

S.T.E.M.

M A G A Z I N E

Teachers Guide to Sleep

Dr. Judy Willis

Nurturing and Enhancing

Dr. Suhaidah Tahir

“REPRESENTA-ROMA” Un Proyecto en Castellano que une Tecnologias, Arte Y Tambien Paises.

Professor Rita M. Campos

Parents as Mentors

Dr. William Grey

SpaceHorizons & i.am.angel Join Forces

Rebecca Lefebvre



June 2015
//210v

Dear Educators,

As another school year comes to an end, thank you for the dedication to your students through your participation in the STEM Innovations program.

The 2015 STEM Innovations Summer Institute is August 3-7 at Merrillville High School. Registration is open for 9th grade math and science teachers and 7th grade math and science teachers who did not participate last summer. **GOOD NEWS:** We have limited space and budget to include participants from last year's summer institute in the 2015 institute if interested! [Click here to register.](#)

The design team is working hard to develop this year's program. 2015 STEM Innovations teams will model a STEM challenge and will create their own based on their school curriculum and standards.

You can access MSP STEM Innovations updates and important summer institute information on the [STEM Innovations Home Page](#).

Dr. Marion Hoyda will be contacting the lead contacts from each MSP district to discuss and plan presentations which will highlight the MiB challenges taught during the 2014-2015 school year. The MSP grant requires teacher work be shared across the state and the teacher successes associated with the STEM Innovations program are well positioned for that goal. Once Dr. Hoyda contacts the administrative leads, anticipate that a team from each school will be contacted to participate in a state level presentation during the 2015-2016 school year.

Thank you for a wonderful year!



Your STEM Innovations Team

CLASS STEM LESSON

Math I use everyday.

What time do you have to be at school?

● Are you taking a shower? How long will that take?

● Doing your hair? How long will that take?

● Breakfast? How long will that take?

● Last minute homework? How long will that take?

● Walk to bus stop? How long will that take?

● Walk to school? How long will that take?

● *What time should you set your alarm for?*

Yes, you will use math (usually easy math) everyday. *Don't be afraid of it.*
Your brain is actually wired for it.

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Campas Spain

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S.T.E.M. Magazine is excited to announce a partnership with - **Global STEM STATES** - for the remainder of 2015. To learn more about Global STEM States visit:

www.stemstates.org



STEM Magazine is a non-profit monthly education publication for teachers, students, their parents and anyone interested in STEM education, career development, work-force development and the global economy. CEO Wayne Carley is the publisher and senior editor for all content in S.T.E.M. Magazine.

S.T.E.M. Magazine believes that the key to success in seeing higher graduation rates, improved testing results, student inspiration and a strong work-force rests in the hands of the teacher. The example and inspiration of individual educators carries tremendous weight on a daily basis, greatly impacting the quality and effectiveness of the classroom environment.

Curiosity is the beginning of all things STEM.

Wayne Carley
Publisher

wayne@stemmagazine.com

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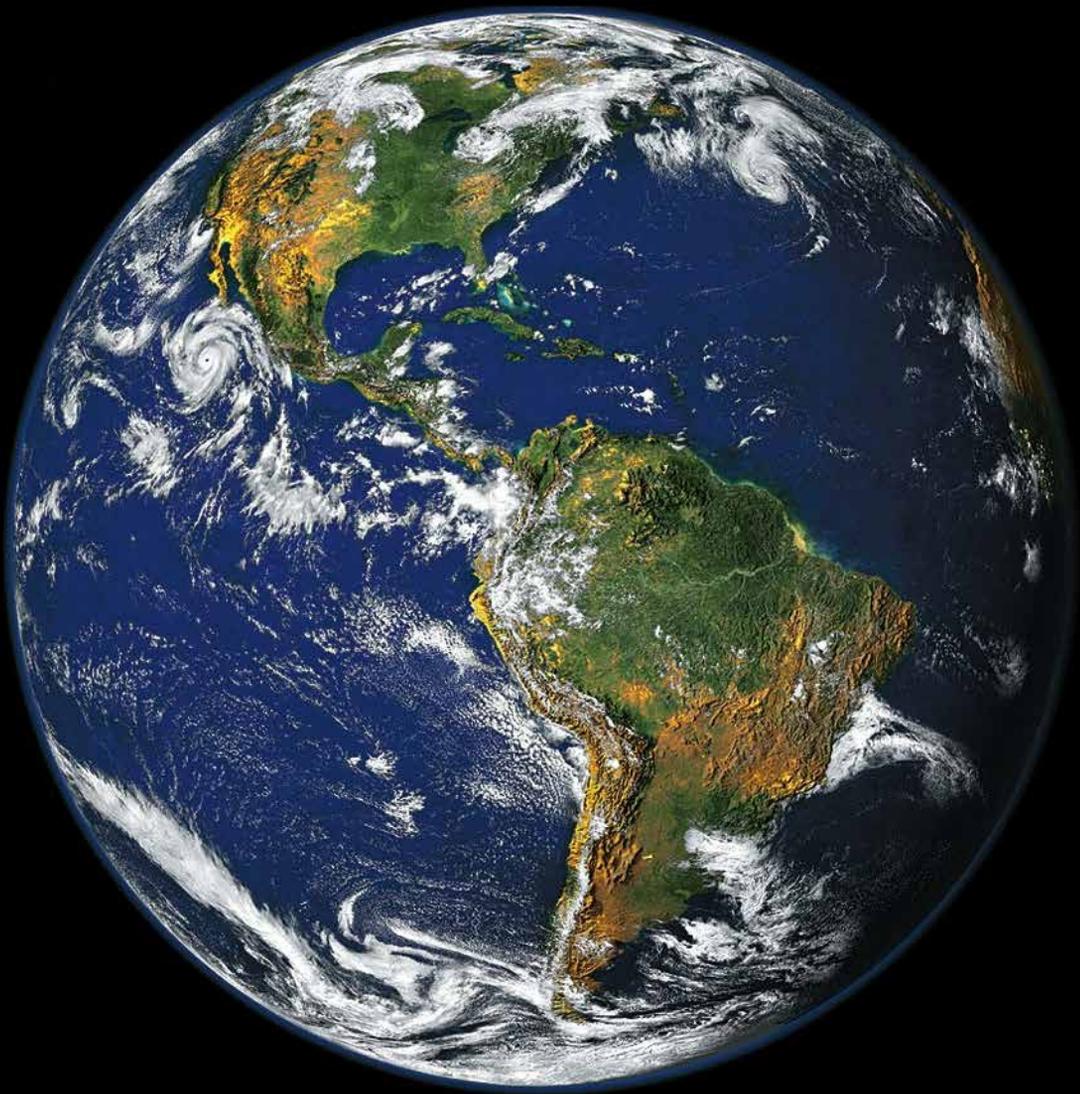
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**A warm welcome to our newest educators,
students and monthly readers in...**

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S.T.E.M. is Global



“Skilling a Nation’s Future”

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- ✓ Policy and Curriculum Development
- ✓ Industry Engagement
- ✓ STEM Ambassador Programs
- ✓ STEM Projects
- ✓ Adult Education
- ✓ Open and Distance Learning

These hot topics and much more...

2nd International Festival of Science, Technology,
Engineering and Mathematics

www.stemstates.org

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Sept 27th to
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City, Saskatoon,
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25 Expert
Presentations,
including:



Dr Joe Schwarcz
McGill University



Mr Etienne Clement
UNESCO



Dr Suhaidah Tahir
South East Asian
Ministers of
Education Organisation



Dr Tony Wagner
Harvard University



Mrs Cindy Moss
Discovery Education

Dr. Judy Willis, *Neurologist*

A Teacher's Guide to *Sleep* -



- and why it matters

If you are a sleep deprived teacher you may not be aware of the term woodpeckering, but you've probably done it. It happens the day following a bad night's sleep. You're sitting in a long meeting and you can barely keep your eyes open, so you prop your head up with your hand. Next thing you know, you are jerking your sleeping head back to its upright position. Do this a few times and you are woodpeckering.

I thought I knew sleep deprivation when I did my medical internship in hospital. That year I frequently went 36 hours with no sleep. When I finished my residency in neurology, I welcomed the promise of full nights of sleep ever after. It went pretty well for the next 10 years until I became a school teacher and experienced a whole new level of sleep deprivation.

Teachers' working hours go far beyond the 8am to 3pm schedule of kids in school. There are hours spent at faculty meetings, correcting homework, preparing for the next day – and then there is the worrying. Nothing I ever did in a hospital emergency room or doing CPR required the intense mental energy needed to keep 30 kids attentive enough to learn what I was teaching.

Good teachers are like jugglers keeping a dozen balls in the air so come nighttime, with alarm set for 6am to finish grading papers, memories of the day that's gone – including the students who didn't understand something,

forgot their lunch or were embarrassed by wrong answers – become sleep-resistant barriers. Add to these financial stress – potential loss of income from spending cuts and job losses – and you have cycle of insomnia with its band of unwelcome consequences.

What is the impact of not getting a good night's sleep?

With inadequate sleep comes irritability, forgetfulness, lower tolerance of even minor annoyances, and less efficient organization and planning. These are the very mental muscles teachers need to meet the challenges of the next day. In wanting to do a better job the next day, the brain keeps bringing up the worries that deny it the rest it needs.

Studies of teachers' response to high job strain reveal that they spend more time than most people ruminating about work-related issues and their brains take longer to unwind. Sleep hours suffer as well as sleep quality.

We need sleep to think clearly, react quickly, and create memories. It is during the later hours of sleep (especially between the sixth and eighth hour) when the brain releases the neurochemicals that stimulate the growth of the memory connections. The average teacher is reported to sleep six hours a night, falling short of the most valuable sleep time.

It is also during sleep that the brain has some its most profound insights and does some of its most creative problem solving. During the day, the neural networks for highest cognition are kept busy directing the rest of the brain's moment-to-moment decisions, choices, prioritizing, and just getting through the day. At night, these executive control circuits are free from those distractions. As seen on brain imaging, these regions can be extremely active during sleep.

After such brain activity, the subjects often awaken with solutions to problems, new insights, and ideas for creative innovation.



How to get a good night's sleep: tips before bedtime

Increasing sleep time from six hours or less to eight hours promotes the growth of the brain connections that increase memory up to 25% and restore emotional calm, alert reflectiveness and job efficiency. Here are some general and teacher-specific tips:

ONE:

The best sleep hygiene includes regular sleep and wake schedules – even on weekends. Exercise is also good, but avoid vigorous exercise in the two hours before bed. Vigorous exercise releases adrenalin and noradrenalin, both stimulants that could delay falling asleep.

Vigorous exercise before bed also means it will take longer for your body to cool down to the lower temperature that promotes sleep.

That said, calming music and gentle stretching, yoga, and progressive muscle relaxation (going through each muscle group and tensing and relaxing it) before getting into your cosy bed is great.

TWO:

Thinking about what you eat and drink before bed also has an impact. You may think you are avoiding caffeine, but look carefully at teas, soft drinks, cold and headache medications where caffeine may be hiding.

Alcohol near bedtime might help you fall asleep, but when it wears off, you'll wake up in the middle of the night and have trouble falling back to sleep.

In the normal cycle, deeper REM sleep does not come until several hours in. Alcohol before bed results in early onset REM thus helps with falling asleep. However, after several hours, the early REM is followed by sleep fragmentation – frequent awakenings. One lies in bed awake and come morning

does not feel refreshed.

The environment in which you sleep should also be cooler as this is more sleep conducive.

THREE:

For teachers, bedtime rituals can clear your brain of that ruminating about work-related issues so why not have a warm bath with relaxing music before you go to bed?

FOUR:

If some worries do wedge themselves into your sleep cycle, write them down on an external note-card. Most importantly, let your last thoughts include self-recognition for the vital work you do and drift to dreamland recalling the day's school successes and the faces to which you brought smiles.

Dr. Judy Willis

Dr. Judy Willis



Opportunities in Asia

What does the rise of Asia's STEM sector mean for North American Universities and education suppliers and how can you be part of it. This is just one of the hot topics being explored as part of the 2nd International Festival of Science, Technology, Engineering and mathematics.



www.stemstates.org

September 27th to October 3rd 2015
Saskatoon, Canada



Exclusive S.T.E.M. Interview

Dr. Suhaidah Tahir

Deputy Director, Research and Development
South East Asian Ministers of Education Organization
Regional Centre for Education in Science and Mathematics

The South East Asian Ministers of Education Organization represents Brunei Darussalam, Indonesia, Malaysia, Philippines, Thailand, Cambodia, Lao, Myanmar, Singapore and Vietnam.

"Nurturing and Enhancing the Quality of Science and Mathematics Education"

1. Tell me about your definition and need for "nurturing and enhancing the quality of science and mathematics education".

Science education provides the foundation for understanding the world around us. Science has changed our lives and is vital to the world's future sustainability and prosperity.

Through inquiry and problem-based active learning experiences, set in context all students should have the opportunity to develop knowledge and understanding of the methods, processes, applications and implications of science, recognize the power of evidence-based explanation and

develop excitement, interest and curiosity about natural phenomena. They should be provided with experiences that enable them to explain what is occurring, predict how things will behave, and analyze causes. They should develop the capability to collaboratively carry out scientific inquiries and solve real world problems.

Through such experiences they should not only develop their scientific capability but also their team working, leadership, communication, ICT, critical and creative thinking skills.

Mathematics is a creative and interconnected discipline that has been developed over thousands of years.

It is essential to everyday life, critical to science, technology and engineering; and necessary for financial literacy and most forms of employment. Mathematics education should therefore provide a foundation for understanding the world, the ability to reason mathematically, an appreciation of the power of mathematics, and a sense of enjoyment and curiosity about the subject.

High-quality mathematics and science education should therefore equip students with the skills, values, attitudes, attributes and capabilities for global citizenship and workforce of the 21st Century.

2. Do you see a weakness in the teaching of science and math that we should address?

Science and mathematics can sometimes be taught out of context and in a theoretical and mechanical way, thus students do not see the relevance and application of the subjects; they do not develop understanding and the necessary inquiry and problem solving skills;

and to not develop the curiosity and enthusiasm for a lifelong interest in the subject.

3. How will this enhancement and nurturing impact student interest in these disciplines?

Through in-context, inquiry and problem-based active learning experiences students develop ownership of their ideas and solutions.

Through cooperative and collaborative development of their critical and creative thinking; and the motivation developed leads to a lifelong curiosity and interest leading to engagement in public discussion on scientific issues and greater application of their mathematical and scientific understanding and skills in everyday life and careers.

4. Is there a common approach that teachers globally will benefit from? Students?

Teachers globally should be provided with high-quality professional development to enable them

to apply a wide range of active teaching and learning approaches that put into practice context-based teaching and learning, inquiry-based teaching and learning; problem-based teaching and learning; constructivism and

5. *What in your opinion is the most effective professional development program you've developed?*

At SEAMEO RECSAM we run four week courses for teachers from all the SEAMEO countries,



develop mathematical and scientific inquiry capability. Thus students will develop deeper understanding through thinking; an appreciation of applications and implications of science and mathematics; their mathematical and scientific capability; lifelong curiosity and 21st Century skills.

these provide teachers with inputs on contemporary science and mathematics philosophies, principles and practices; hands-on experiences through exemplar activities; opportunities to reflect and discuss implementation in the diverse cultural and classroom settings; opportunities to exper-

iment through micro and team teaching; and the opportunity to carry out research through action research and lesson study.

These intensive courses that culminate in the development of personal action plans provide powerful and effective professional development for the teachers that has enormous impact in their classrooms and schools.

6. *What countries do you currently provide services to?*

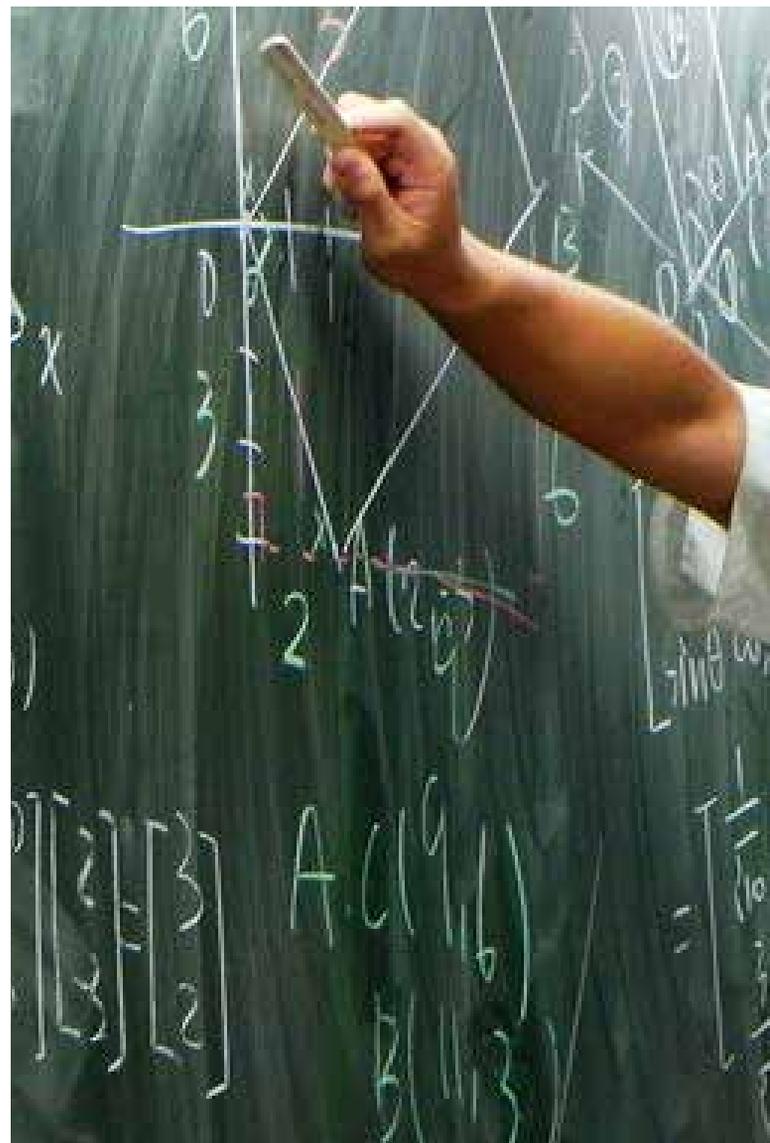
RECSAM was officially inaugurated in May 1967. Since its inception 45 years ago, the Center had conducted many training courses, seminar-seminar, symposiums, workshops to cater not only the needs Of the Southeast Asian regions (Malaysia, Thailand Myanmar, Cambodia, Laos, Vietnam, Philippines, Brunei, Singapore, Indonesia, Timor Leste) but also the Asian Pacific and African regions as well.

To date more than 25,000 Science and Mathematics educators across the region and beyond had partic-

ipated in RECSAM's programs and activities.

7. *What gives you the most satisfaction in your role with SEAMEO RECSAM?*

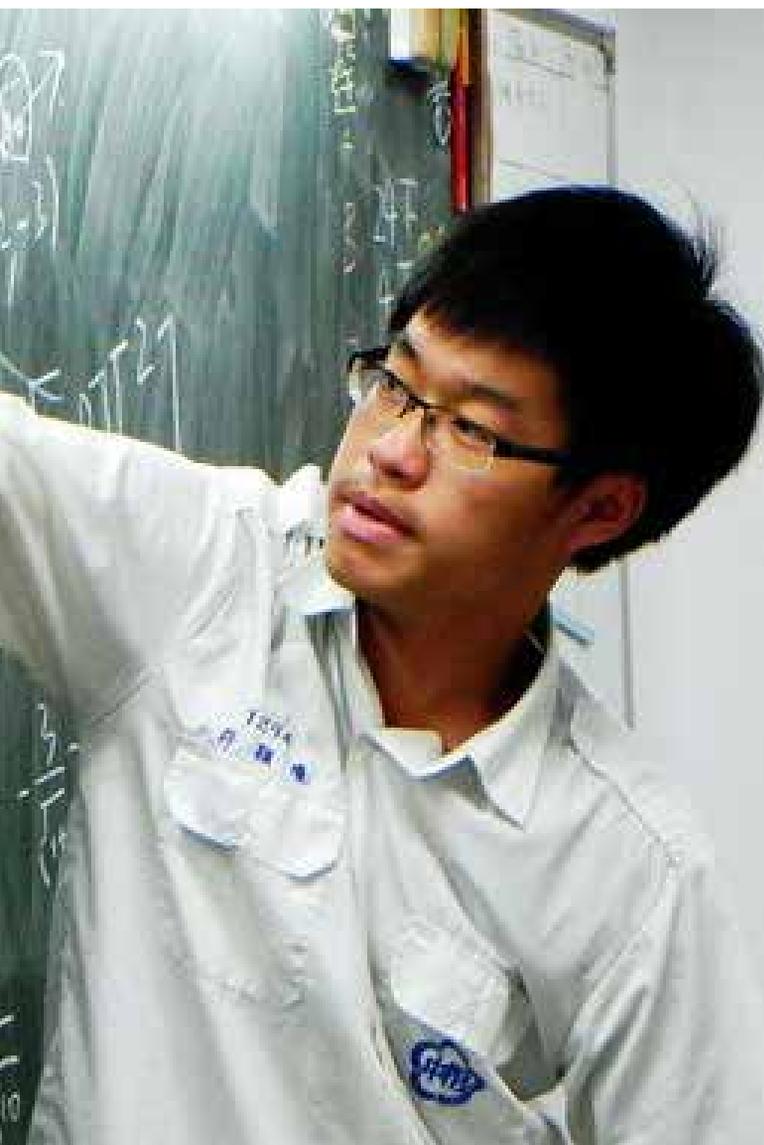
My greatest satisfaction comes from seeing the teachers we are engaging with grow in confidence, competence, experience and expertise and the enormous effect this has on the students in their classrooms.



8. What is the first step an interested educator should take to participate in your programs or projects?

Please go to our website and see which programs they would like to be involved in and then contact the relevant programme leader or member of staff.

<http://recsam.edu.my>



Plumber

A great STEM



This is a great example of a STEM career with:

- limited education requirements,
- apprenticeship opportunities
- self-employment future
- no gender restrictions and,
- a *great* salary.

Career

Having been an apprentice plumber in college for a time, I can attest to the STEM applications and career opportunities.

We will ALWAYS need plumbers.

Plumbers are primarily responsible for installing and maintaining various types of piping systems and fixtures. The exact responsibilities of a plumber depend on the particular project type. All plumbers must be able to follow blueprints, work with plumbing tools, and know what types of materials are required for each job. Plumbers may also design piping systems for new construction projects. During plumbing jobs, you may need to perform:

- basic carpentry to access pipes inside walls or brace pipes to keep them in place.
- You will also weld, solder, and attach fittings together when necessary.

Once a piping system is installed, you'll:

- install fixtures, such as bathtubs, showers, toilets, water heaters, and dishwashers
- gas lines
- specialized in-floor heating systems
- customized plumbing applications for unique projects
- the list is long

The Science of plumbing:

“A systematically organized body of knowledge on a particular subject.”

There is a lot to learn about plumbing and as the associated tools, technology, pressures, regulations, laws, safety requirements, environmental concerns, material specifications and demands change, the plumber must continue to learn, apply and imagine.

The Technology of plumbing:

What is new in plumbing? Technology comes up with new things all of the time, but there are some latest developments that are piquing people's interest. One of these things is epoxy pipe lining. This is actually a new trend in repair. It

used to be when a pipe was becoming worn and developing holes, it needed to be completely replaced. With epoxy pipe lining, instead of replacing a pipe, the plumber sandblasts the inside of the pipe to remove corrosion and rusting, then fills it with an epoxy lining that seals it and makes it function good as new.

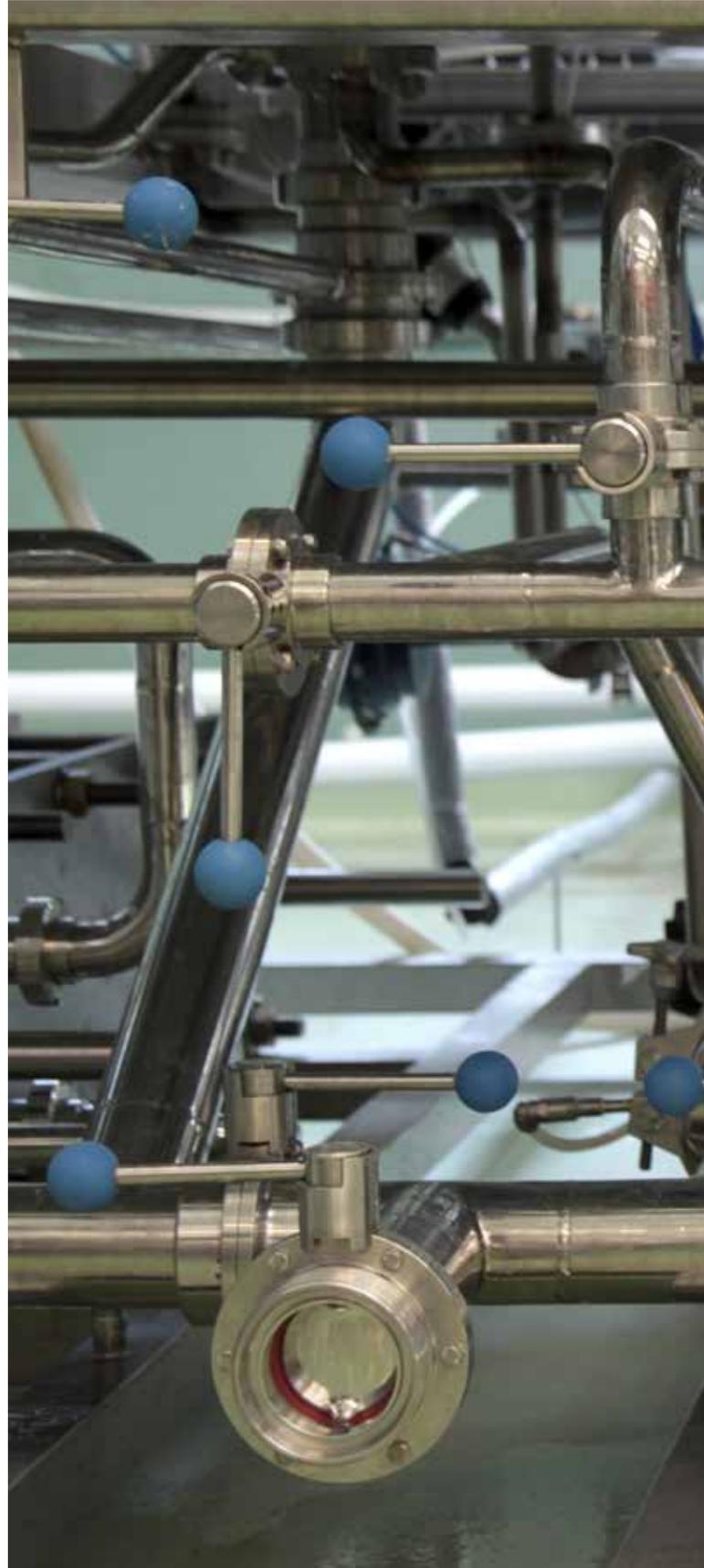
You will need to know about new synthetic plastics, electronic sensors, laser sighting, metering systems and remote controls, chip technology, new metal alloys, copper innovations, monitoring devices, and a good old wrench.

The Engineering of plumbing:

Since the engineering method, a decision making process, is critical to plumbing layout and design, thinking ahead and problem solving will be a daily routine and expectation.

Following the blue prints is important, but they are often in error when it comes to actually laying out the design. You will have to use

your imagination, creativity (the Arts), and experimentation to find solutions to unexpected challenges.



The Math of plumbing:

It's not difficult to figure out that there is a lot of measuring involved.

Be ready for a little geometry, basic measuring calculations, a bit of physics and some three dimensional visualization.



Plumbers and the related trades of pipe fitters and steamfitters, who often work in commercial and industrial settings, earned median pay of about **\$49,000** a year nationally, well above the \$35,000 average for all occupations, according to 2012 data from the Bureau of Labor Statistics.

Earning potential can be much greater once you start your own business and find the best city or state to set up shop. Resort areas are a fantastic place to make it big.

--- School ---

While a formal training program may not be required, it can aid advancement and teach students useful skills that can come in handy on the job. Many trade or technical schools and community colleges offer formal training programs for those individuals who want to become plumbers.

These are typically short certificate training programs that last about one year. Coursework covers water supply and drainage systems,

as well as piping, venting, fittings and valves. Students can expect to learn plumbing skills and maintenance. They can use this training to begin an apprenticeship as a plumber or go on to earn an associate's degree.

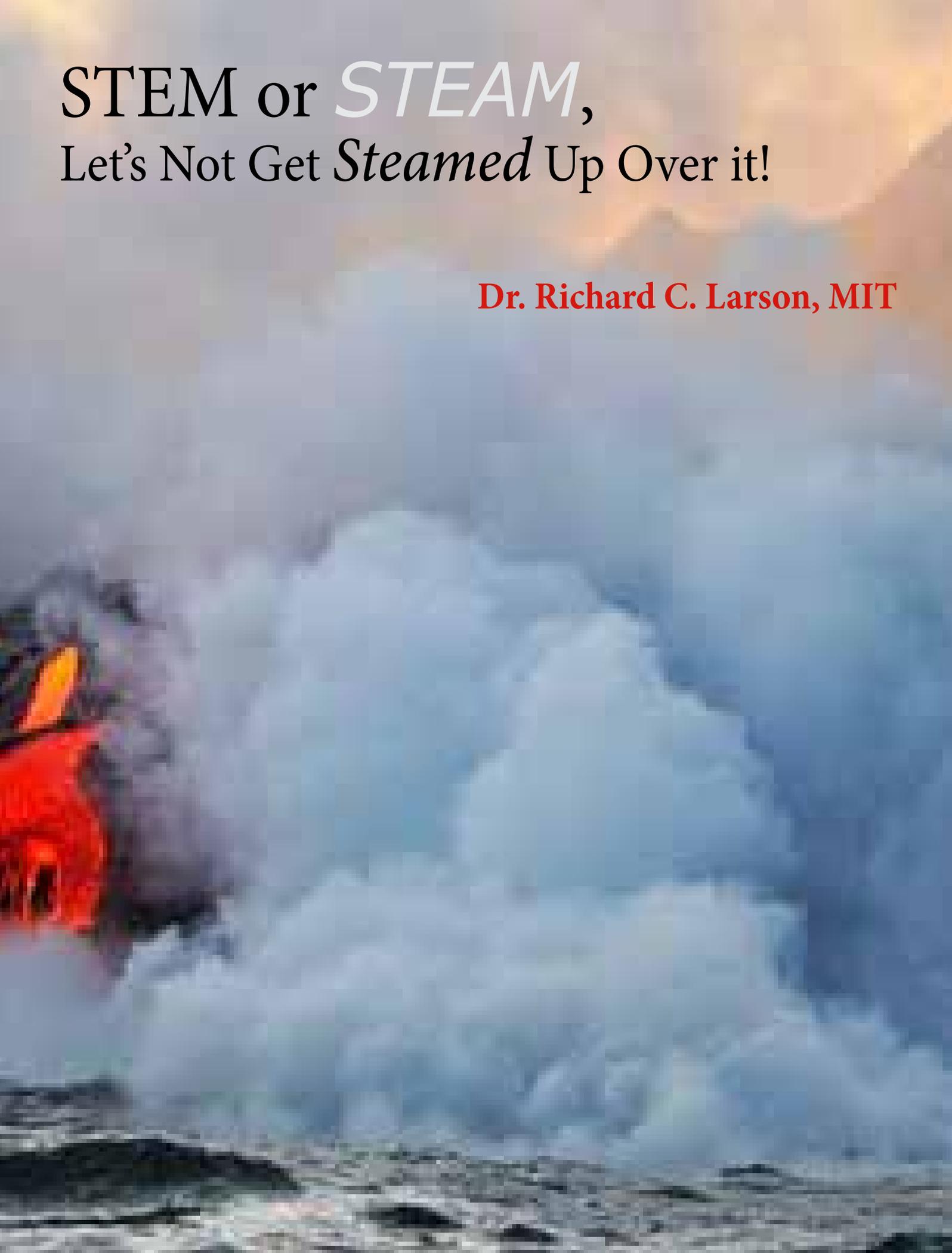
Apprenticeship programs are provided by local unions and their affiliates, as well as by non-union contractors. These programs last from 4 to 5 years and combine paid on-the-job training with classroom instruction, which can be either paid or unpaid.

On-the-job training should total anywhere from 1,700 to 2,000 hours per year, according to the U.S. Bureau of Labor Statistics. Apprentices learn local plumbing codes, as well as all types of plumbing procedures, from primary installation of plumbing fixtures to repair and maintenance of water pipes. Trainees also gain special plumbing skills, such as choosing materials and plumbing fittings, identifying grades and types of pipes and using the tools of their trade.



Ladies welcome. Show us how it's done!





STEM or *STEAM*,
Let's Not Get *Steamed* Up Over it!

Dr. Richard C. Larson, MIT

Recently, with all the emphasis on STEM (Science, Technology, Engineering and Math), some folks have been complaining about the absence of attention to Arts. They say, why not STEAM, Science, Technology, Engineering, Arts and Math. I agree, but it does not take Herculean efforts to get there. We are already there!

First of all, let's look at one of the greatest scientists ever. Leonardo Da Vinci. The exemplary Renaissance man, he is first known as a transformative painter. And musician. And sculptor. But he was also a path-breaking scientist and engineer and inventor. Art and science and math and engineering all went hand in hand. Da Vinci was STEAM, through and through. He remains an 'existence proof' that STEAM is not only possible, but most likely preferred.

Much of what appears in science and in engineering really is art. Apple, Inc. is known for its minimalist beautiful designs of its hi-tech products, complicated as can be inside, but artistically pleasing

and intuitively understood outside. That emphasis is traced back to Steve Job's early fascination with calligraphy.

The design of bridges can be thought of as an engineering feat, as poor engineering can result in bridge collapse, witness the failed Tacoma Narrows Bridge (aka "Gallopig Gertie") in 1940. But who would say that these bridges are not wonderfully artistic – Brooklyn Bridge, an icon of New York City; Si-o-se Pol (The Bridge of 33 Arches), in the Iranian city of Isfahan; Rialto Bridge in Venice, Italy; and the Millau Viaduct, an enormous cable-stayed road-bridge that spans the valley of the river Tarn in southern France. And there are many more.

Similar artistic attributes apply to buildings, automobiles, clothing, and much more in our daily lives. So art and engineering go hand in hand.

Double helix DNA is one of nature's works of art, and it took artistic creativity for Watson and



Crick to recognize it, playing with sticks resembling tinker toys. Fibonacci series create beautiful art in nature, as is found for instance in snail shell geometries. And consider the wonderfully intricate manmade geometric designs seen on many Mosques.

In short, STEAM is all around us. It is up to us educators to bring it into the classroom and integrate it with students' learning. Narrow silo'd education, placing math and biology and physics and chemistry and engineering each into its own hermetically sealed tube, is wrong. Nature does not work that way. Humans do not operate that way. Inventions rarely come about that way. Our students should not be taught that way.



2nd International Festival of Science,
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September 27 to October 3rd 2015 in Saskatoon, Canada

The World's STEM community is coming
together....

1200 delegates
55 countries
28 events
1 week
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1 venue

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“REPRESENTS -ROMA”

A Project in Castilian that Unites Technologies, Art and Also Countries.

“REPRESENTA-ROMA”

UN PROYECTO EN CASTELLANO QUE UNE TECNOLOGÍAS, ARTE Y TAMBIÉN PAISES.

by Professor Rita M. Campos

“No bastan en una nación las fuerzas sin la unión, ni la unión sin fuerzas”

-Séneca-

“REPRESENTA-ROMA”, palabras que resumen la filosofía de nuestro Proyecto.

Presentar el espíritu y el contenido de esta iniciativa y presentarme, son las dos primeras cosas que haré en este artículo. Ya hice la primera. Ahora me toca hacer la segunda, soy Rita M. Campos, profesora Titular de Tecnologías en un Instituto de Enseñanza Secundaria “Cuatro Caminos”, situado en una pequeña ciudad de la CC.AA. de Extremadura-España-, Don Benito.

En nuestro centro, hay alrededor de 1.200 alumnos matriculados en diversos cursos obligatorios y



voluntarios y unos 95 profesores impartiendo sus materias.

Es un centro dinámico, donde el profesorado suele estar siempre a la vanguardia de las posibles iniciativas educativas que nos ofrece la C.E.E. y aquí es donde aparece nuestro Proyecto.

Tuve la suerte de ser invitada a un Congreso entre países miembros, al que asistían profesores que estaban inscritos o trabajando en la Plataforma Digital Educativa Europea e-Twinning.

Este encuentro, se desarrollaba bajo la iniciativa “Habl-Arte” del Consejo Nacional de Educación de España, en su segunda edición. La iniciativa “Habl-Arte”, intenta promocionar el uso del castellano en esta Plataforma, aunando tecnologías, lengua y cooperación educativa internacional. La reunión se celebró en Madrid y dio bastantes frutos: nuestro Proyecto, uno de ellos. Alrededor de 100 participantes (profesores de secundaria) de toda Europa, fuimos teniendo la oportunidad de conectar, sin habernos visto jamás, para realizar

algo en común con nuestros alumnos, tan alejados y tan unidos por las tecnologías.

Su gusto por el uso de los accesorios digitales, forma parte de sus vidas, sus teléfonos móviles, sus “tablets”, sus reproductores MP3 Y MP4 y sus ordenadores ¡esto une mucho! ¡las “maquinitas”, como decimos aquí, les tienen locos!

Aprovechando esta “locura” adolescente, propuse a mis alumnos de 4º curso, de la asignatura de Informática, formar parte del Proyecto, allá por el mes de Enero. Algunos me miraban con cara rara, otros con cara de intriga y otros simplemente miraban, pero todos dijeron, sí.

No sé si lo mismo les ocurrió a mis colegas: Betty Oliveros, Giacinta Mecucci, Greta Sopo y Faten Ben Jebri, todas profesoras de Castellano y amantes de las Tecnologías, con sus alumnos respectivos, porque aún no hemos hablado de cómo les convencieron, pero algún día me lo dirán.

Y así nació nuestro Proyecto, producto de una idea que surgió pensando en los países de Betty y de Gia, durante nuestro encuentro en el Congreso. Francia, Italia, España, latinos, romanos, el teatro romano de Mérida (Capital del Imperio Romano), a tan sólo 70 km. de nuestra ciudad.

convencido después y Greta, tan activa y eficiente se convenció sola, casi desde el principio. Mis colegas entregadas y nuestros alumnos tan dispuestos, permiten que ahora esté en pie, nuestro Proyecto, que se va moldeando con cualquier idea que cada una de nosotras va



ALUMNOS-ESPAÑA-CON PROF

¡Tan vivas aún sus ruinas entre nosotros! ¡seguimos usándolas para los Festivales Nacionales de Teatro Clásico! ¡Teatro romano de Lyon! ¡Coliseum!

Salimos de nuestro Congreso con “las ideas enfundadas”, dispuestas a trabajar, las tres; a Faten la hemos

ALUMNAS-

aportando. Nuestro ideario de trabajo, a parte del ámbito tecnológico y lingüístico, trabaja también, la autoestima, auto-motivación, el ámbito personal y social (inteligencias múltiples). Nuestros alumnos, son los receptores y colaboradores de nuestro trabajo y los ejecutores del producto que se ve.

Son agradecidos y dispuestos para estos asuntos. Y por suerte, hasta ahora nuestra compenetración ha sido exquisita.

Hablemos ahora de la parte estructural y técnica:

socios inscritos y hacerles propuestas de Proyectos, siendo necesario que haya implicados en cada Proyecto, un mínimo de 2 socios fundadores. Lo que si está claro, es que a todos los inscritos, pertenezcamos a la especialidad que pertenezcamos, estamos unidos por las TIC'S, en cualquiera de sus manifestaciones.



TUNEZ

ALUMNOS-ESPAÑA-CON PROF-GRUPO2

Como se apunta anteriormente, trabajamos en una plataforma educativa online, llamada e-Twinning. En la que nos acreditamos libremente los profesores europeos, previa certificación y autorización de nuestros respectivos centros educativos y estatales. A través de ella, podemos contactar con otros

Tenemos un espacio propio para trabajar online en nuestro proyecto, vinculado a esta Plataforma Educativa-

<http://www.etwinning.net/es/pub/profile.cfm?f=2&l=es&n=111683>

nuestro Twinspace <http://twinspace.etwinning.net/5411> , que se

nos asigna online, una vez que es aprobado por el Consejo Nacional de Educación y en el caso del resto de los países socios, por sus respectivos órganos pertinentes. El nombre que le dimos a nuestro Proyecto: “REPRESENTA-ROMA”, es creación genuina de nuestra colega Giacinta Mecucci. Cuando nos lo propuso, nos encantó y rápidamente le bautizamos. Actualmente, estamos registrados 150 miembros: 145 alumnos y 5 profesores.

El Proyecto se podrá desarrollar en dos o tres fases, cada fase se corresponde con un curso académico, aunque como su desarrollo hasta obtener el producto final, dependerá del grupo de alumnos que tengamos asignados cada curso, pues podrá acelerarse o dilatarse en la generación de las tareas intermedias, dependiendo de las posibilidades de trabajo con estos alumnos.

Las eventualidades de moldeabilidad y el dinamismo del Proyecto dentro de sus líneas de actuación, son aspectos que hacen seductora

esta Plataforma Digital Educativa ya que las mejoras y los cambios pueden realizarse constantemente. Hace que el Proyecto sea modificable en sus fases intermedias, permite cambiar de dirección cada intervención e incrementar o disminuir el número de participantes ¡está vivo!

[¿Cómo conseguimos aunar currículo y actividades del Proyecto? ...](#)

Creo que con imaginación y creatividad y muchas ganas de hacer cosas nuevas o diferentes, aunque estén hechas con las herramientas de siempre. Los profesores siempre enseñamos, es “de-formación” profesional.

En mi caso concretamente, al impartirles la asignatura de Informática en un curso como es 4º de Secundaria Obligatoria, pues, por ejemplo, incluyendo en el apartado de tratamiento de la información, la búsqueda de información con el uso de distintos navegadores, utilizando diversos buscadores y seleccionando adecuadamente, los enlaces de información de entre todos

sus encuentros; por ejemplo, una búsqueda para nuestro proyecto sería, encontrar información sobre la civilización romana, concretamente, atuendos y moda , maquillaje, ropa militar, etc. Esto lo incluiré en el apartado de “alfabetización en navegación por la red” del currículo, ya que esta actividad encaja totalmente.

En el corto camino para poner en marcha este Proyecto, me he encontrado con personas que nos están ayudando a que este plan se desarrolle:

-El Claustro de Profesores de este Centro, con su apoyo a nuestra iniciativa.

-El Equipo Directivo, facilitando espacios, coordinando horarios y dotándonos de medios.

-Diego Ramos, que trabajó en el Dpto. de Artes Plásticas como Profesor y de quien fui colega hace 6 años. Actualmente es Gerente y Actor en Producciones “El Desvan”, aquí en nuestra CC.AA.

-La Profesora del Dpto. de Lengua Castellana y Literatura de este Centro, Montaña Pantrigo, ayudando en la tediosa tarea de reorganizar este escrito.

-Todos los centros educativos integrantes de la red de socios de nuestro Proyecto, en sus distintos países.

-Todos nuestros alumnos.

Y por supuesto, si no se han cansado todavía de leer, pueden conocer esta iniciativa, gracias a la curiosidad e interés por nuestro trabajo del Señor Wayne Carley, a quién debo agradecerle su disposición para publicar este artículo. Una cadena de personas y amigos a los que unen, las redes, las tecnologías y las ganas de aprender y conocer. Queda mucho por hacer, pero esta, es también “la parte interesante y cautivadora”. Alumnos, Profesores, familias que apoyan las iniciativas de sus hijos, colegas que ayudan, colaboradores, tecnologías, esto bien agitado es el cocktail:

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SpaceHorizons & i.am.angel Foundation *Join Forces*

By Rebecca Lefebvre

On April 22, 2015, SpaceHorizons officially announced their pilot STEM program at Roosevelt High School in Boyle Heights (part of the Los Angeles Unified School District).

The announcement was made as part of Roosevelt's "Space Day" event when students learned that they would have the opportunity to build and launch their own satellite. Bringing this challenge into high school classrooms will give students a chance to learn, lead, and build a foundation for their future.

SpaceHorizons is a recently formed nonprofit corporation based in Boulder, Colorado that is reinventing the notion and approach of how under-served kids can be energized to pursue a STEM career. Through its robust mission and abstract thinking of its founder and CEO, Kevin Gebert, SpaceHorizons developed a program that merges the entertainment and science communities to motivate and inspire at-risk students to pursue higher education.

In the Fall of 2014, Gebert, then having recently retired from a 35 year career in Aerospace, focused his energy on a long-held passion for technology and education. The outcome of which was a nonprofit called SpaceHorizons: an innovative STEM-based educational and career-development program designed to connect high school students in urban and under-

served regions to the resources necessary to conduct a real space mission, increase pursuit of STEM careers and expand overall STEM literacy.

Knowing he would need help, Gebert shared his excitement for this venture with his friend of 19 years and former aerospace colleague, Steve Diamond, who now serves as Chief Relationship Officer for SpaceHorizons.

While Gebert had been busy assisting small aerospace and tech companies in bringing their products to the education market, Diamond was ardently working with the Colorado Front Range universities and National Labs to engage the STEM community and build partnerships, collaborations, and mentoring opportunities with local and national nonprofits.

Finding themselves both in opportune times and with decades of shared aerospace experiences, they formed SpaceHorizons with the primary goal to inspire at-risk youth (specifically minorities and

young women) toward the pursuit of higher education and/or career opportunities in STEM-centric fields.



Gebert and Diamond both believe that what kept them engaged throughout their careers was all about having fun and enjoying what they did professionally. This philosophy serves as the unique foundation for SpaceHorizons and may be found infused in each of its endeavors. SpaceHorizons' first pilot program in Los Angeles will exemplify this unique approach.

SpaceHorizons quickly formed a relationship with i.am.angel Foundation, founded by musician, producer, director, and advocate for education will.i.am. This partnership with i.am.angel serves as a shining example of the founder's creative goal to combine excitement and education. With i.am.angel on board, SpaceHorizons is uniquely positioned to meld entertainment and technology in ways unparalleled in the secondary education system. This pioneering partnership with i.am.angel has propelled SpaceHorizons' first pilot project to be six months ahead of schedule.

Principal to the success of SpaceHorizons is its commitment to creating a synergistic environment for the entertainment, education,

and technology industries. The main objective is to develop programming, both compelling and forward-thinking, by partnering recognized role models in the entertainment community who share a passion for STEM with Roosevelt High students. With this approach, SpaceHorizons will create a bridge between education and professional development opportunities these young adults would not have had otherwise.

Building on this foundation, SpaceHorizons has partnered with leaders in the science, academic, and technology communities to create a nonprofit that capitalizes on the strength of all participants. These same participants, along with select students from each secondary school program, will be part of SpaceHorizons' Advisory Committee and will be integral to the development of each embedded space mission and the future of SpaceHorizons.



SpaceHorizons' embedded projects will be facilitated through school programs featuring in-class lectures, mentoring, and program management with the support and

involvement of leaders within the entertainment, science, and aerospace industries. In building this type of partnership, the intent is to connect real life role models to



engage, inspire, support, and build confidence in each student for future success all while having fun.

SpaceHorizons' pilot program for Roosevelt High School students will be implemented in seven modules that follow the school calendar. The modules are designed to be flexible and easily modified to reflect availability of in-class teacher time, student time, guest presenters, and funding.

These types of small satellite space missions have been primarily sponsored and managed by major organizations and large universities.

Gebert and Diamond are aware it will take a large and diverse commitment from a very broad-based coalition to ensure SpaceHorizons' success. To date, Gebert and Diamond have had discussions with SpaceX, NASA, GM, Laboratory for Atmospheric and Space Physics (LASP), and have formed partnerships with the University of Denver, the Science and Entertainment Exchange, and

volunteers in various capacities from Raytheon, JPL, NASA, the University of Southern California, and the University of Colorado.

SpaceHorizons' mission is straightforward and built on the growing disparity within the technology industry. In a recent interview, Gebert said, *"It's a much larger problem than most people recognize. We are facing a STEM deficit!"*

Gebert believes that in order for the U.S. to be competitive and at the forefront of science and technology, everyone must recognize that it is imperative to create children's interest in these career opportunities before they discount themselves when considering their futures.





One of the unique characteristics of SpaceHorizons' program is the filming/documentary aspect, which will enable students to memorialize and share their experience with others. With the assistance of award-winning filmmakers, the entire pilot program will be available to other instructors, educators, and students in an online format. This approach will broaden SpaceHorizons' reach and bring STEM education to communities across the nation and around the world in an effort to address the growing needs for well prepared students within this industry.

For example, in Los Angeles, with a poverty level hovering around 20%, it is especially important for high school students to be aware of the breadth of STEM opportunities that may help them climb out of poverty. In 2013, there were 5.7 million job postings in STEM fields. Of those, 76% or 4.4 million, require at least a bachelor's degree, and 41% or 2.3 million are entry-level jobs requiring less than two years of experience.

Recently, President Obama recognized the STEM gap in his speech at Boise State University on January 21, 2015. SpaceHorizons' very own Advisory Committee member Camille Eddy was the keynote speaker and introduced President Obama during his Presidential visit.

Eddy is a past Vice President of the National Society of Black Engineers and Vice President of the Boise State chapter of the American Society of Mechanical Engineers.

She's a great example of why we're encouraging more women and more minorities to study in high-paying fields that traditionally they haven't always participated in math and science and engineering and technology”.

SpaceHorizons' pilot program in Boyle Heights, where 33% of the residents live below the poverty line, has been designed to spark student interest in higher education by providing opportunities to develop, build, and launch a satellite as part of a real space mission.

There is no specific skill set minimum GPA, or test scores required to participate.

Students will gain real-life skills. Building and launching a satellite will provide a means for students to experience researching, planning, problem solving, team building, responsibility, and accountability as each of these elements arise in the execution of building the satellite. These skills are applicable not only to the aerospace industry, but *in every industry*.

SpaceHorizons plans to launch similar programs in the Denver-Metro area and beyond. SpaceHorizons has developed a diverse Advisory Committee and Executive Board that includes, doctors, educators, scientists, and other key leaders within the industry and community.

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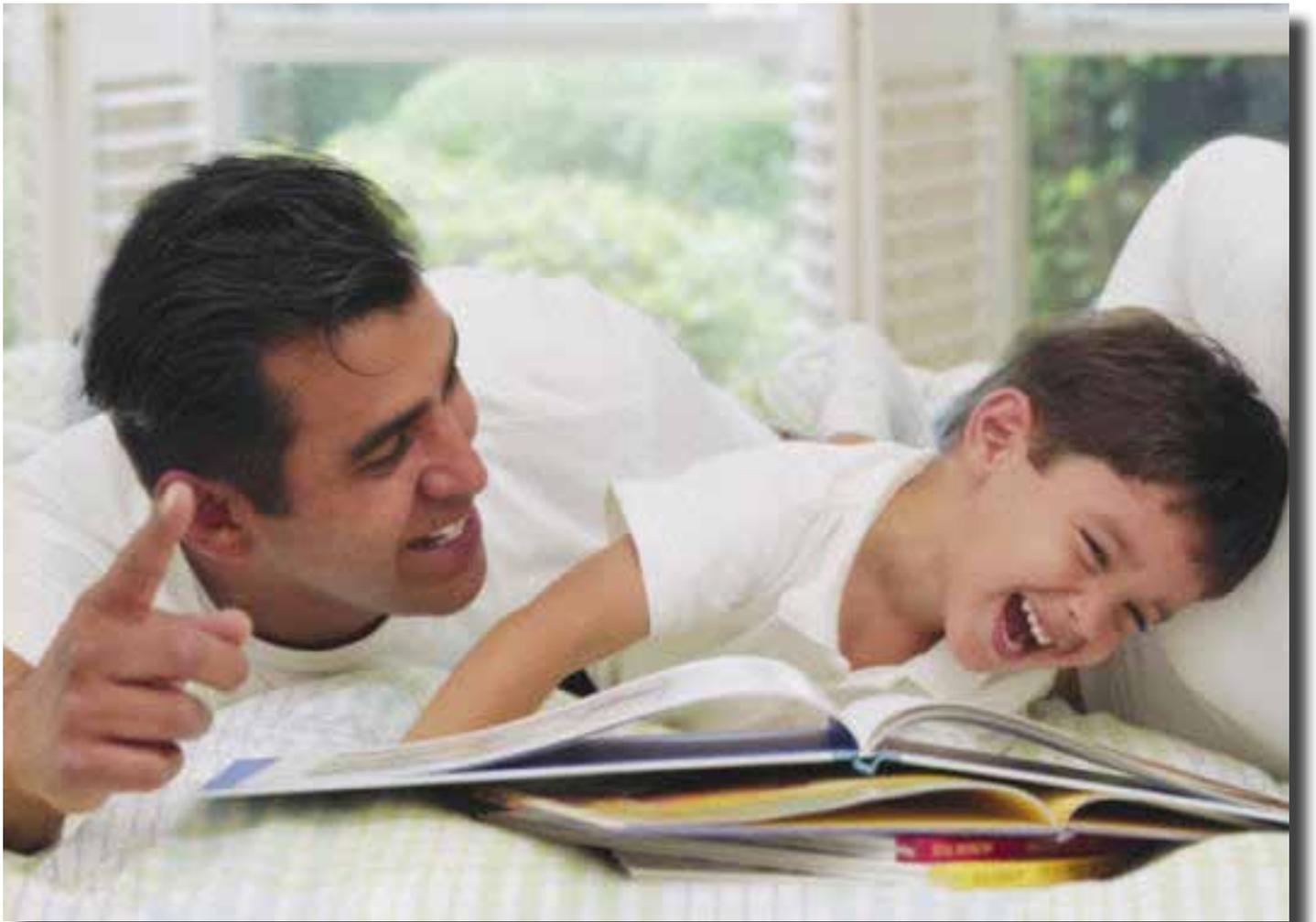
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Parents as Mentors

for your own Children: Spending Quality Time Together

Dr. William Gray

Former UBC professor



There was a time when parents and their children spent lots of time together, working in the family business or on the farm, or engaged in essential homemaking activities. This gave parents many opportunities to teach and demonstrate their expertise, resulting in children not only respecting this, but also respecting their parents. And, parents gained increasing respect for their children as they developed the various kinds of expertise parents passed on to them.

Today, few children know what expertise their parents have. Most parents go off somewhere to work so that children cannot see what parents actually do and learn from them. Consequently, these parents often lack “quantity” time with their children. Instead of feeling guilty or fretting, enhance the “quality” time you can spend by systematically sharing an expertise with your children.

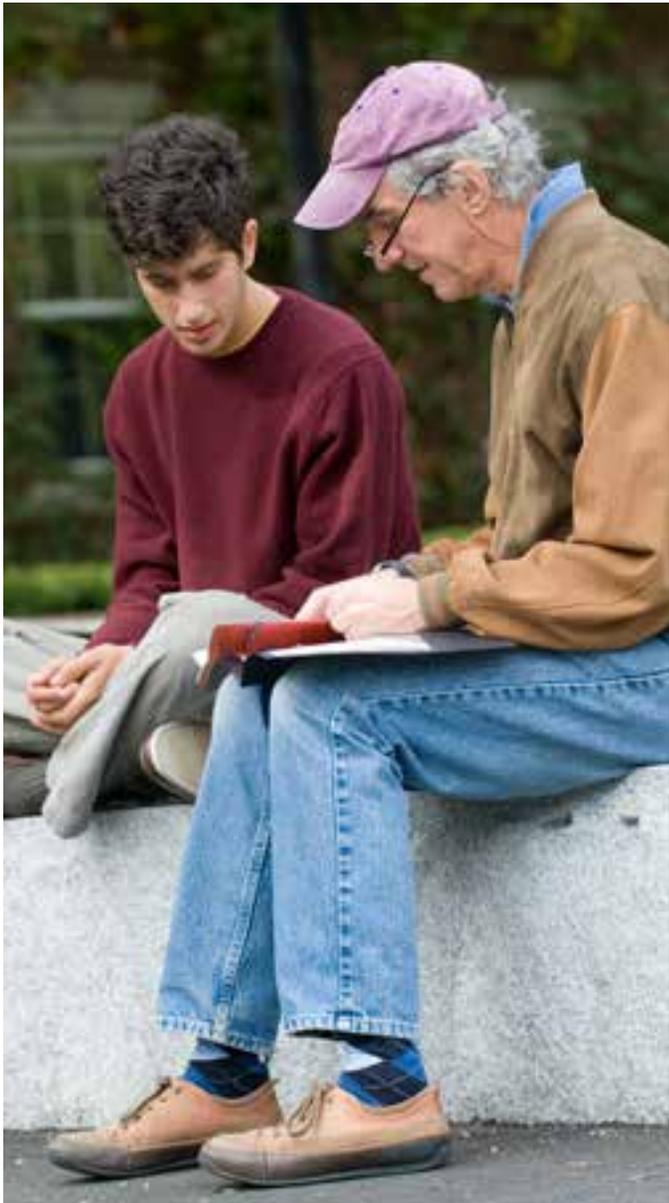
Parents can do this by carrying out a Mentor-Assisted Enrichment Project [MAEP] with your children

so they gain respect for what you know and can do – and for you. Let me explain each part of a MAEP, based on my research of more than 300 Mentors and 1,000 Proteges in grades 4-12.



As a Mentor, parents perceive their children differently and more objectively – as the Proteges – and thus interact differently with them as they share an expertise that interests the Proteges.

Assistance from Mentors occurs in two main ways: Equip Proteges with specific knowledge, practical know-how and wisdom. Empower Proteges to use their talents and creativity, and to learn and do what interests them.



photography with her daughter – taking black and white photos using film, developing the film, framing the pictures, and entering them in Fine Arts Shows where she won awards. To equip the Protege, this Mentor taught and demonstrated these competencies and helped the Protege prepare good interview questions to ask when they visited other photography labs and met photographers at two Shows.

Enrichment is provided directly by Mentors while doing activities with Proteges, and indirectly when Mentors arrange for others to share expertise. All of this occurs during a Project that has a beginning, middle and end as illustrated below.

Photography example: A parent wanted to share an expertise in

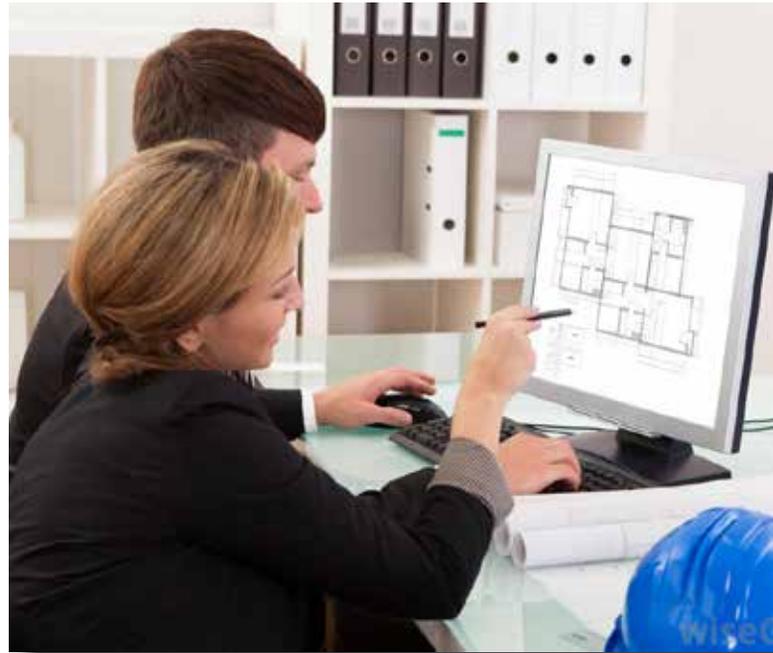


The Mentor empowered the Protege to apply this new knowledge to digital photography the Protege was already doing – to enhance photo-taking (angles, lighting, contrasts, etc.) and produce digital images requiring less digital editing. The result: the Protege learned how to do all aspects of B&W photography and used this to enhance digital photography. Mentor and Protege gained respect for each other's expertise, and for one another.

Architecture example: Two boys had a beloved grandmother living in a Seniors Residence. Each time they visited, they heard many complaints. The mother knew her sons were interested in architecture as a potential career, so she offered to be their Mentor on this project: design a Senior's Residence that meets their needs.

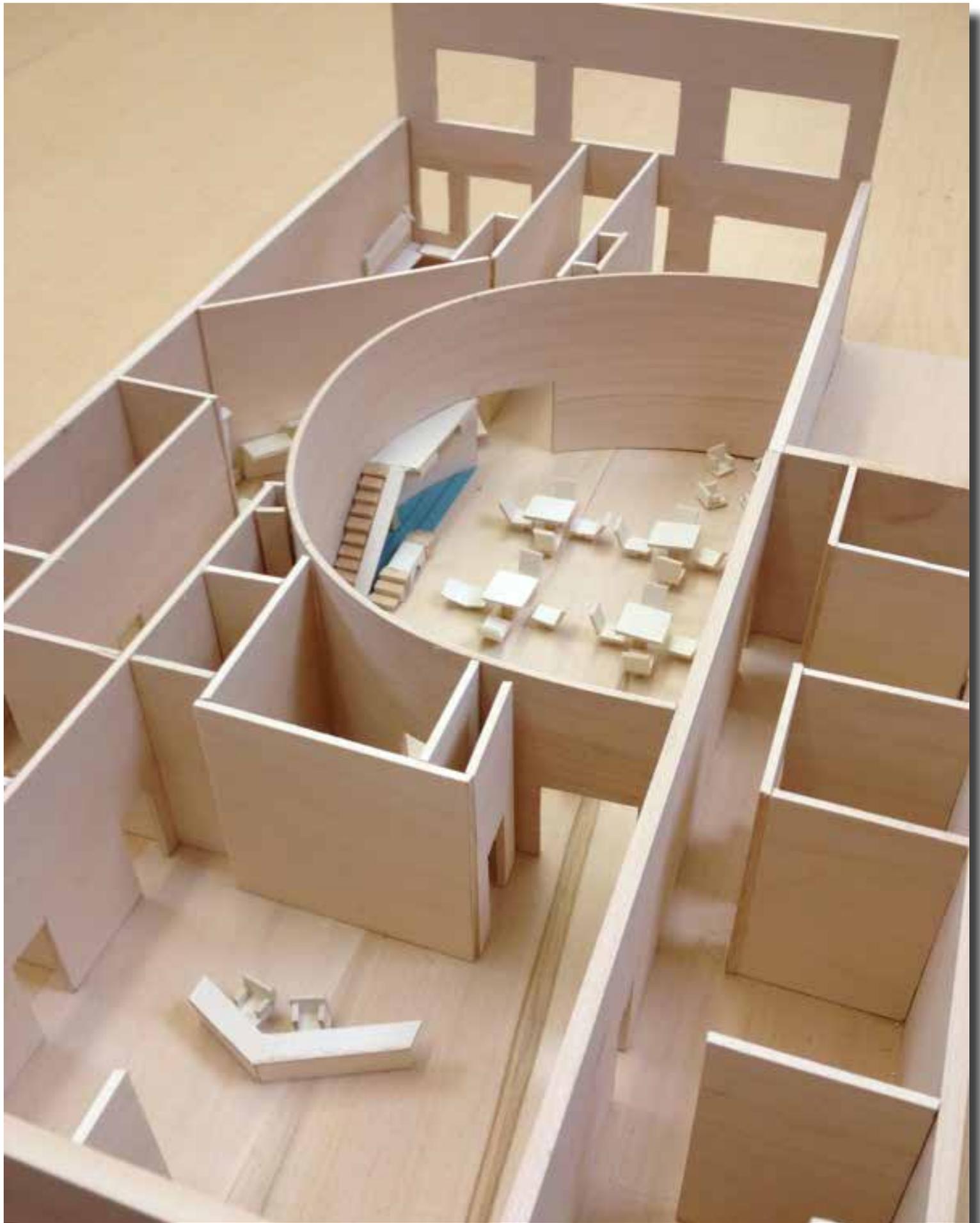
This Mentor taught her Proteges how to prepare questions and facilitate a focus group, took them to do this at the grandmother's residence, helped them translate responses into a draft design, got a

got a professional architect (friend) to enhance it, helped them build a scale model based on the revised design with input from the architect, took them to facilitate



another focus group to get feedback on the scale model, helped them modify the design using this feedback, took them to present their final scale model for “The Ideal Senior's Residence.”





The seniors were more than pleased with the scale model and the presentation explaining its design, because they had been listened to and their needs had been understood.



The Mentor had personally equipped the Proteges with needed knowledge and skills, and also arranged for professional assistance. This was necessary to empower the Proteges' interest in possibly becoming architects.

The two boys, mother and grandmother had spent quality time together. And, the architect (and two would-be architects) learned the value of listening to focus groups at the front end of this project (to solicit input) and at the back end (to get it right).

Butler University Educator Uses Analytics for Continuous Course Improvement and Improved Learner Outcomes in ***Chemistry***

Dr. Robert Pribush, Ph.D., Butler University



An increasing number of postsecondary educators are using data to understand students' comprehension and mastery of course content. However, for the General Chemistry I and II courses that I teach at Butler University in Indiana, I've taken it one step further, by using data to continually improve my course.

Even though my students' scores are on par with national standardized test scores, over the past several years I've used student course data to study different aspects of their performance and as a result, have been able to determine certain behavioral patterns.

Using this information, I have altered my pedagogy to improve student outcomes.

About the General Chemistry Course and Requirements for Successful Completion

Butler University is a four-year college serving approximately 4,000 undergraduate students. The majority of students attend full-time, with a graduation rate of 74 percent within six years (for the 2007 cohort). Ninety-one percent of full-time degree-seeking freshmen starting in 2012 were still enrolled in 2013.

General Chemistry is a two-semester course taught on campus with a lecture and lab component. Students who enroll in these courses are primarily pre-pharmacy, health sciences, and biology majors; other majors include premed, education, engineering, physics, and psychology.

General Chemistry II covers chemical kinetics, solution chemistry, acid-base chemistry, chemical equilibrium, thermodynamics, and electrochemistry.

Successful completion of General Chemistry I with a grade of C or better is a prerequisite to General Chemistry II.



Challenges and Goals

I've taught this course for many years, and I've found that the average student that I encounter has not been challenged in high school. Most have achieved high grades with minimal study and without demonstrating conceptual understanding.

Too much of what my average student has learned has been through memorization and not true understanding. In addition to teaching towards content mastery, a primary focus of mine has been to teach students better study habits and work ethic.

I have tried to accomplish this by having a one-hour or less homework assignment, containing ten or fewer problems for every textbook section covered. Each assignment is coded so that the student knows where to find the material in the textbook. For example, Assignment 13.6 is related to section 6 in Chapter 13 of the textbook.

I want students to use their text

book effectively. To ensure that each student is actively engaged in learning topics covered in class, the deadline for the completion of each assignment is two days after the material is introduced in class. This gives the student one day to discover what they do not understand and ask questions to allow completion of the assignment the second day. Keeping students on task is a vital component of enhancing student mastery of learning outcomes.

I have always tried to attain the highest level of student mastery in my courses relative to normed national measures as one measure of my students' ability to compete on a national level. Ever since I began teaching, I have used the American Chemical Society (ACS) Examinations Institute's nationally standardized exams as a consistent way of comparing my classes from year to year.

In 2006, I became concerned with my students' performance on the American Chemical Society (ACS) national standardized general chemistry exam, which is used as



the final exam for General Chemistry II. Student performance seemed to have peaked, so I sought a way to enhance content mastery.

To address the issue, I began emphasizing the importance of being active and responsible learners and promoting effective study skills. I decided to implement the online mastery-based educational technology, Mastering Chemistry, in fall 2007 with the intention of evaluating the effectiveness of the online, graded homework system on both content and study-skills mastery.

I posited that if this self-paced, homework and tutorial assessment technology solution was effective, average ACS exam scores would

increase and students would identify the program as a positive influence on their course success. Enrollment averaged 72 students per academic year (AY).



Effective Implementation of Personalized and Continuously Adaptive Technology

The use of the mastery-based learning technology solution is an important part of my course: it is used for graded homework and to glean diagnostic data on student performance and student misconceptions that I use to evaluate overall learning both during and at the end of the semester.

Each semester, students are assigned approximately 87 graded online homework assignments of 10 problems each (800–900 problems), with an assignment due for most chapter sections. Assignments take approximately one hour each and are due two days after the material is covered in class. Homework is a formative assessment tool, so course credit is assigned accordingly.

Monitoring class and individual performance statistics, especially assignment grades, time-on-task, and problem difficulty-level relative to database norms, all of which are easily accomplished with my online grade book, are

important to me. I try to attain a 90 percent mastery level for every assignment and every student. Students who fall below that mark tend not to earn an A in the course. If the class average is below 90 percent, I will alter class presentations to further review those topics.

Monitoring individual student time-on-task is particularly revealing. Students who are struggling in the course tend to spend much more time doing homework than high achieving students. Together with assignment grades, time-on-task data helps me identify students in need of additional help.

Time-on-task monitoring is also an easy way to detect students who are not doing their own work! Seeing the answers students submit to problems makes it easier for me to determine how to efficiently help them better understand the concepts and calculations involved in solving the problems.

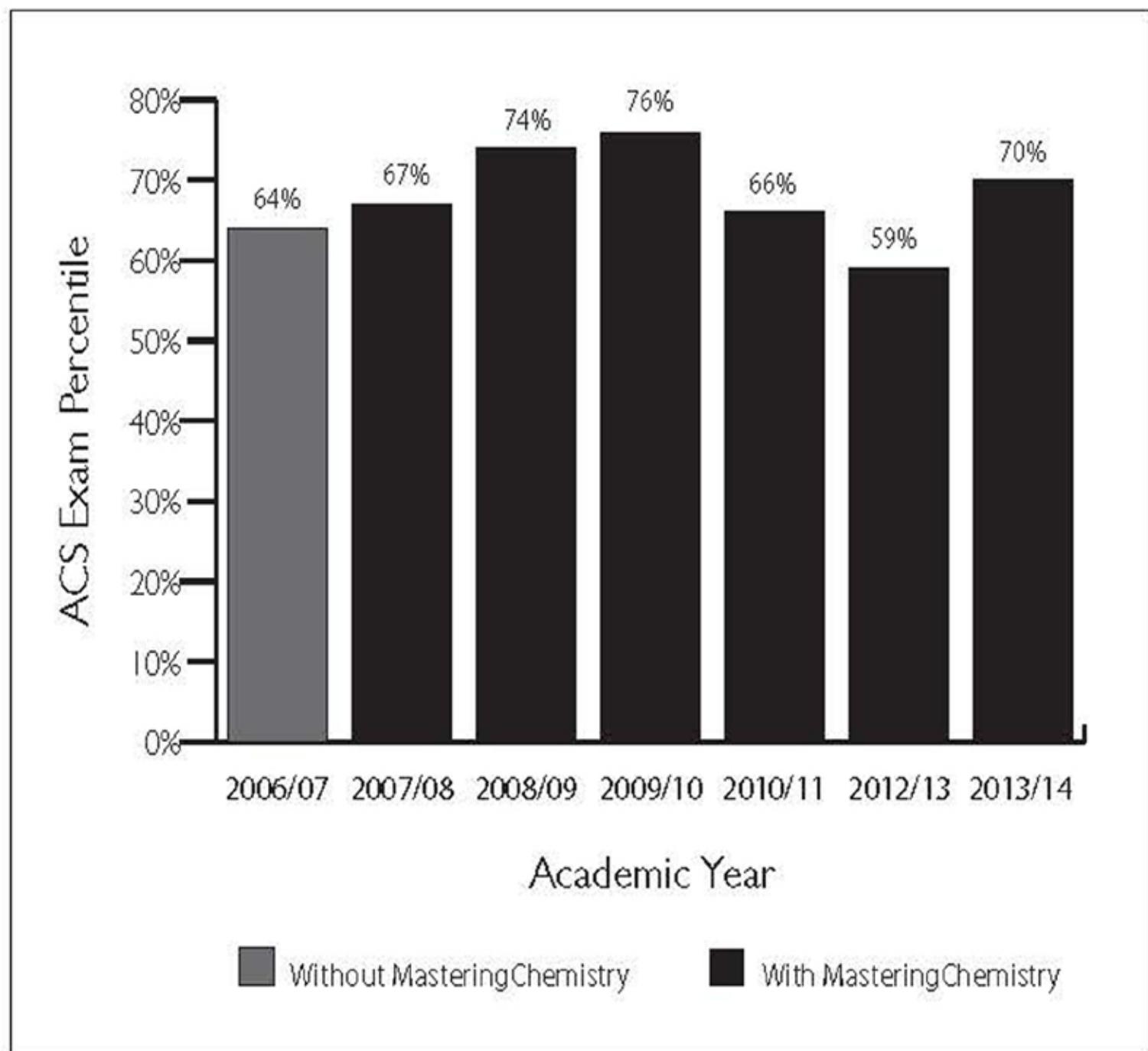


Figure 1. General Chemistry II American Chemical Society Exam Percentiles, Fall 2006–Spring 2011, Fall 2012–Spring 2014 ($n = \sim 504/\sim 72$ per academic year). No data was collected during academic year 2011/12 due to sabbatical.

By adjusting my pedagogy in response to what I observe from monitoring student homework, students realize that I am aware of their misconceptions and problem-solving difficulties and that I care enough to further help them in and out of class to better master the material. In this way, I become a mentor as well as a professor. Seeing that I sincerely care about each student is a powerfully motivating factor.

Results and Data

During the period of this study, the same ACS exam was given and its results compared (Figure 1).

I made changes to how I implemented Mastering Chemistry during this period of time, along with departmental and administrative changes, as follows:

- *In AY 2007/08, the first year the technology solution was used, ACS percentiles increased: students who used the program for one semester averaged a two-percentile increase; two-semester technology users averaged a seven-percentile increase.*

- *In AY 2008/09, I promoted use of technology solution hints during problem solving by changing the default settings to decrease penalties for opening them. I used the same textbook and technology solution assignments as the prior year, and results show a seven-percentile increase on the ACS exam.*

- *In AY 2009/10, I focused on the metacognition/self-efficacy exercises in the technology solution. One week before each exam, students were sent the learning outcomes associated with each exam question. They were instructed to match the learning outcomes with a homework assignment. Then, for each learning outcome, the students predicted how they would perform on the exam, and their predictions were compared with actual exam results. The average ACS exam scores were two percentile points higher than the previous year.*

- *In AY 2010/11, to equalize course enrollments among sections, registration was changed so that instructor names were not listed with specific sections. I believe that I am perceived as a more-challenging instructor and that therefore I may have gotten more academically prepared students who were looking*

for a more rigorous class. After the change, I had a more diverse group of students in my sections. Results of the ACS exam decreased from the prior year but remained 2% points above the final year that the technology solution was not in use.

- In AY 2012/13, a textbook change was made. In addition, I observed that more students were less academically prepared than in the past. There was a decrease in student performance on the ACS exam during this year, which prompted a review of the course and a decision to make changes in textbook and homework assignments for the next year.*

- In AY 2013/14, the department switched to a textbook that more closely matched course goals and made a decision to make the higher level chemistry courses more rigorous. As a result, students in the General Chemistry sequence needed to be better prepared in order to succeed in the more-advanced courses. I began assigning higher level Mastering Chemistry problems in General Chemistry to develop students' critical-thinking skills in preparation for more-challenging courses. Results of the ACS exam*

show an increase of 11 percentile points over the prior year (six percentile points above the final year when the technology solution was not in use).

The Student Experience

Students in General Chemistry II were asked to rate several course resources in terms of the impact they had on student understanding of course material, with 1 = a very strong impact and 5 = no impact. Students ranked the mastery-based learning technology solution as the highest resource out of 20 (Table 1)



| Student Resource | Rating |
|---------------------------------------|--------|
| MasteringChemistry | 1.3 |
| Instructor | 1.4 |
| Lecture | 1.5 |
| Exams | 1.7 |
| Exam outlines | 1.8 |
| Learning objectives | 1.9 |
| In-class problem sessions | 2.1 |
| Textbook | 2.5 |
| Solution manual | 2.6 |
| Working with classmates outside class | 2.8 |
| Lab experiments | 2.8 |
| Lab lecture | 2.5 |
| Self-rating exercises | 3.0 |
| Group lab work | 3.0 |
| Online interaction with instructor | 3.2 |
| Lab assistant | 3.3 |
| Lab notebook reports | 3.4 |
| Instructor office hour | 3.5 |
| Former General Chemistry students | 3.5 |
| Other | 4.2 |

Table 1. Student Ranking of Course Resources, AY 2009/10 ($n = 75$)

1 = Very Strong Impact and 5 = No Impact

By monitoring Mastering Chemistry data both during and after each semester, I can immediately address student misconceptions and areas of weakness in class, adjust my implementation of the technology solution to enhance student learning, and more easily understand the impact of pedagogical changes on learning.

The data enables me to compare my students' performances on the ACS exam with the national average and to investigate what may have impacted those results. In addition, anecdotal responses from my students reveal the key role of the technology solution in modifying student work ethic and performance.

Also, I've begun a new study evaluating student performance based on time on task. Using data from the technology solution, initial findings indicate that better students spend less time on the technology solution homework because they are more efficient at preparing for homework by reading and using the resources as

questions arise. Poorer performing students wait until the last minute and spend more time trying to guess the answer to complete the assignment by the due date. So, as I continue to collect data based on use of the technology solution, I will test this theory and report the results.

Having students become more active learners in a mentoring environment lead to higher achievement levels than many students thought possible. Students appreciate the effectiveness of the on-line homework program and the close professor/mentor- student relationships that can be achieved when they observe the professor caring enough to monitor their performance and work with them to effect higher levels of achievement.

Establishing good student attitude toward learning and pedagogy is critical to the success of a course. Students have to believe that a professor's approach and methodology is effective to keep them motivated and enhance the learning process.

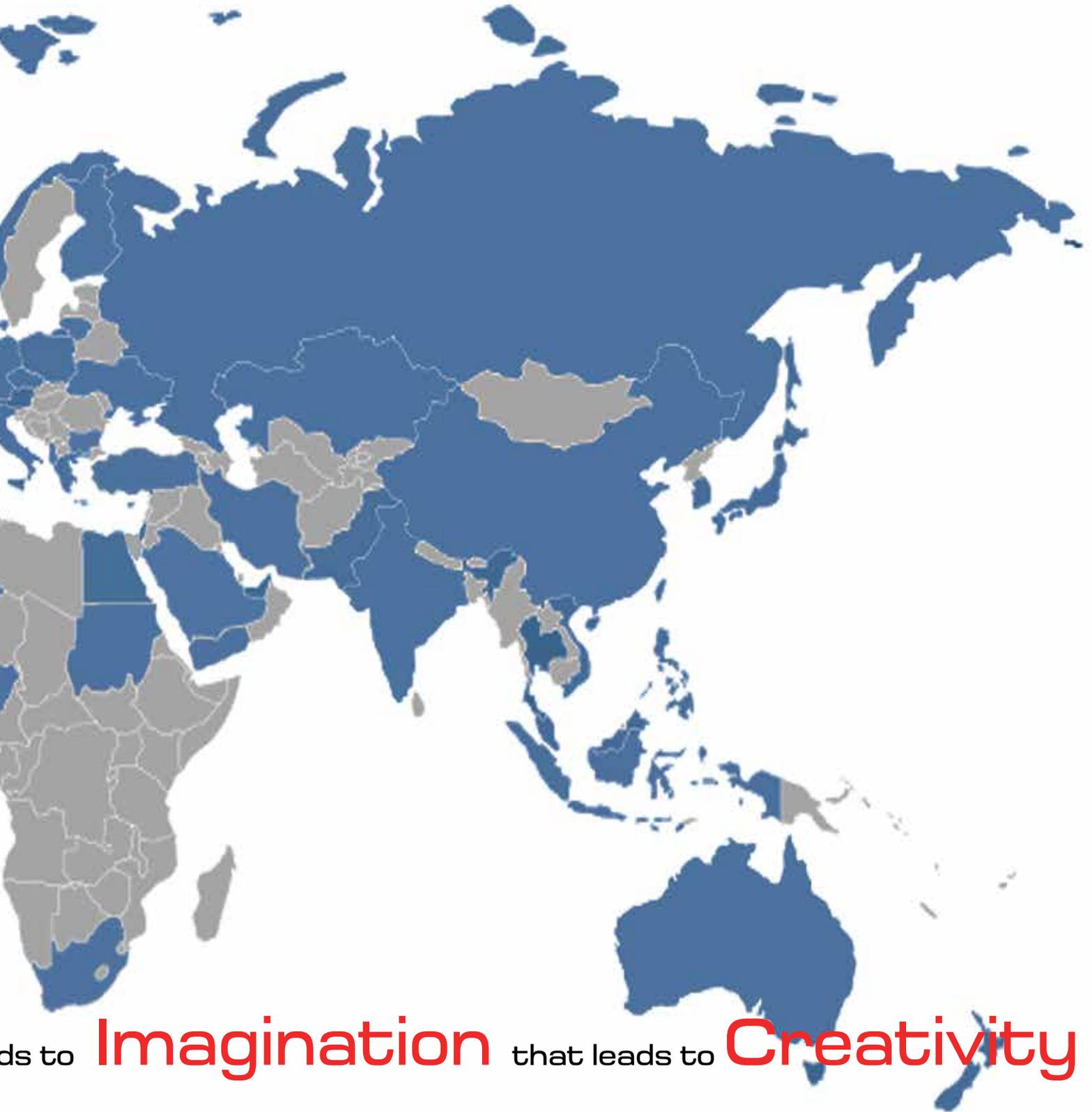


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