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LIGO SEC Data Presentation

Inverness Research

July 20, 2017

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Review of our work this year

- Last summer, we visited LIGO SEC, interviewed leaders, and observed a Core Element professional development session
- This year, we collected data from 3 key LIGO SEC audiences: **Teachers, Docents, and Teacher Leaders**
- Surveys went out to **teachers** that have attended LIGO SEC professional development (PD) or field trips at least in the last year (N = 293)
- Surveys went out to **docents** that have participated since 2012 (N = 75)
- All 14 ***Joseph Meyinsse Teacher Leadership Institute* Cohort 1 participants** were contacted about an interview, and 7 total interviews were conducted.

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Some Overarching Ideas and Questions

- The data suggest that **LIGO SEC's strong suit is creating awareness, inspiration, and excitement about science for teachers and students** (vs. increasing student achievement in science).
- To what extent are you interested in **building on the assets you have created to generate new experiences or programs**, e.g. engaging teachers or docents in leadership roles in the PD and/or field trips; creating leadership training for high school students?

- How important is **expansion of LIGO to a larger audience** vs. focusing on very local communities?

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Teacher Professional Development

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Key Accomplishments: Teachers

- LIGO SEC is reaching a range of teachers, mostly in Eastern Baton Rouge
- Overall, teachers believe PD and field trips are of high quality and value, and many have participated multiple times
- Contributions, usefulness, and influence of LIGO SEC PD highly rated, with some exceptions
- Teachers are interested in engaging with and learning more from LIGO SEC
- Pre- and post supports highly rated (but not widely used)

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Teacher Survey: Response Rate

- 293 teachers were sent an email invitation to complete the survey. They were offered a chance to receive a $50 check via lottery in exchange for a completed survey.

- 123 responded to the survey for a response rate of 42%

- Of the 123, 116 indicated they had been involved in LIGO SEC in some way, for a final response rate of **40%**

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LIGO SEC is reaching a range of teachers

The majority of teachers have at least 9 years of teaching experience (73%) with 54% teaching more than 12 years

- 37% teach in elementary school
- 25% teach in middle school
- 20% teach in high school
- 15% teach in other settings, including college, gifted center, k-12 school, technical center, and home school.

- 65% public schools
- 12% public charter schools
- 19% private schools
- 2% home school

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LIGO SEC is reaching a range of teachers

What do they teach?

- General elementary curriculum (36%)
- Middle school:
  - Physical science (23%)
  - Life Science (10%)
  - Earth and Space Science (12%)
- High school (20%): physics, chemistry, math, engineering

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Teachers are mostly from East Baton Rouge

Where are they located?

(90 teachers answered the question about location)

- 43% East Baton Rouge
- 9% Orleans
- 8% Livingston
- 7% St. Tammany
- 7% Tangipahoa
- A smattering of 1 or 2 teachers from an additional 16 Parishes.
- 42 Parishes with 0 respondents.
- 20 teachers came from Mississippi

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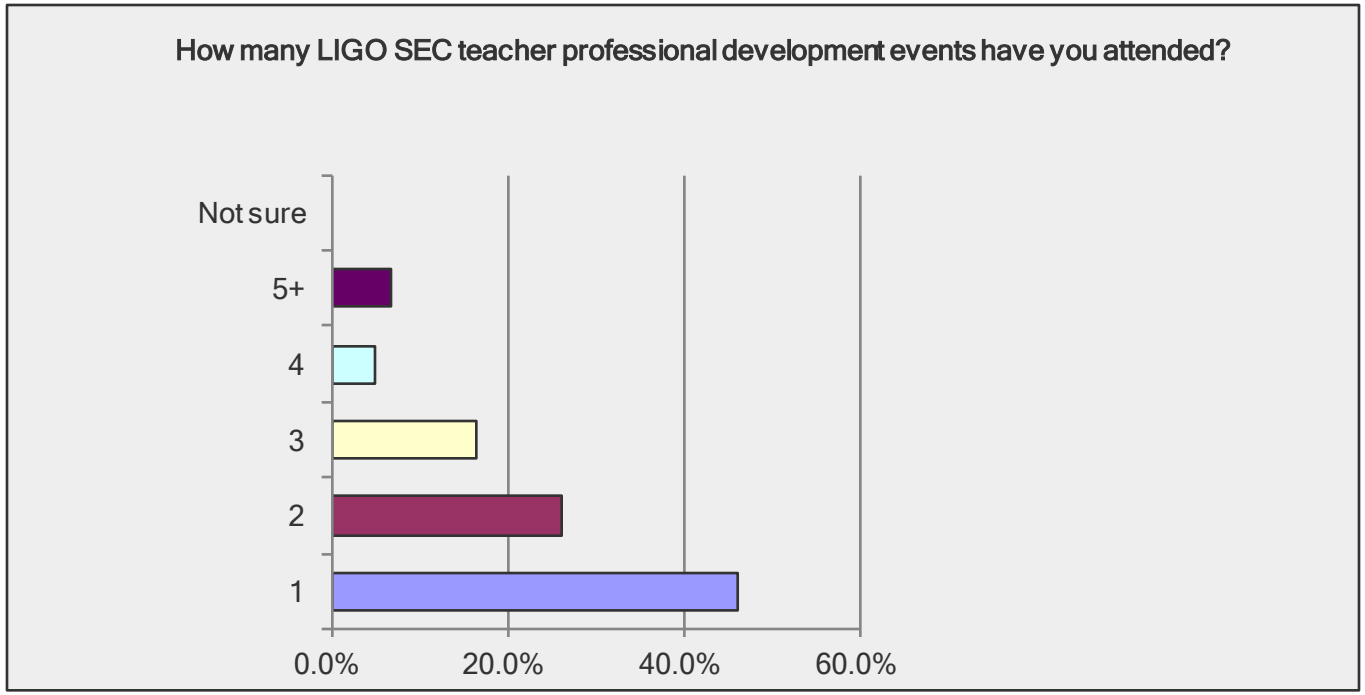
Teachers come back for PD

54% of total respondents had participated in more than 1 professional development activity associated with LIGO SEC



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Teachers believe PD is of high quality and value

OVERALL QUALITY OF THE PD THEY ATTENDED:

Very Poor	2%
Poor	0%
Average/Mixed	5%
Good	19%
Excellent	74%

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Contributions, Usefulness, of PD highly rated

Contribution to science knowledge

Some	26%
Substantial	29%
Great	45%

Usefulness for Teaching

Not useful	2%
Little use	0%
Some use	19%
Substantial use	29%
Great use	50%

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Details of Contributions of PD

Answer options	Not at all	a little	Some	A lot	A great deal
Your understanding of what LIGO-related science is	0%	3%	18%	33%	46%
Your interest in LIGO-related science	0%	5%	8%	28%	59%
Your overall understanding of how science is done	0%	2%	20%	30%	49%
Your enjoyment of learning science	0%	0%	11%	16%	72%
Your view of yourself as a science learner	0%	2%	10%	32%	57%
Your ability to teach science using an inquiry-based approach	2%	3%	13%	31%	51%
Your understanding of how students learn science	2%	2%	13%	38%	45%
Your perception of your role as a science teacher	2%	5%	15%	36%	43%
Your ability to teach science	2%	3%	13%	40%	42%
Your enjoyment of teaching science	0%	2%	11%	31%	56%
Your ability to help students enjoy science	0%	2%	7%	36%	56%

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Details of Influence of PD

Answer options	Not at all	a little	Somewhat	A lot	A great deal
Your thinking about your science curriculum	2%	3%	19%	41%	36%
Your choice of topics to teach	5%	5%	22%	39%	29%
Your instructional approaches	3%	2%	20%	36%	39%
Your thinking about the possible role of science institutions like LIGO SEC in improving your teaching	3%	0%	16%	33%	48%
Other (specify below)	13%	0%	19%	31%	38%

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Teachers want more PD, recommend it to others, and believe it is more influential than other experiences

- **88%** of teachers said they would like to attend additional LIGO SEC professional development.

- **91%** would recommend LIGO SEC PD to other teachers.

- When compared to other PD experiences, **93%** said that their experience at LIGO SEC was at least as or more influential on their teaching.

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LIGO SEC experiences increase teachers' understanding of LIGO-related science concepts

How did their experience impact their **understanding of LIGO-related science concepts?**

	Before	**After**
Very limited	36%	0%
Limited	33%	3.8%
Some	33%	23%
Considerable	18%	49%
A great deal	6%	25%

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Teachers are interested in learning more from LIGO SEC PD

LIGO science content	49%
How to teach LIGO science with classroom-based activities	67%
How to use the LIGO facility/exhibits	40%
Inquiry-based science teaching in general	51%
Research experiences for students and/or teachers	41%
How to develop a partnership btw LIGO SEC and my classroom or school	48%
Other	4.2%

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Field Trips

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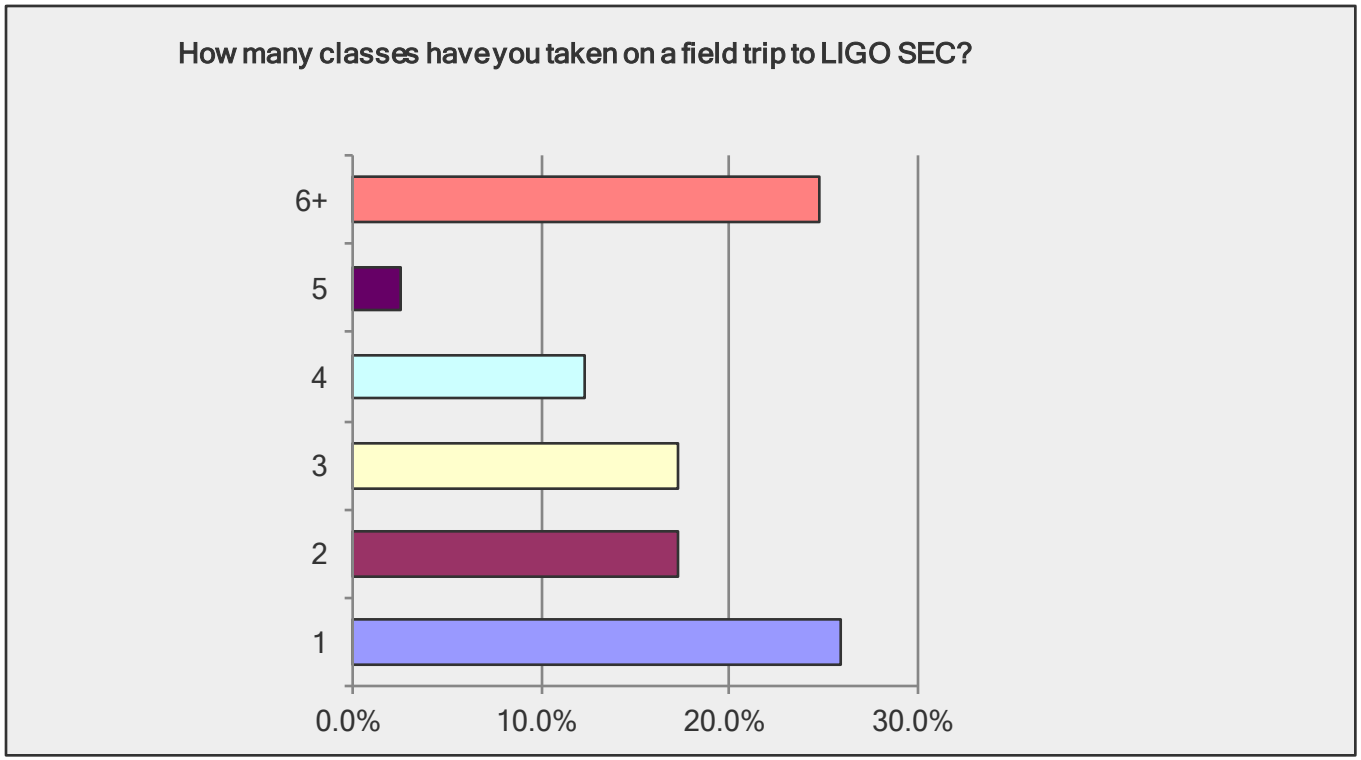
Teachers come back for field trips

76% (83) of the teachers surveyed have taken students to LIGO SEC for a field trip



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Why teachers don't take field trips to LIGO SEC

Reasons those who have **not** taken students to LIGO SEC for a field trip:

No time	50%
Transportation issues	31%
Not enough school/district support	12%
Not a good fit with curriculum	4%

Other reasons include: distance, state testing, difficulty leaving campus.

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Pre- and post-field trip supports are highly rated by those who use them

About ½ of the teachers used LIGO SEC or SUBR supports to **prepare for a field trip**. Of those who used them, **98%** thought they were good or excellent in quality and usefulness.

About **60%** used **post-field trip** resources, and of those, all but a couple of teachers found them to be good or excellent in quality and usefulness.

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Teachers believe field trips are of high quality and value

Answer options	Not at all	a little	Some	A lot	A great deal
My students had an excellent field trip experience.	0%	0%	1%	10%	89%
The science concepts covered during the field trip aligned with what I am expected to teach in the classroom.	0%	1%	9%	22%	68%
I was able to transfer the inquiry approach into my classroom.	0%	0%	4%	31%	65%
I have incorporated my students' experience from the field trip into my regular classroom teaching.	0%	0%	5%	34%	61%
My students gained a better understanding of LIGO SEC-related science concepts on their field trip.	0%	0%	0%	24%	76%

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Teachers believe field trips are of high quality and value

All but **1** teacher found the quality and usefulness of the fieldtrips to be good or excellent, and all of the teachers said they would bring their students again and recommend it to a colleague.

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Teacher comments on Field Trips

LIGO field trips are an opportunity to experience innovative science research in students' own community:

It was a great overall experience that took the students outside the walls of our classroom. Louisiana often gets a negative connotation when it comes to education and research. The field trip helped connecting the students with paradigm shifting community in their own "back yard."

LIGO field trips inspire teachers to improve their own teaching:

The students love LIGO and want to continue to go there year after year. It has also inspired me to be a better science teacher.

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Teacher comments on Field Trips

LIGO SEC field trips are unique and memorable:

The BEST science field trip experience in southeast Louisiana. I have been teaching for 35 years and have been on quite a lot of field trips, but LIGO is by far the best because it is geared towards the needs of our students. Three months later, and they are still talking about it!

LIGO field trips can improve student learning in science:

I brought students to LIGO three years straight. These trips were made right before standardized testing. Each year students' test scores increased. I feel the LIGO field trip was a contributing factor to that increase and would definitely recommend and have recommended LIGO to other teachers

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There are a few key deterrents that prevent teachers from coming more

Deterrents that **prevent making greater use** of LIGO SEC:

Distance	44%
Cost	19%
Transportation	31%
Alignment with curriculum/standards	9%
Limited internet access	1%
Limited classroom equipment and materials	19%
Appropriateness for my students	2%
There are no deterrents	31%
Other	12%

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Teachers believe both PD and field trips are of high quality and value

Overall **quality** of LIGO SEC support: **98%** good or excellent

Overall **usefulness** to teaching: **94%** good or excellent

LIGO SEC as a **resource for the improvement of science teaching in the region**: **91%** good or excellent

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Teachers offered suggestions for improvement

Provide unique and tailored opportunities and experiences for students to connect with the LIGO experiment:

Build upon any possible opportunities for connecting students to the researchers/scientists in an authentic way. Whether it's through a meet and greet (perhaps not typically feasible) or a video clip or some other interaction, I think connection with experts in the field is powerful. Create really high quality experiences for field trips rather than standard activities that most good science teachers are already doing in their classrooms so that the field trip is something special. Be willing to personalize the field trip experience based on communication with the educator and the students' needs and studies.

Continue to provide experiences that inspire students:

Continue to refresh the exhibits. Continue the friendly attitude with students that builds camaraderie and a love of science for each of them. Young gifted students need a place where their quirkiness and inquisitive nature are appreciated and "tolerated".

Provide more opportunities for LIGO to visit schools:

Since it is sometimes difficult to get a field trip scheduled, I would suggest more opportunities for LIGO representatives to visit schools. I know this is difficult with the limited staff; but maybe using the Southern University students could help.

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Teachers offered suggestions for improvement

Create a scavenger hunt for students to use on field trips:

I would like to develop a scavenger hunt (paper-based) so that when students do visit, they can leave with hands-on accountable documents to ensure comprehension of each activity.

Provide timely information about PD and field trips:

Please send out timely information about Professional Development opportunities and scheduling field trips. Not just to public schools, but also private and parochial schools.

Provide PD that aligns with curriculum:

Provide PDs for teachers that align with the new curriculum.

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Teacher Leadership

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LIGO SEC has the potential for fostering teacher leadership

Where do teachers engage in science education leadership?

Answer option	%	#
At my grade level	50.5	55
In my science department	40.4	44
In my district	22.0	24
In my parish	16.5	18
In my region	7.3	8
In science organization or professional group	17.4	19
NA, I do not engage in formal or informal leadership for science	19.3	21

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Leadership roles teachers play

- Curriculum-oriented: write, select, coordinate curricula for grade-level, school, district
- Department chair
- Leadership role in professional association
- Professional developer
- Attend and present at regional, state, and national conferences
- Science club sponsor
- Committee member

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JMTLI Cohort 1 Interviews

N = 7

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Highlights/Accomplishments

- JMTLI Cohort 1 participants are highly motivated to improve their facilitation, presentation, and general leadership skills
- Average Ratings - Quality: 4.4 (n = 6), Value: 5 (n = 4)
- Major Highlights: the focus on cultural relevance; opportunities to reflect on roles; increased presentation confidence and skills
- All of them have participated in leadership activities since the institute
- Most all of them would recommend JMTLI to other MISE graduates

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Ideas for improvement

Ideas for improvement/ongoing support:

- Clarity about expectations – both for participating in the activities as well as work done at home
- Endorsement or certificate that could lead to advancement
- Support for those who are interested in school/district-level leadership career track
- Formally network/connect and track graduates for ongoing colleagueship and support

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Teachers: Considerations for Improvement or Further Inquiry

- Most teachers that participate in LIGO activities are experienced. Can LIGO create programs for early career/pre-service teachers?
- Are there other leadership opportunities within current field trip or PD programs for teachers that can be created?
- Teachers rate understanding LIGO science, the nature of science, inquiry teaching identity lower than other items. Are there opportunities to address these areas in a different way?
- How can LIGO help teachers make greater use of pre- and post-field trip resources?
- What are other or additional ways to reach teachers at a distance?

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Discussion of LIGO Teacher PD Design and Strategies, Field Trips

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Key Accomplishments: Docents

- LIGO SEC is recruiting docents who have a strong interest in STEM, education and service
- Docents highly value all of the activities we asked about
- ~50% say their docent experience has influenced their college, job, or career decisions
- LIGO SEC offers a unique experience in the docent program
- LIGO SEC impacts docents' interactions at work and in the community
- Docents have significant memories of their LIGO SEC experience

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Docent Survey: Sample characteristics

75 current and former docents were invited to respond to our survey. 29 responded for a response rate of **39%**

3 respondents were in Cohort 4
6 respondents were in Cohort 6
5 respondents were in Cohort 7
5 respondents were in Cohort 8
16 respondents were in Cohort 9
9 respondents were in Cohort 10

3 respondents participated in 3 cohorts
10 respondents participated in 2 cohorts
16 participants participated in 1 cohort

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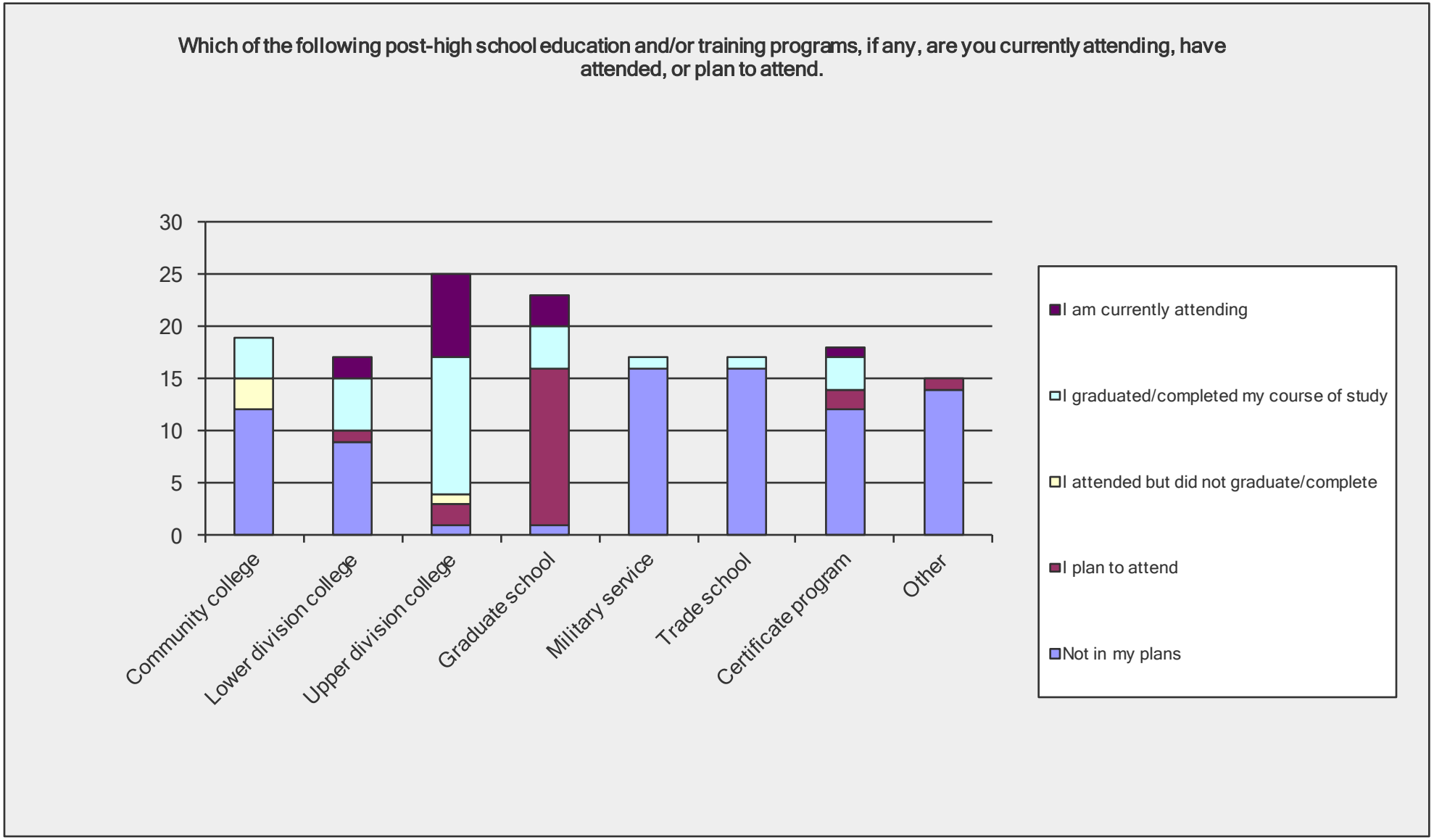
Docent Survey: Education status



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Docents' study area of focus

- ¼ of the docents are mechanical engineering majors, followed by
  - electrical engineering (11%),
  - nursing (11%), and
  - a smattering of agriculture, biology, chemistry, civil engineering, computer science, elementary education, math, physics, and psychology

- 74% of the docents were employed at the time they took the survey

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The majority of Docents are interested in STEM-oriented careers

Answer Options	%
science research	24.1%
education research	17.2%
medical	31.0%
engineering	44.8%
technology	24.1%
business	13.8%
teaching	24.1%
sales	6.9%

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Docents have a range of ideal careers

- A job as a manufacturing or reliability engineer
- A job incorporating math, science, education, and medical field.
- Anesthesiologist
- Becoming an investor
- Business Owner
- Cancer Research
- Case worker
- Counselor
- Educational Administration
- Educational Consultant
- Electrical Engineering
- Entrepreneur
- Forensic Science
- Geotechnical Engineer
- Nurse practitioner
- Pharmacy
- Principal of an Elementary School
- Project Engineering, leading teams
- Sales
- Software Engineer and Part Time Professor
- Talking to people about their problems
- To become an engineering/ scientist.
- Upper level management at ExxonMobil
- Working for Apple or Amazon
- Working for Boeing
- Working with an innovative company that allows me to use my knowledge, as well as, my creativity.
- Working with animals
- Working with technology that will allow me to interact with people

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LIGO SEC is recruiting Docents who have a strong interest in education and service

Reasons students become docents fall into 3 main categories for the majority:

- Interest in teaching or working with youth
- Interest in the subject matter
- Interesting in serving the community

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Docents highly value LIGO SEC activities

Answer Options	Valuable	Very Valuable	Combined
Learning multiple strategies for engaging visitors at exhibits and supporting visitors' learning	14%	82%	96%
Experiencing and reflecting on being a learner at the exhibits	23%	73%	96%
Reflecting on the visitors' museum experience	33%	67%	100%
Understanding expectations for roles and responsibilities as docents	32%	68%	100%
Making connections between exhibits and LIGO research	18%	79%	96%

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Docents highly value LIGO SEC activities

Working with LIGO staff	21%	79%	100%
Working with partner(s) with visitors	27%	73%	100%
Working individually with visitors	25%	75%	100%
Having an opportunity to share questions, successes and challenges	22%	74%	96%
Hearing from returning docents about their experiences in the program and real examples of visitor interactions	15%	85%	100%
Training that concentrated on exhibits that could all be related by science concepts	22%	78%	100%
Participating in Friday "public tours"	33%	62%	95%
Participating in Saturday Open Houses	32%	68%	100%
Participating in monthly Science Saturdays	12%	88%	100%
Training provided specifically for returning docents	29%	71%	100%

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LIGO SEC influence on Docents' decisions about college, jobs, and careers

Answer Options	Not at all	A little	Some	A lot	A great deal
College decisions	7%	17%	21%	28%	28%
Job decisions	0%	24%	17%	38%	21%
Career decisions	0%	14%	24%	38%	24%

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LIGO SEC helps prepare Docents for future careers in STEM

Answer Options	Not at all	A little	Some	A lot	A great deal
The LIGO Docent Program helped me know better what to expect if I go into a math, engineering, medical or technical field.	0%	11%	21%	29%	39%
The LIGO Docent Program provided role models and/or mentors to me.	0%	7%	18%	39%	36%
The LIGO Docent Program taught me about how to effectively communicate about STEM concepts and skills.	0%	4%	7%	32%	57%
The LIGO Docent Program gave me personal contacts and information that have been useful to me.	4%	18%	21%	21%	36%

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LIGO SEC influences Docents' decisions about the future

Answer Options	Not at all	A little	Some	A lot	A great deal
The LIGO Docent Program positively influenced my interest in pursuing a STEM field.	4%	14%	11%	32%	39%
The LIGO Docent Program negatively influenced my interest in pursuing a STEM field.	75%	7%	4%	7%	7%
The LIGO Docent Program helped me decide to go into a science, math, engineering, medical or technological field.	18%	7%	29%	18%	29%
The LIGO Docent Program helped me decide to go into an educational field.	21%	11%	14%	36%	18%

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LIGO SEC offers a unique experience for Docents

Answer Options	Not at all	A little	Some	A lot	A great deal
The LIGO Docent Program provided me with **experience** I could not have gained anywhere else.	0%	7%	18%	11%	64%
The LIGO Docent Program provided me with **knowledge and skills** I could not have gained anywhere else.	0%	7%	18%	18%	57%

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Comments about LIGO SEC impact on Docents' engagement at work and in the community

LIGO SEC helped improve Docents' communication skills:

Before my experience with LIGO I struggled to communicate with others (especially children) to help them understand the way things worked. After LIGO and seeing the way Tien worked with adults and kids to spark their interests, it helped me understand how to get a point across without confusion and loss of interest.

LIGO has help me in other ways such as presenting power points and talking to others, I have also worked severally math and science nights in the past that allows me to be one with children and there parents.

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LIGO SEC impacts docents' engagement at work and in the community

LIGO SEC impacts Docents' confidence interacting with youth:

My LIGO experience has made me more comfortable with interacting with children and young adults on an intellectual level. I have encountered so many different individuals and made so many memories, that there is always a ways to relate new experiences back to LIGO.

It has enhanced my confidence when dealing with the public.

LIGO teaches Docents how to engage others to think and learn:

LIGO teaches you how to properly engage individuals, ask questions, and how to push others to expand their minds and think in a positive way. LIGO has truly taught me that it is more than just speaking but being a positive person that knows how to properly engage people to make them want to learn and become more knowledgeable about the topic at hand.

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LIGO SEC impacts docents' engagement at work and in the community

LIGO SEC inspires Docents to give back:

[LIGO] made me more interested in volunteering and giving back to the community because the children need it.

LIGO has taught me the importance of reaching out to our youth, which are the foundation to the future of this country. Having them Educate in a STEM background will grant them many educational and career options.

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Docents share significant memories of their LIGO SEC experience

Working with other Docents on an outreach event:

One significant memory that I had while participating in the LIGO Docent Program was when I worked a Girls Scout event in Livingston. This particular day Ms. Kathy was so impressed with how well the docents worked as a team running the exhibit. She said that it was the first time in years where she didn't have anything to do. We setup, ran, and cleaned the LIGO exhibit without needing her assistance. This was a true student-has-finally-become-teacher moment. Collectively as a team, we had learned and reciprocated to the community the skills and knowledge LIGO had taught us.

Going to classrooms and sparking students' interest:

One significant memory I have about he LIGO program is when we went to schools and displayed projects for them. This was significant for me because I know we made an impact on their life and sparked their interest in STEM.

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Docents share significant memories of their LIGO SEC experience

Realizing the impact s/he is having on students:

There was a young boy who came during the Saturday activities. He was always interested in listening specifically to me when I explained the tornado exhibit. This is significant to me because I realized how much of an impact I was able to have on a young person's life while still learning myself.

Seeing students' interest and attitudes turn around:

I think my best and most significant memory at LIGO would have been a field trip day with just about 50 students. They were all so young and a few of them started out the day not caring at all. After being able to welcome them and talking to them, they finally began to truly care because they were having fun learning about something that they did not ever get the opportunity to do before. The days was so significant because I feel like for the first time I was able to really touch and every student.

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Docents sharesignificant memories of their LIGO SEC experience

The opportunity to apply to LIGO as a researcher:

A significant memory I have is actually having an offer extended to me to conduct research with LIGO. I was advised by the staff to apply and was made an offer. It was great knowing they saw potential in me.

Working a busy Science Saturday:

My first science Saturday: it was a bit overwhelming seeing how many people in the community that were interested in the facility, especially after hearing that a lot of them were regulars. My favorite memory was showing the wide-eyed minds the way the special event "theme of the day" exhibits worked.

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Docents had few challenges

Answer Options	Not at all	A little	Some	A lot	A great deal
Conflicts with the time required for my other classes	41%	28%	21%	10%	0%
Too many conflicts with other extracurricular activities	52%	31%	14%	3%	0%
My family obligations were too time consuming	79%	14%	4%	4%	0%
Conflicts with my job responsibilities	75%	11%	11%	4%	0%
Transportation was difficult	62%	21%	7%	3%	7%

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Docents had few challenges

Answer Options	Not at all	A little	Some	A lot	A great deal
I was not well enough prepared for the expectations of the program	75%	14%	7%	4%	0%
The program and/or activities were not interesting to me	86%	10%	0%	3%	0%
The content of the program was too difficult	79%	17%	0%	3%	0%
Sometimes I was intimidated by the laboratory and research environment	62%	31%	3%	3%	0%
I found communicating with different audiences to be difficult	69%	24%	3%	3%	0%
Docent teacher(s) at LIGO SEC did not communicate well with me	86%	3%	0%	3%	7%
Docent teacher(s) at SUBR did not communicate well with me	83%	3%	3%	7%	3%
Working and collaborating with other students was difficult	90%	7%	0%	3%	0%

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Working with Docents: Considerations for Improvement or Further Inquiry

- Can LIGO help connect docents to, or provide them with, mentors/models?
- Can LIGO help bridge docents' connection between LIGO SEC and the LIGO lab/research?
- Can docents be engaged in more/different kinds of outreach?
- Can LIGO create a leadership cadre of docents for advanced training/more responsibilities?
- Are there opportunities for high school teachers or students to become docents?
- Can docents become ambassadors of LIGO SEC to bridge the science and education communities in Louisiana and beyond?

END

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July 2017