilustrados no pueden construirse simultáneamente
Los modelos mostrados no se construyen simultaneamente
Os modelos nas imagens não podem ser construídos em simultâneo
A képen látható modelleket nem építheted meg egyszerre
LEGO
education

Super Builders

Team #8538

Our Research

Our Animal

e a box turtle for our team animal. It has orange
its back. Also, it has claws, and it also can have
es on its back.

e USA. They are mostly found in wetlands,
d woodlands. Their house is their shell. The shell
r protection.

al because it has an endoskeleton and an
shell is the exoskeleton. An example of its
e backbone. It also can stretch its neck.

it's not too hot and not too cold. The
r. Some plants provide food such as
roots. It also gets its water from ponds

getting ran over. A good way to stop
aying turtle crossing. Also, people
on to the road just in case a box
d. If this doesn't stop, box turtles

Our Model

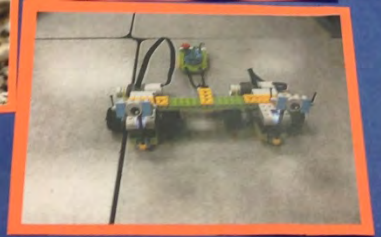
In our model we have the Empire set. We have our box turtle's habitat in our model. We also have our pinkies and autumn.

When we were making our model we were going with the flow. Some of it was planned. The set was the only thing that was planned.

We built the box turtle with Legos: a motor, wheels and gears. The box shell was made with Lego bricks. The rest of it was made with plain Legos.

The box wheels made the whole thing move. The team on the gears made the wheels move. It made is a straight line.

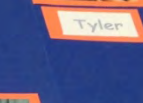
We made it move with gears, an axle, and a motor. The gears have teeth. We used a program called Wallo 2.0 to program it



Our Team

Mrs. Smith

Brock



Tyler

Lydia

Gavin

My name is Tyler Shalvan. My favorite part of the CREATURE CRAZE Challenge was working on the moving part because I like making robots. One thing I learned is what an axle is. For fun I play Minecraft on the Computer and on Minecraft Pocket Edition.

My name is Brock Modesitt. My favorite part of working on the CREATURE CRAZE challenge was when we made the model. One thing I learned is queen bees sting other queen bees. For fun, I like to program the model.

My name is Lydia Gump. My favorite part of working on the Creature Craze challenge was researching about our animal. One thing I learned is that our animal is very slow. For fun, I like to ride my bike.

My name is Gavin. My favorite part of the creature craze challenge was our model because our team loves Legos. One thing I learned is it takes a team. For fun I like to help build the Legos for fun.

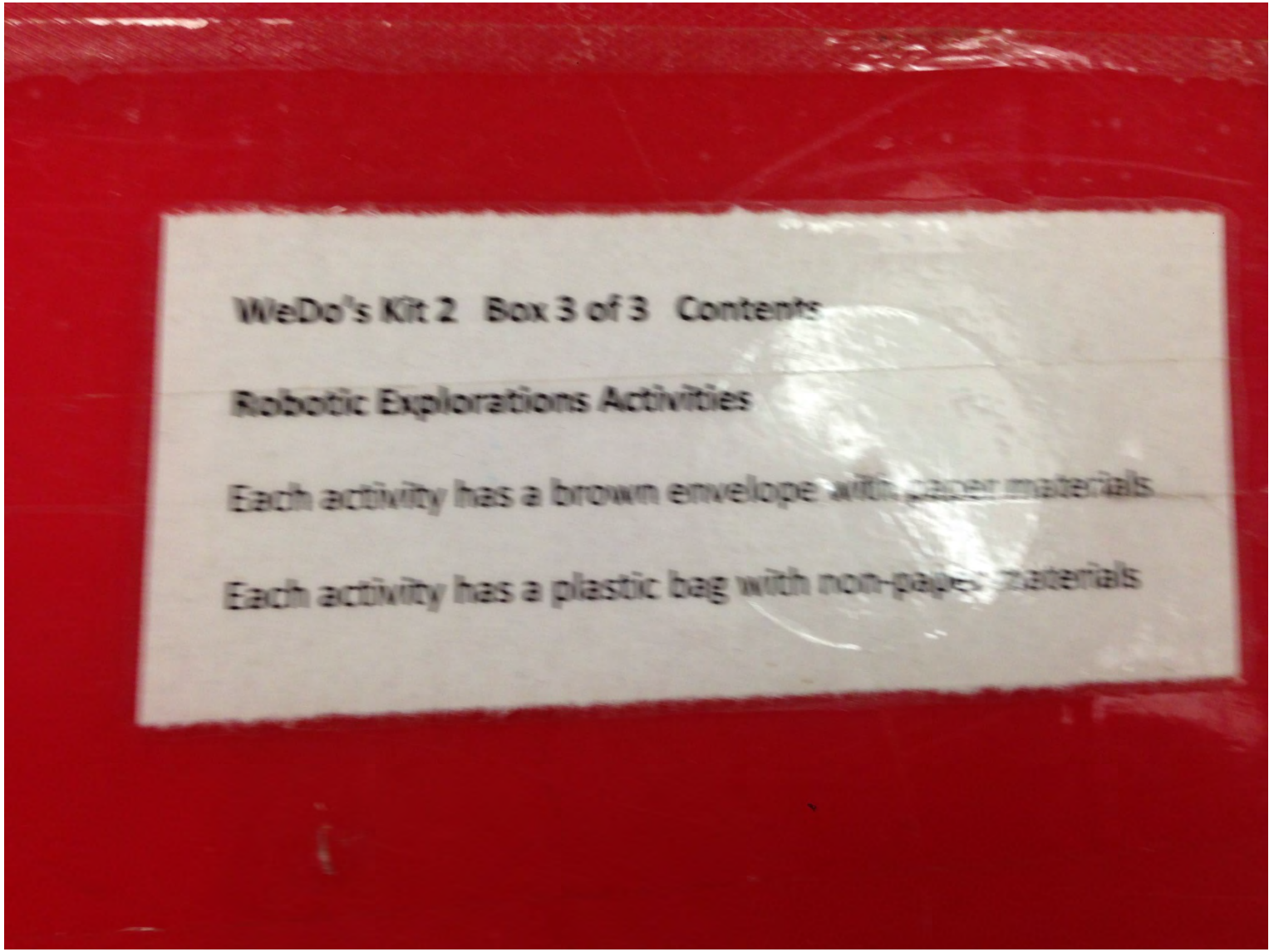
Our children like these activities – and Guess What ??
They Are Helping them learn in exciting ways…

My Movie.mp4

Patrick.mp4

Check This Out ….

The story of the West Virginia top.mp4


WeDo's Kit 2 Box 3 of 3 Contents
Robotic Explorations Activities
Each activity has a brown envelope with paper materials
Each activity has a plastic bag with non-paper materials


LEGO education
5
LEGO education
2

Have you ever heard of …?

- DonorsChoose.org
- Community & Area Foundations
- The Governor's Science, Technology, Engineering, and Math (STEM) Initiative
- West Virginia Department of Education and the Arts
- WV Education Alliance www.educationalliance.org
- Techconnect WV www.techconnectwv.com
- Intuit - Brad Smith, Chairman and CEO
  - Brad Smith (Native of WV) – STEM + "A" (For Arts) = STEAM
  - https://soundcloud.com/user-870372855/brad-smith-chairman-ceo-of-intuit
- **Bayer** - WV PTA has a Grant - for Families & STEM

  https://www.makingsciencemakesense.com/science-library/

National PTA Website – STEM – Programs and Activities

Many Programs & Grants are improving, everyday – In Support of STEM / **STEAM**

- Contact US – Jared & Craig (we really want to help you !)
- Check on the WV PTA Website, for updates
- Contact us – **We Will HELP YOU**

- **AND NOW ON TO THE BEST PART –**
  - **Jared Gump (PhD), WVU-P STEM CHAIR**
  - And the Latest & Greatest