

EXSEED Summary: July 2011

Excellence in Science Experiential Education (EXSEED) is a project designed to enhance Science, Technology, Engineering, and Math (STEM) subjects in Adventist K-12 schools.

K-12 Participants

Summary	
Institutions, Union, & Conferences	Individuals by Role
9 academies (from 2 states - CA, HI) 3 sister Adventist higher education institutions (LSU, PUC, and WWU) 1 union conference (Pacific)	10 secondary science teachers 2 elementary teachers 3 professors from sister Adventist higher education institutions 1 associate director - elementary (PU Conf.) 1 educational technology consultant 1 principal
Total institutions: 13	Total educators: 18
Local Conferences	K-12 Educators
Central California Conference (CCC) Hawaii Conference (HC) Southern California Conference (SCC) Southeastern California Conference (SECC)	CCC: 2 HC: 1 SCC: 3 SECC: 7
Total Conferences: 4	Total K-12 Educators: 13

LLU Participants Summary

Faculty, Staff, Students	School/Org.	Role	Role in EXSEED
Total: 46+	Total Schools: 7 Total Offices & Orgs.:- ±14	Total LLU Students: 5 Total LLU Faculty: 20 Total LLU Central: 5	

LLU Schools, Labs, Centers Visited

School	Name
LLUMC	Non-invasive Imaging Laboratory
LLUMC	Tom & Vi Zapara Rehabilitation Pavilion
LLUMC	Proton Treatment Center
SAHP	Nutrition & Dietetics Research Kitchen
SM	Medical Simulation Center
SM	Swatek Anatomy Pavilion
SP	Lab in Chan Shun Pavilion (Spit in the Cup - DNA hands-on project)
SPH	Geographical Information Systems Lab
Total Schools: 4 + LLUMC	Total labs and centers: 8

EXSEED Schedule

EXSEED participants were kept busy all day and some nights, too. They visited labs, had hands-on experiences, listened to and got acquainted with various researchers across campus, plus worked to plan the future of EXSEED as well. The following two pages document the EXSEED week's activities.

LOMA LINDA UNIVERSITY

EXCELLENCE IN SCIENCE EXPERIENTIAL EDUCATION (EXSEED) JULY 25-29, 2011

	Mon., July 25	Tues., July 26	Wed., July 27	Thurs., July 28	Fri., July 29		
8:00 am	Breakfast/Worship 8:00 AM <i>Dr. David Taylor</i> CC 4220A	Breakfast/Worship 8:00 AM <i>Dr. Richard Rice</i> CC 4220A	Breakfast/Worship 8:00 AM <i>Dr. Johnny Ramirez</i> CC 4220A	Breakfast/Worship 8:00 AM <i>Dr. Sigve Tonstad</i> CC 4220A	Breakfast/Worship 8:00 AM <i>Dr. Mark Carr</i> CC 4220A		
8:30 am	Welcome/Orientation 8:30 AM <i>Pres. Hart, Prov. Carter, Dr. Eggers</i> CC 4220A	Group 1 SiC Lab <i>Dr. Rashid Mosavin</i> CSP 21017	Group 2 SiC Papers <i>Dr. Warren Peters</i> WH B131	Group 3 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Telomeres – Endless Possibilities 8:30 AM <i>Whitney Evans, Miguel Illan-Serrano</i> CC 4220A	Travel Time 8:30 AM	EXSEED Planning 8:30 AM <i>President Richard Hart, Provost Ronald Carter, Dr. Marilyn Eggers</i> CC 4220A
9:00 am	Medical Simulation Center 9:00 AM <i>Dr. Janice Palaganas</i> CC 4 th Floor					Orthotics/Prosthetics 8:45 AM <i>Dr. Johannes Schaepper</i> East Campus	
9:30 am	Swatek Anatomy Pavilion 9:30 AM <i>Dr. Ben Nava</i> CC 1 st Floor	Group 1 SiC Papers <i>Dr. Warren Peters</i> WH B131	Group 2 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 3 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Geographical Info. Systems Tour & Lab 9:30 AM <i>Dr. Samuel Soret, Seth Wiafe</i> CC 3 rd Floor	Travel Time 9:45 AM	Break 10:00 AM
10:00 am	Video Project Introduction 10:30 AM <i>Dr. Marilyn Eggers</i> CC 4220A					Non-invasive Imaging Laboratory 10:00 AM <i>K.A.* / CSP Thompson Lobby</i>	
10:30 am	Orientation/Discussion 11:00 AM <i>Provost Ronald Carter, Dr. Marilyn Eggers</i> CC 4220A	Group 1 SiC Papers <i>Dr. Warren Peters</i> WH B131	Group 2 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 3 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Lunch & Lab Time 12:30 PM CC 4220A (catered)	Proton Treatment Center Tour/Lecture 10:30 AM <i>Dr. Reinhard Schulte</i> Medical Center, B-level	EXSEED Planning & Conclusion 10:15 AM <i>Provost Ronald Carter, Dr. Marilyn Eggers</i> CC 4220A
11:00 am	Lunch 12:00 PM Faculty Dining Room					Drive-by LLU Campus Orientation 11:30 AM	
11:30 am		Group 1 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 2 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Group 3 SiC Papers <i>Dr. Warren Peters</i> WH B131	Lunch & Lab Time 12:30 PM CC 4220A (catered)	Nutrition Discussion 1:00 PM <i>Dr. Bert Connell & Team</i> NH 1611/12 – Research Ktch.	PLEASE RETURN YOUR LLU VISITOR BADGE TODAY.
12:00 pm						Travel Time 1:30 PM	
12:30 pm		Group 1 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 2 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Group 3 SiC Papers <i>Dr. Warren Peters</i> WH B131	Video Project Lab 1:45 PM <i>Dr. Marilyn Eggers</i> CC 4220A		
1:00 pm	Break 1:00 PM School of Dentistry Software Demo. – Head/Neck Anatomy 1:15 PM <i>Dean Charles Goodacre, Kathleen Moore</i> CC 4220A					Outreach Through Environment: Working with Turtles for a Better World 1:00 PM <i>Dr. Stephen Dunbar</i> CC 4220A	
1:30 pm		Group 1 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 2 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Group 3 SiC Papers <i>Dr. Warren Peters</i> WH B131	Video Project Lab 3:30 PM <i>Dr. Marilyn Eggers</i> CC 4220A		
2:00 pm	“Spit in Cup” (SiC) Introduction on Research 2:00 PM <i>Dr. Warren Peters</i> CC 4220A					Science Philosophy and Creation/Evolution 2:00 PM <i>Dr. Kevin Nick</i> CC 4220A	
2:30 pm		Group 1 Med. Sim. Center <i>Dr. Kent Denmark, Dr. Janice Palaganas</i> CC 4 th Floor	Group 2 SiCLab <i>Dr. Rashid Mosavin</i> CSP 21017	Group 3 SiC Papers <i>Dr. Warren Peters</i> WH B131	Video Project Lab 3:30 PM <i>Dr. Marilyn Eggers</i> CC 4220A		
3:00 pm	SiC Lecture on DNA Advances 3:00 PM <i>Dr. Willie Davis</i> CC 4220A					Break 3:00 PM Hox Genes 3:15 PM <i>Dr. Kerby Oberg</i> CC 4220A	
3:30 pm							

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4:00 pm	EXSEED Planning 4:00 PM <i>President Richard Hart,</i> <i>Provost Ronald Carter,</i> <i>Dr. Marilyn Eggers</i> CC 4220A	EXSEED Planning 4:00 PM <i>Provost Ronald Carter,</i> <i>Dr. Marilyn Eggers</i> CC 4220A	EXSEED Planning 4:00 PM <i>Provost Ronald Carter,</i> <i>Dr. Marilyn Eggers</i> CC 4220A	EXSEED Planning 4:00 PM <i>Provost Ronald Carter,</i> <i>Dr. Marilyn Eggers</i> CC 4220A	
4:30 pm	NO EATING OR DRINKING PAST 4 PM for SiC group.	NO EATING OR DRINKING PAST 4 PM for SiC group.			
5:00 pm	SiC (12 people) / CSP 5:15 PM	Dinner & Debrief 5:00 PM CC 4220A	Video Project Lab (optional) 5:00 PM <i>Dr. Marilyn Eggers</i> CC 4220A	Video Project Lab (optional) 5:00 PM <i>Dr. Marilyn Eggers</i> CC 4220A	
5:30 pm		SiC (6) / CSP 5:15 PM			
6:00 pm		Maximizing Learning in the Classroom with and without Technology 5:45 PM <i>Dr. Marilyn Eggers</i> CC 4220A			
6:30 pm					
7:00 pm		Video Design & Development 7:00 PM <i>Stew Harty</i> CC 4220A			
7:30 pm					
8:00 pm		Making Movies in the Classroom 8:00 PM <i>Stephen Robertson</i> CC 4220A			
8:30 pm					
9:00 pm					

*Kamal Ambadipudi, with presentations by Dr. Shu-wei Sun and Dr. Lei Huang

CC = Centennial Complex
CSP = Chan Shun Pavilion
NH = Nichol Hall
OEE = Office of Educational Effectiveness
WH = West Hall

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EXSEED Vision and MFL

Loma Linda University and EXSEED are committed to Mission-focused Learning (MFL). The MFL learning environment fosters the highest commitment to analytical and critical thinking, advocates the highest ethical and professional standards of practice, values the creation of new knowledge, and the faithful transmission of best practices within professional and scientific disciplines. It provides a learner-centered educational environment that facilitates the absorption of knowledge and perfection of skills, while blending evidence-based decision making with transformative learning events (“teachable moments”). It develops a culture of service, while encouraging the pursuit of wisdom through the example of Jesus Christ who lived to bring hope, healing, and happiness to mankind.

During the EXSEED week the participants experienced MFL in many ways throughout the week. They participated in the School of Religion worships, listened to various researchers, and explored campus resources such as centers and labs across campus; but they also spent time every day working on plans for EXSEED and trying to apply what they had learned to this new STEM initiative.

The final day—Friday morning—was dedicated exclusively to planning. Below are some of the initial goals of the group. The discussions will continue in the EXSEED Portal where all of the planning, networking, development, activities, online projects, intensives, and courses, will be housed (<http://www.llu.edu/exseed>).

K-G Collaboration Projects

- The goal is to develop and implement interdisciplinary, practical research projects that have a mission. They could have an umbrella topic that encompassed many—if not all—of the STEM disciplines. A student blog site could be developed for these projects. All projects will be evaluated.
- The suggested 1st topic: sea turtles (in collaboration with Steve Dunbar and his sea turtle research project: ProTECTOR - <http://www.turtleprotector.org>)
 - Chemistry
 - GIS
 - Physics
 - Biology
 - Bible/ethics
 - Stewardship
- The suggested topic for a later project: taste receptors & telomeres (School of Medicine, Basic Sciences)
- There could be multiple collaborative projects, some short, but some longer.
- Here is a proposed project that the EXSEED group is excited about.
- **LLU Proposed Collaborative Project**
Telomere Length Project
Dr. Penny Duerksen-Hughes, Whitney Evans, Miguel Illan-Serrano, Dr. Kimberly Payne, and Dr. Ron Carter
This project is still in the design process and will take approximately one year to get set up for collaboration with our west coast sister Adventist higher education institutions and K-12 teachers and students. *See a more complete description of this project on pages 5-6.*

Elementary

- New NAD science curriculum for K-8 will be out in a year or two. Both NAD and the Pacific Union Conference have encouraged EXSEED’s efforts to enhance the new curriculum.
- Develop a list of K-8 experiments to put in the portal. Have teachers develop videos – one per month.
- Virtual talks need to be developed that are appropriate for elementary.
- Develop and sell kits for either the new science books or for experiments and projects to go with other EXSEED projects to sell at cost.
- Share the following with elementary teachers:

- There is growing evidence that students who are successful in science show excitement in science by 6th grade.
- In fact, Dr. Hart read recently in a study that if a student hasn't decided by 6th grade that s/he is going into medicine, it is unlikely that s/he will make it into medicine.

Science Masters

- **Problem:** The EXSEED participants cited the real and urgent problem that they are not able to get masters at their Adventist colleges unless it is in education, because that is where the annual Pacific Union Conference subsidy is usually targeted for the K-12 educators. However, science teachers urgently need to get a content masters that covers more than one area.
- **Proposed solution:** With this problem in mind, a collaborative MS program needs to be developed between LLU/LSU/PUC/WWU. This program:
 - Would not be a watered down MS science program.
 - Could include certification classes for science disciplines as outlined in the *NAD Educators Certification Manual*.
 - Would have two tracks: thesis and non-thesis (project) tracks.
 - Would be a 45-55 hour program.
 - Would allow students to select two areas of emphasis.
 - Could include science education.
 - May require students to take undergraduate prerequisites before applying to the program even though they may be currently teaching in that area.
- **Preparation:**
 - Harley Peterson will work with Pacific Union Conference.
 - Ron Carter was voted to represent EXSEED STEM MS/MA and was encouraged to share at the upcoming AAAA meetings.

Intensives

- **Problem:** Frequently science teachers are asked to teach multiple subjects, and they are not always certified in all those subjects or they may be rusty in the subject so need to update their knowledge. They need ways to get information on how to teach, understand a particular subject/content without 'going back to school'.
- **Proposed solution:** It was proposed to have intensives in specific content areas available in a variety of venues (face-to-face, videoconferencing, online, etc.; record sessions to archive for others):
 - Should address:
 - Needs of the science teachers.
 - What college professors say students need preparation in.
 - "What worked for me...."
 - Have meetings:
 - For content teachers so they can share and discuss problems, solutions, creative approaches, etc.
 - Have presenters (and possibly video the presentation) share on a topic.
 - Demonstrate how to teach new lab.
 - Have a traveling van of lab activities that would especially help schools that don't have well-equipped labs.
 - Intensives would be taught by possibly multiple college teachers and/or high school teachers could add to course content.
 - Share pictures of lab apparatus, etc.
 - Include effective pedagogy as well as content
 - Provide instant help.
 - Help Student Missionary science teachers
 - Promote peer collaboration

- Have college-based 'courses' that are 1-2 weeks with or without labs.
 - Have some intensives every year; over time the online library of these intensives will build.
 - Should have college and/or professional development credit options.
 - Should promote peer collaboration.
 - Should support high school labs.
- **Development:** It was decided that the development of these intensives should be led by a college/university so department faculty put it together, or they could collaborate with other institutions.
 - **Delivery:** The goal will be to help all science teachers no matter where they are located in the Pacific Conference Union. This means that online, videoconference, and face-to-face (f2f) intensives will be delivery options as long as the f2f intensives are recorded and are posted in an interactive format online with all of the digitized resources. In addition, they must have discussions and help contacts to experts. Online intensives should have interactions with live professors.

Next Summer

- EXSEED would like to have both a regular session at LLU next summer plus participate in the NAD Teachers Convention in August.
- Summer session at LLU:
 - Have it in early summer so teachers don't have two conferences back to back.
 - Have tracks by disciplines – would go for years so teachers could take each of the tracks over time.
 - Post content for the tracks before the session so teachers can do preparatory work for the conference and sessions.
 - Have the colleges and universities each take responsibility for a track...or collaborate together, if that is better for all. Include outside people such as CalTech, etc.
 - Need to have good promotion for EXSEED next year that should include interviews in both video and print. Articles should be written for the *Pacific Union Conference Recorder*, and for the *Journal of Adventist Education*. Have a limited number of spots for the summer EXSEED Conference so may have to be selective in accepting people. In spite of being selective for the face-to-face conference, all teachers who want to participate with EXSEED in the portal would be accepted. Provide experienced coaches for new people.
- NAD Teachers Convention
 - Give a plenary session or arrange for a speaker.
 - Present one or more breakout sessions; perhaps have an EXSEED STEM track throughout the conference.
 - Include IT people or maybe give a one-day webinar. Science teachers need to have their schools' IT people as their partners in order to participate in EXSEED.

Partnerships with La Sierra University, Pacific Union College, and Walla Walla University

- There was enthusiasm from the representatives for all three sister institutions to work significantly in EXSEED. Some possibilities are to develop intensives, answer K-12 teachers questions, and host discipline-specific events on their campuses or field stations. In order to develop relationships and projects, LLU will host a series of videoconferences with our potential partners to work out formal plans.

Additional EXSEED Projects

STEM ‘Rock Star’ Videos – Teachers emphasized the need for materials and resources to share with their students about how STEM is being used now and what is needed for various professions. LLU will develop a series of short 30 seconds to 5-minute videos featuring LLU researchers, professors, teachers, students who have excelled in STEM field(s) with the goal of inspiring and educating K-12 students. These videos will also emphasize “Mission-focused Learning” (MFL, that LLU is known for).

Team STEM Video Project - One of the long-term goals of EXSEED is to build up instructional content resources that teachers are free to use whenever they need them. One way to accomplish this is to have teachers and students develop short instructional videos. Of course, LLU will also develop and contribute instructional videos and many other learning materials for the EXSEED teachers and students.

To help meet this need, there was a hands-on project during the EXSEED: Team STEM Video Project. Each team of 3-4 participants developed a short (30 sec. to 3 minute) instructional video. The foundation of the project was the research-based instructional strategy that we learn best what we teach. When students teach other students, they learn what they teach much better than through traditional instruction. The goal of the project was to teach teachers how to shoot, edit, and produce short videos with free or inexpensive equipment, so when they get back to their classrooms they will be better prepared to teach their students how to produce short instructional videos themselves.

Some of the teachers were a bit hesitant about this project before they began working on it, but after they had the instructional sessions with Stew Harty, Loma Linda University Church Media Director, and Stephen Robertson, LLU ESS Senior Audio-Video Specialist, they were eager and ready to get to work. The final videos were presented to the full group before dismissal on Friday at noon. Because not enough time was given to produce a final draft of the videos during the intense schedule, only rough drafts were shared.

Participants are excited about having their students produce meaningful instructional STEM resources, and thus increase their students’ engagement as well as increase the number of available instructional resources.

Telomere Length Research Project¹

Dr. Penny Duerksen-Hughes
Loma Linda University

Telomeres are the DNA sequences on the very ends of our chromosomes (think of the plastic ends on our shoelaces). As a general rule, each time our cells divide, the telomeres grow shorter, and when the telomeres get to a certain length, the cells do not divide anymore. This is part of the reason that we age.

However, telomere length is not only connected to our age; it has also been connected to stress. That is, people of the same chronological age may have different telomere lengths, and that difference can be connected to stresses such as taking care of a person with Alzheimer’s Disease or another chronic illness. The not-yet-proven implication, then, is that stress may shorten a person’s longevity by accelerating the rate at which telomeres are “used up.”

This raises a number of interesting possibilities and questions. For example, if stress increases the rate at which we lose telomere length, are there specific things that could decrease this rate? For example, how about exercise, meditation, worship, community, etc.? Does this have implications for how we treat our environment? That is, do loud noises and polluted air increase telomere loss, does time spent in natural environments decrease telomere loss, and is there a difference in the rate of telomere loss between urban and rural environments? How about music, or exposure to visual arts? How about pets, or the impact of different family structures (i.e., proximity to grandparents, one- or two-parent homes, or involvement of

¹ See page 2 for more K-G Collaboration Project ideas

aunts/uncles)? How about time spent reading, on the internet, or gaming? How about families with 0, 1, 2, 3 or more children? Does the number of children matter, either for the parents or for the children themselves?

An appropriately-designed network, with Loma Linda at the hub and involving SDA colleges and high schools/academies, has a huge and exciting potential to answer some of these questions, perhaps in ways that few, if any other entity can. For example, we have unparalleled access to some of the longest-lived people in the world (blue-world zone). So, we will have the means to figure out what works with respect to longevity. We may also be able to synergize with the Adventist Health Study, their people and their data. Finally, with such a network, we can reach people in so many different environments and situations nationwide, giving us the ability to do multiple comparisons.

Answering these questions will require large sample sizes, careful analysis of telomere length, and rigorous statistical analyses. It should be possible to accomplish this. High school/academy students could participate in sample collection – samples could be as simple as swabs from the inside of a person’s cheek. Analyzing telomere length would need to be done using modern molecular biological equipment, reagents and techniques. Certainly, Loma Linda could do this, it is likely that most of the colleges could do so also, and it may be that some of the academies could do so as well. The statistical analysis aspect is in some ways the most important aspect; it will need to be carefully considered from the very beginning, where we choose the questions and decide what samples we need. Once we have the appropriate demographic and lab data, we will need this expertise to interpret our results. Loma Linda has statisticians capable of dealing with this; I don’t know if the colleges do.

If we choose our questions wisely, collect the right number and right types of samples, analyze telomere lengths carefully, and analyze the results rigorously, we may be able to make a significant contribution to humanity’s understanding of how human longevity can be achieved.

In addition, such a system has the potential to significantly strengthen the SDA educational infrastructure. High school students will have the chance to participate in “real” research, providing them with an unparalleled opportunity to be a part of the scientific process and potentially increasing their excitement and engagement. High school and college teachers would gain additional experience and training, enhancing their professional growth. High school students who participated in the program would be motivated to continue their participation through college, providing them with an incentive to choose an SDA college.

Perhaps most importantly, this project would have the potential to tie together high school students, their teachers, college students and their teachers, and Loma Linda University in the pursuit of knowledge that builds both on our SDA legacy and modern scientific knowledge to improve our understanding of health and longevity.

EXSEED

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