The Nevada Traverse

Journal of the Professional Land Surveyors of Nevada

Institutional Affiliate National Society of Professional Surveyors • Member Western Federation of Professional Surveyors

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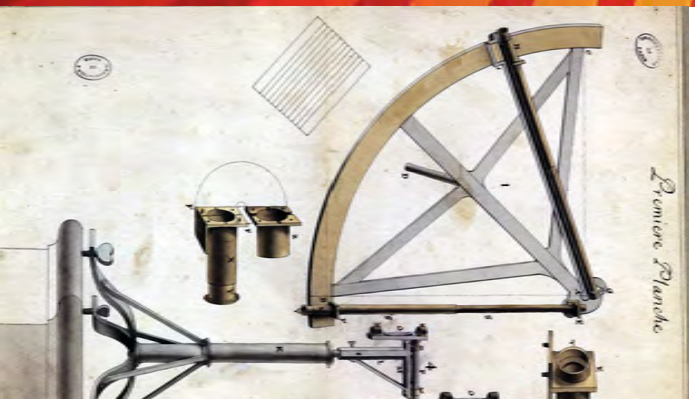

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The Nevada Traverse

This publication is issued quarterly by the **Nevada Association of Land Surveyors** (NALS) and is published as a service to the Land Surveying profession of the state of Nevada. *The Nevada Traverse* is an open forum for all Surveyors, with an editorial policy predicated on the objective of NALS and Bylaws, Article II, which reads:

"The purpose of the association shall be to promote the common good and welfare of its members in their activities in the profession of Land Surveying; to promote the common good and welfare of the public in terms of professional land surveying activities; to promote and maintain the highest possible standards of professional ethics and practice; to promote public awareness and trust in Professional Land Surveyors and their work.

This organization, in its activities and in its membership, shall be non-partisan, non-sectarian, and non-discriminatory."

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(Effective September 1, 2016)

The Nevada Traverse is published quarterly by the Nevada Association of Land Surveyors and accepts advertising. Contact the editor for submittal specifications for advertisements. The rates per issue are as follows:

		MEMBER PRICE		NON-MEMBER PRICE	
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The Editor's Corner

by Carl C. de Baca, PLS

Well, Christmas is coming early this year. Paul Pace is gracing these pages with another historical beauty. This is part one of a planned four-parter outlining the exploits of the 17th and 18th century French scientists who sought to accurately measure the circumference of the Earth by laying out a triangulation network in Peru. Another great read by our resident laureate.

GBC Student Jennifer Jones, who was part of GBC's inaugural Student Competition Team, has used that experience to prepare her capstone project, a look at distance learning. If you have preordained thoughts about the efficacy of online education, you are going to want to read this paper. And don't blame the Traverse if you find yourself signing up to join the program soon after putting the article down.

Switching hats for a moment, I have offered up a suggestion for a new committee that NALS could implement. Given the changes to the profession and the threats to licensing, I think it is inevitable that surveyors are going to need to start being a little more active in policing themselves. I have briefly described a "Professional Practice Committee" which is modeled on a very successful program adopted by a

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neighboring state. I would like to see the chapters consider this proposal, which is still only in outline form, and any thoughts sent here to this desk by NALS members would be gratefully published.

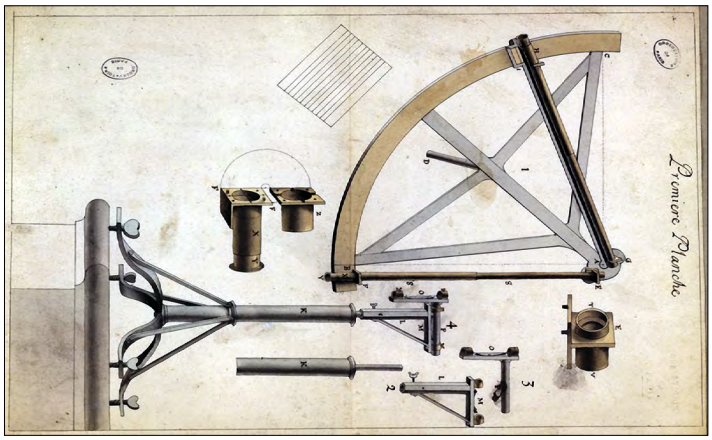
There's a little piece on the California Trail Interpretive Center, near Elko, which is hosting an interactive exhibit starting in February, 2017, entitled: "Taking the Measure of the Land". This is a BLM exhibit developed in Wyoming and discussing the earliest GLO surveyors as they worked their way west. I encourage everyone to take a drive up there next spring and see this exhibit. The Center takes donations and the Star still makes great Picon's…

And finally, as I close out this last issue of the Traverse for 2016, it's time for my annual plea for new material. You folks all have a variety of unique experiences in the world of Surveying. You all tell great stories at the bar or at the table before chapter meetings start. And there's certainly no shortage of opinions on the leading surveying topics of the day. What's so difficult about turning that into an article or editorial? Help me keep this magazine Nevada-centric.

May you all have a Merry Christmas and Happy New Year!
-Ed. ⊗

About the Cover...

"Unleash Your Inner Superhero" is the theme for this year's NALS Conference. Leave your Kryptonite at home.



Optically equipped quadrant used by Abbé Jean Picard to measure the meridional arc in 1671.

California Trail Interpretive Center

I encourage you to take a trip to the northeast corner of the state and visit the **California Trail Interpretive Center**. Located off of Interstate 80 at Exit 292 approximately 8 miles West of Elko. The Center is part pioneer history museum, part classroom for educational and cultural enrichment for the general public. It is managed by the BLM and entry is free, although they gladly accept donations. The Center puts on numerous programs throughout the year, including Trail Days, "Flint, Steel and S'mores", the Humboldt River Rendezvous, and other events like gatherings of Native American Dancers, Basque Dancers, and numerous kids programs such as "How to Throw a Tomahawk", "leave it to Beavers", "How to Bake a Pioneer Biscuit" and many more.

Starting in February, the Center will be hosting the Wyoming BLM's travelling exhibit entitled "Taking the Measure of the Land". This is an exhibit that commemorates the role of the General Land office in our nation's settlement. Ranger Alex Rose will be explaining what pioneering surveyors were doing out here in the West, and with some period equipment on loan from BLM Cadastral in Reno, it will be an excellent place to take the kids or grandkids. Watch for more in the next edition of the Nevada Traverse.

Check it out at: http://www.californiatrailcenter.org/*2015 and 2016 tripadvisor Certificate of Excellence*

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The President's Message

by Carl C. de Baca, PLS

Well, this is my last report as President. It's been an honor and a privilege to serve this past year and I appreciate the assistance and cooperation of all those members and officers who helped me throughout the year. I am torn regarding turning over the reins to the next president. On the one hand I am looking forward to being done and moving on to some other things, but on the other hand I have some regrets because, as he will soon learn, there is not enough time in the year to accomplish everything you set out to do, not even close. All you can do in your year as president is keep the ball moving. Someone passed it to you and you will pass it to someone else. Don't drop it, don't let it get stolen from you and try to keep it moving in the right direction, that's about it.

2016 was a great year to have served as president and I am extremely lucky that I got to experience it. This was the first full year of having a NALS central office and much of what was accomplished is directly attributable to their fine work. So before I go any further, I owe a huge "Thank You" to last year's president, Trent Keenan who worked hard to make hiring our central office achievable. And I owe a debt of gratitude to Dorothy Calegari and Crissy Willson, our Central Office. We are where we are, and we are in a position to keep climbing, because of their knowledge of us as surveyors and our business, and because of their tireless work on our behalf.

This year we saw our membership rise substantially. We established a non-profit education foundation based here in Nevada. We moved our account to a bank that will be more efficient for future officers, since it has branches in all the places from which they might hale. We put together a fantastic and very profitable conference and already booked our next two conferences. We have lowered our costs of producing the Traverse and increased our revenue

We are working toward making Continuing Education workshops easier to organize at the chapter level by taking advantage of the central office's experience, knowledge and contacts. This process is evolving and it will take a while before the right combination of local and central office effort is determined. The workshops represent a significant portion of chapter revenue each year. The central office can reach out and get speakers and topics otherwise unavailable to the chapters. I encourage everyone to work together toward making our Continuing Education program the envy of other states.

At the conference this year, I handed out some presidential citations, in what I hope will become a NALS tradition. Many people labor throughout the year, in capacities unseen and mostly unrecognized by NALS members and officers. I would like to see these people get a moment of sunshine.

NALS and NSPE-NV have partnered in presenting two "Meet the BPELS" events this year. The first one, put on by NSPE-NV, was held in Las Vegas in September. There were 60 attendees and the event was a smashing success. The only negative I saw, was that we ran out of time before all the people in the audience had a chance to ask all their questions. The second event, in November, will be at the Silver Legacy in Reno and will be put on and hosted by NALS.

I'd like to think that while long standing national groups, associations, political parties, charitable organizations, what have you, are splintering and falling apart, NALS is seeing a trend toward more solidarity. Our membership is up, our organization does everything it does with the best interests of current and future members in mind, and that seems to be getting some recognition.

We at NALS are celebrating the past while planning for the future. This organization is about generating and then acting upon ideas, stepping up when a problem or opportunity presents itself. We have a great track record over the past few years and I know I am leaving the board in good hands! ⊗

Has Your Contact Information Changed?

Change in your address, email address, or telephone? Please contact NALS with your updated information.

You may log onto the NALS Website at:
www.nvlandsurveyors.org
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Fill in your information and submit.

Help your NALS Board to keep you current.

Thank you!

NEVADA ASSOCIATION OF LAND SURVEYORS

BOARD HIGHLIGHTS

The NALS Board of Directors meeting was held October 21, 2016 at the offices of Diamondback Land Surveying in Las Vegas, NV.

2017 Slate of Candidates
The Board of Directors approved the 2017 Slate of Candidates as presented by the nominating committee. Ballots will be mailed to the membership.

Alan Dill, President
Jerry Juarez, President-Elect
Halana Salazar, Secretary
Doug Wood, Treasurer

Conference
The conference will be held April 1st-4th at the Silver Legacy in Reno, Nevada. The theme selected by the Conference Committee is "Unleash Your Inner Super Hero."

See info on page 17.

Coming Soon – NALS Logo Store
The Board of Directors authorized the development of a store to sell NALS logo items including apparel, hats, coffee mugs, etc. Information regarding the store will be sent to members in January.

Coming Soon – New Member Benefits
The NALS Executive Office is working on development of new member benefits including a discount with UPS and Courthouse Direct. Members are encouraged to sign up for the NALS Office Depot discount. Contact the Executive Office for more details: nals@nvlandsurveyors.org or (888) 994-3510.

Tri-State Monument
NALS, in conjunction with the Arizona Professional Land Surveyors (APLS) and the Utah Council of Land Surveyors (UCLS) is working to refresh the Tri-State monument. We are seeking donations to help offset the cost of the project. Contact the Executive Office to make a donation: nals@nvlandsurveyors.org or (888) 994-3510.

NALS Fall Seminars
The Board discussed the upcoming fall seminars which include a Gary Kent seminar in Reno and Las Vegas as well as a BPELS Meet and Greet. NALS will continue to develop opportunities to provide members affordable, quality education.

Great Basin College (GBC)
The program and GBC continues to grow. The NALS Board of Directors discussed ways to assist the program. The Board directed Carl CdeBaca to investigate the possibility of setting up an endowment to help fund a second professor. A second professor would provide assist GBC in obtaining ABET accreditation.

Outreach Opportunities
In addition to the annual TrigStar program and Teaching with Spatial Technology (TwiST) program, The Board discussed other potential outreach projects.

Chris Konakis is working on development of a permanent land surveying exhibit at the Elko Museum.

Chris Konakis is investigating the possibility of a joint project between NALS and Great Basin College students to set a monument for the geographic center of Nevada.

Trent Keenan reported that the Barracuda Championship golf tournament is seeking volunteers to record and transmit locations, length, and distance of shots using tripod lasers stationed on fairways and greens. This is also a way to help fund scholarships as the tournament will provide a $20 donation to the NALS Education Foundation for each volunteer. At least 100 volunteers are needed. If you are interested, please contact the Executive Office: nals@nvlandsurveyors.org or (888) 994-3510.

NSPS Disaster Relief Fund
Carl C.de Baca reported on the NSPS Disaster Relief fund, which provides assistance to surveyors during time of disaster (e.g., Katrina), and the Atwell memorial fund which aids surveyors impacted by medical emergencies. The Board Authorized a one-time donation of $2500 to the Atwell fund.

Members are encouraged to donate to this fund. Information can be found on the NSPS website at: http://www.nsps.us.com/donations/

NSPS Political Action Committee
The NSPS political action committee (NSPS PAC) is the political arm of NSPS and the surveying profession in Washington, DC. The PAC helps build a better future for the surveying profession by pooling personal contributions from individual NSPS members and contributes to the election campaigns of deserving candidates and incumbents for Federal office based on their records, policy positions, and leadership responsibilities. By law, no NSPS funds can be used for political campaign purposes. That's where the NSPS PAC comes in. NSPS must rely on the generous, voluntary, personal contributions to the PAC from individual surveyors.

The NALS Board authorized a one-time donation of $1000 to the NSPS PAC. Members are encouraged to make a donation. Information can be found on the NSPS website at: http://www.nsps.us.com/donations/ ⊗

The Power of Ideas France's Geodesic Mission to Peru 1735-1744, Part I

By: Paul S. Pace, PLS

Beginnings

The course of Western thought changed dramatically during the 18th Century. An emerging scientific revolution in the last half of the 17th Century and sweeping cultural and intellectual changes wrought throughout the 18th Century enabled this great transformation. Those changes came during the so called Age of Reason, what we know today as The Enlightenment. Traditional beliefs and long-held superstitions began to fade away in the light of scientific method and reason.

But we are what we know. In the 17th and 18th Centuries more questions arose about our world, and the larger universe, than could be immediately or conveniently answered by conventional wisdom or emerging sciences. Fortunately, the dawning Enlightenment brought with it thinkers with the intellectual wherewithal to seek and find answers, such as: Francis Bacon, René Descartes, Cesare Beccaria, Thomas Payne, Adam Smith, John Locke, the Cassini family and Isaac Newton. Advancements in science, medicine, economics, government, and mathematics, as well as cartography and surveying came with increasing frequency. This was only the beginning.

From the relative comfort of our 21st Century it is easy to forget the hardships often required to resolve questions that dominated Enlightenment thought. In the world of 18th Century ideas, sometimes only raw physical strength and stamina could derive an answer. The resolution for some of these questions fell to surveyors. This is a story of their triumph over adversity, in the service of truth.

The Natural Philosophers

In 1660 wealthy, private citizens in England formed the Royal Society of London for Improving Natural Knowledge. While its title contained the word "royal", it received no funding from the monarch. The Society devoted itself to publishing the scientific papers of its members, who paid dues for the privilege. They also conducted scientific experiments and demonstrations, held public lectures and advanced higher mathematics. The Royal Society's Latin motto, *Nullius in Verba*, or "Take no one's word for it", signaled the tenor of its mission.

On the Continent meanwhile, similar efforts got underway. In 1666 France founded the Académie des sciences, but there a different model was used. The Academy received limited patronage from Louis XIV, promising some stable financial support. Soon the Academy was sponsoring large scientific missions, including efforts to more accurately determine the physical properties of the Earth and the solar system, improve the accuracy of French maps and develop better maritime navigation techniques.

Prominent in these early efforts was Abbé Jean Picard, geodesist, astronomer and a founding member of the Academy. Father Picard pioneered the use of telescopes, crosshairs and micrometers on his famously precise surveying instruments. In 1669 he began a large-scale survey project from a baseline 6.8 miles in length. Then, through a triangulation network of thirteen triangles, running along a meridian from Paris northward to Amiens, he measured an arc of 1° 22' in latitude. His instrument was a quadrant with a radius of 38" and graduated to 15" of arc, Fig. 1.

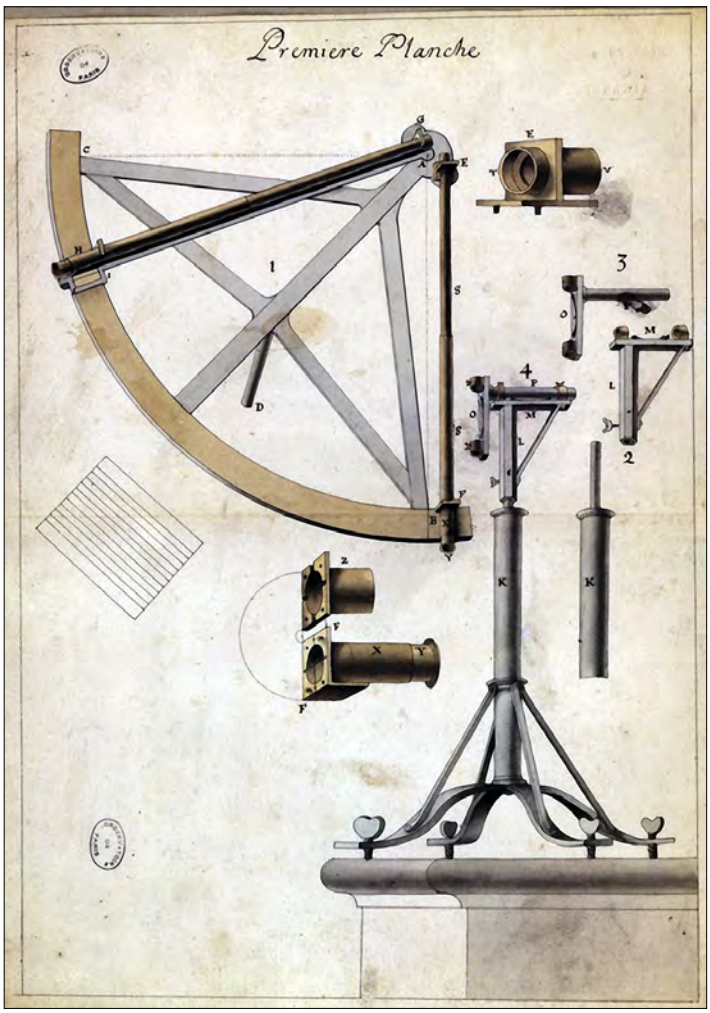

Figure 1. Picard's optically equipped quadrant used to measure the meridional arc in 1671.From l'Obseravtoire de Paris

Picard determined that at his latitude, 1° of arc equaled 57,060 *toise*[1], or roughly 69.10 miles.

He forwarded his results to a mathematics professor at Cambridge University named Isaac Newton, who incorporated the results of the survey in his physics research, and credited Picard for it. In 1671 Picard published the results of his work in his own book, "*Mesure de la Terra*", or "The Measurement of the Earth". He continued running his triangulation network southward from Paris, until his death in 1683.

The Cassini family, Academy members as well, carried on Picard's triangulation work, extending it north to Dunkirk on the coast of France, and south, for the time being, to the Pyrenees Mountains.

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Science looks to the New World

In 1672, the Academy sent the astronomer Jean Richer to Cayenne, a few hundred miles north of the equator, in France's South American colony of Guiana. It was Richer's second scientific voyage to the New World. His first expedition was to France's colony in Canada. That voyage included a failed test of two pendulum clocks, built by another Academy member Christiaan Huygens.[2] Upon his return from Canada, Richer and the Dutch astronomer traded punches over the clocks' failure. Richer wrote to Huygens offering some ideas on why he thought the pendulum clocks had stopped. Huygens was not amused; he wrote back, "…Where success was lacking, this ought to be imputed to the carelessness of those to whom the clocks had been entrusted rather to the devices themselves."[3]

At Cayenne, the sun and planets were very near Richer's zenith, all but eliminating the effects of atmospheric refraction. This allowed a comparative study of the effects of refraction, integral for observing celestial bodies in navigation and geodesy. Next he made observations for solar and planetary parallax, hoping to derive the dimensions of the solar system. He also cataloged the positions and magnitude of the southern stars not visible from Europe, for navigational and geodetic purposes. Richer's equipment once again included two of Christiaan Huygens' now-improved pendulum clocks.

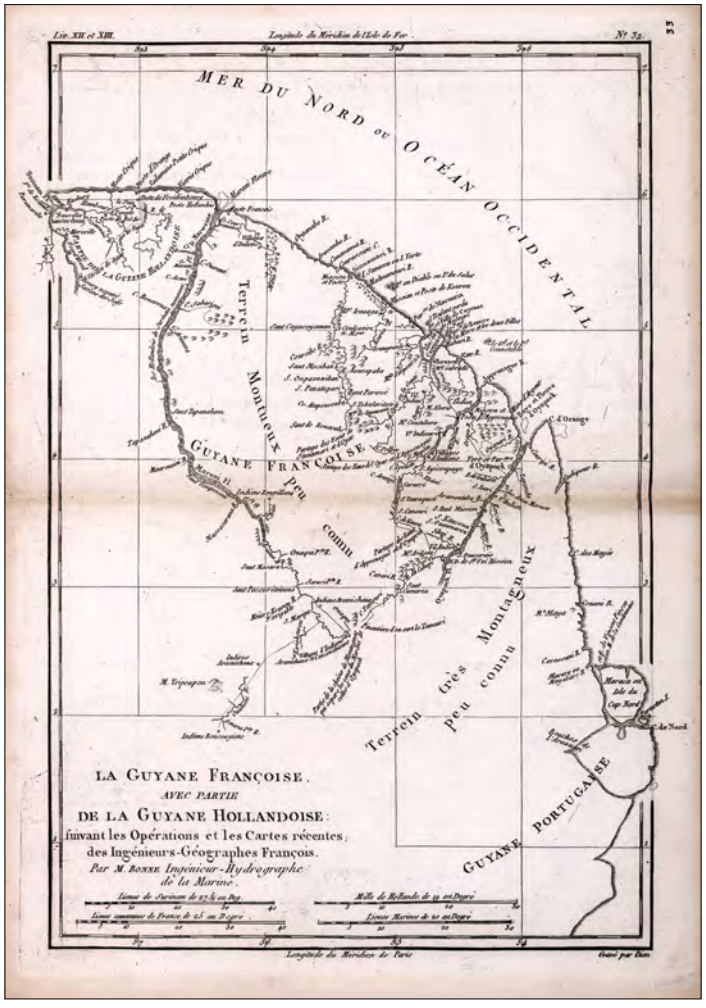

Figure 2. 1780 map of northeastern South America, French and Dutch Guiana in particular. Cayenne is located near 5° North Latitude
David Rumsey Map Collection

Richer conducted observations for a year, recording a lunar eclipse and transits of Jupiter's moons, which allowed him to determine Cayenne's longitude. While in Guiana, he was to determine if the length of the "seconds pendulum", a pendulum whose period is precisely two seconds, or one second in each direction, was the same in Cayenne as it was in Paris. Richer noted that Huygens' clocks, carefully set in Paris, were losing two minutes and twenty-eight seconds per day in Cayenne. In order to adjust the clocks, Richer shortened the three-foot-long pendulums by 2.8mm.[4] This dimmed hopes that a "seconds pendulum" of a specific length could be used as a worldwide standard of length.[5]

Richer returned to Paris in 1673. Giovanni Cassini, the head of the Paris Observatory, compared Richer's parallax results with Cassini's and Picard's simultaneous observations made in France. From these data Cassini produced the first accurate value for the Astronomical Unit, the distance from the Earth to the Sun. This he put at 85.6 million miles, only 7% below its actual distance.[6]

This value was critical in the accurate formulation of ephemerides used in navigation and geodesy. Using Kepler's third law of planetary motion[7], Cassini reckoned the average distance of Saturn from the Sun to be a previously unimaginable 820 million miles, somewhat shorter than its actual distance. While some researchers held doubts about Cassini's numbers, the realization that the solar system was vastly larger than anyone believed possible came as a shock to contemporary Europe. Earth's prominence in the grand scheme of the universe, like so many other beliefs during the Enlightenment, began to fade in the popular mind.

The Shape of the Earth

Scientists at the French Academy next looked into Richer's issues with the pendulum clocks. Many believed that the forces exerted on the pendulums in Paris should be the same in Cayenne. However, Giovanni Cassini reasoned that there must less mass under the Earth at the Equator, thus affecting the pendulums. This must be so, he said, because the Earth was elongated toward the poles, a prolate spheroid.

The English polymath Robert Hooke instead speculated that the Earth was actually an oblate spheroid, based on his own empirical research. He argued that gravity was diminished at the Equator because over time the Earth's rotation had exerted centrifugal forces on the planet. This caused a slight bulge at the Equator, and the extra distance from the center of the Earth thus reduced the influence of gravity on the pendulums. This was a concept that Newton later claimed he had developed, while Hooke maintained he had priority. A controversy arose, but as late as 1681 Newton had written that the Earth was spherical, just as the much large Jupiter appeared to be.[8] In the end, Hooke's empirical research could not stand up against Newton's mathematics. Newton outlived Hooke by decades, which doomed Hooke to the shadows.

When news of Richer's findings arrived in London, the debate over the exact shape of the Earth began in earnest. It continued for years, with the Royal Society's prominent members holding that Earth was an oblate spheroid, flattened at the poles and widened at the Equator. Later, in 1691, Cassini's more careful observations proved Jupiter was in fact oblate. Newton then used Cassini's own observations as further argument against him: Jupiter's equatorial diameter was wider by the ratio of 16:15, with respect to the polar diameter.[9]

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At the same time, scientists were searching for a universal theory of gravity. In a huge intellectual leap, Newton concluded that the same force that caused objects to fall to earth also kept the moon in its orbit around the planet. His colleagues at the Royal Society were generally receptive to this concept, but some on the Continent held doubts. Newton insisted he had the math to back it up, dense and complicated as it was. In July of 1687, Newton published his seminal work, *Philosophiae Natualis Principia Mathematica*, or "Mathematical Principles of Philosophy". Called simply "Newton's *Principia*", Richer's pendulum results were front and center in the first volume.

As to the shape of the Earth, Newton believed the math trumped Cassini's surveys, which he imagined might contain hidden errors, or Hooke's empirical work, or especially the metaphysical theories of some French mathematicians, René Descartes in particular.[10] Descartes himself did not hold any particular notions on the exact shape of the Earth. However, some scientists on the Continent used Descartes' ideas on celestial mechanics to demonstrate that Newton's unseen gravitational forces of universal attraction were still worthy of doubt. Moreover, they agreed with Cassini that the Earth was elongated at the poles, if not perfectly spherical, but in any case not oblate. During the 1730's, the French Academy's members themselves became divided over the issue, with prominent members in both camps.

Another Survey Is Needed

Knowledge of the Earth's true shape had, among other things, consequences for large-scale surveys, map projections, and marine and terrestrial navigation and of course it still does. For 18th Century scientists, this was not a small problem. After some discussion, the leadership of the French Academy proposed to send a team to Spain's Viceroyalty of Peru, located on the Equator where they would measure a meridional arc.[11] Excepting the possibility of a perfectly spherical Earth, measuring the length of a degree or two of latitude along a meridian in France would surely be different than those measured near the Equator. Which was longer than the other would settle the matter once and for all and only another survey could resolve that. Figure 3.

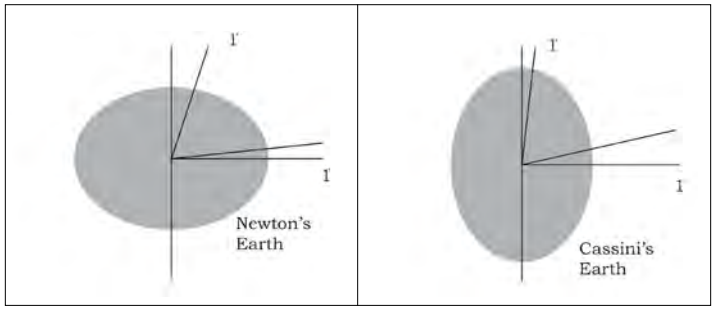

Figure 3. 1° of latitude in the opposing Newton and Cassini schemes.

Science, like war, can be the extension of politics by other means, a vehicle for national prestige and power. For Britain and France, the world's two super-powers, science served the expansion of national influence, not unlike the "space race" between the U.S. and the Soviet Union during the Cold War. The debate between Newton and Cassini, over the elemental physics that ruled the universe, became another battlefield in the war for knowledge. In this light, the French Academy perceived the expeditions as a windfall, regardless of the outcome. If the expedition to Peru established the Earth as prolate, Cassini and the Cartesians were proved correct. If the Earth were actually oblate, French scientists would prove Newton correct before the British themselves could.

The Academy selected Louis Godin, a noted astronomer, Academy member and a Newtonian, as expedition leader. But Godin had little or no field experience. And there were rumors that, among other things, he had issues handling money. With him would go Charles Marie de La Condamine, another Academician. He was a well-known explorer, soldier, geographer, and a Cartesian. Charismatic, personally fearless and intellectually curious, La Condamine was also a wealthy man and well connected socially. The last prominent figure assigned to the mission was Pierre Bouguer, a geodesist, mathematician, Academy member and all around genius.[12] He initially expressed a reluctance to go on such a lengthy expedition, but was finally persuaded to join it.

An Expedition to the New World

Plans for the "French Geodesic Mission to Peru" got underway.[13] Godin traveled to London to talk with members of the Royal Society including Edmond Halley, the Royal Astronomer at Greenwich. He purchased instruments, including several telescopes, an octant by instrument-maker John Hadley, a pendulum clock and a precision zenith sector with a twelve-foot radius by noted English instrument maker George Graham. In the meantime, La Condamine purchased three quadrants from the French instrument maker Claude Langlois at a cost of 1,500 *livres* apiece, about $14,000 today. He picked up a fourth from an estate sale. La Condamine had an iron bar forged and ground exactly to a *toise*, or 6.395 feet, the prevailing French standard unit of linear measure.

With large survey experience in the New World, Jean-Joseph Verguin was chosen as chief surveyor for the expedition.[14] Joseph de Jussieu was named surgeon and would also act as botanist. A younger surgeon named Jean Seniergues would assist Jussieu. Théodore Hugo was added as instrument-maker/repairman. Godin's first cousin Jean-Baptiste Godin was named as an assistant. Jean-Louis de Morainville signed on as artist/draftsman and Jacques Couplet-Viguier, grandson of the famous French geodesist Claude-Antoine Couplet, also joined the expedition.

During the mission planning, Godin examined what few maps of Peru (modern day Ecuador) were available to him. He saw the double chain of mountains, roughly parallel and ranging South from the Equator for hundreds of miles, separated by a long, relatively flat valley. This region was known as the Avenue of the Volcanoes. It spanned the entire length of his project and would provide the setting for his triangulation scheme.

He reckoned they could lay in a triangulation network with a chain of triangles over two hundred miles in length, spanning about three degrees of latitude. They could occupy stations on volcanoes on each side of the so-called avenue. And, there were cities for logistical support at each end of the network, and a small town in the middle: Quito in the north, Cuenca in the south and Riobamba in between.

Spain Intervenes

Diplomatic negotiations with Spain were needed to obtain visas for the expedition. These talks went reasonably well. After all, both countries' monarchs were Bourbons: King Filipe V of Spain was the uncle of France's Louis XV. But the Spanish were taking

CONTINUED ON PAGE 24 ▶

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ONLINE COLLABORATIVE LEARNING

by Jennifer Jones, GBC 2016 Senior

Introduction

Earning a degree of higher learning is not a task that is easily undertaken, especially for those who choose to obtain such a degree later in life. The steady growth rate of students utilizing online learning options to achieve this goal has surpassed that of traditional enrollment since 2002 (see Table 1) (Allen and Seaman 2014). Often these students are seeking further education as a means to gain a professional edge in an established career or to make an occupational transition, trends that may be attributed to the recession experienced in 2008 (Kumar 2010). Consequently, the traditional student (typically defined as being between the ages of 18 and 22, attending school on a full-time basis, and living on-campus) is becoming a notion of the past as an increasing number of students are choosing to receive an education online (Ocker and Yaverbaum 1999). The noteworthy advantages that an online learning platform provides pairs remarkably well with the needs of the changing student demographic. Nonetheless, online education is not without its disadvantages: both those that are based upon perceptions and those that are quantitative.

Table 1: Total and Online Enrollment in Degree-granting Postsecondary Institutions - Fall 2002 through Fall 2012

	Total Enrollment	Annual Growth Rate Total Enrollment	Students Taking at Least One Online Course	Online Enrollment Increase over Previous Year	Annual Growth Rate Online Enrollment	Online Enrollment as a Percent of Total Enrollment
Fall 2002	16,611,710	NA	1,602,970	NA	NA	9.6%
Fall 2003	16,911,481	1.8%	1,971,397	368,427	23.0%	11.7%
Fall 2004	17,272,043	2.1%	2,329,783	358,386	18.2%	13.5%
Fall 2005	17,487,481	1.2%	3,180,050	850,267	36.5%	18.2%
Fall 2006	17,758,872	1.6%	3,488,381	308,331	9.7%	19.6%
Fall 2007	18,248,133	2.8%	3,938,111	449,730	12.9%	21.6%
Fall 2008	19,102,811	4.7%	4,606,353	668,242	16.9%	24.1%
Fall 2009	20,427,711	6.9%	5,579,022	972,669	21.1%	27.3%
Fall 2010	21,016,126	2.9%	6,142,280	563,258	10.1%	29.2%
Fall 2011	20,994,113	-0.1%	6,714,792	572,512	9.3%	32.0%
Fall 2012	21,253,086	1.2%	7,126,549	411,757	6.1%	33.5%

Aimed at quelling some of the general stigmas related to the climate of online education, this study considers some of the most commonly reported negative judgements reported in the body of literature from a distinguishing point of view. More specifically, the role the method of delivery of education has in determining the success of a group project is examined. Compared and analyzed is the performance of a group of online learning students from Great Basin College in Elko, Nevada with groups of students who are engaged in traditional and blended learning methods. Data is obtained from each group by observation and personal interview, relevant to their participation in a national student competition related to the field of land surveying. Results will provide an indication of the validity and effectiveness of online learning programs as a measure of the success of the students in the competition.

LITERATURE REVIEW

An overwhelming amount of research has been conducted investigating the many facets of computer supported collaborative learning (CSCL). These studies range in focus from the process- oriented to the outcome-oriented to a combination thereof (Strijbos and Fischer 2007). Because of this diverse approach to the research, numerous theoretical accounts have been developed to describe the processes and outcomes of collaboration efforts (Strijbos and Fischer 2007). As a result, there is an expansive, sometimes disparate, amount of research on the subject; limiting the quality of the analysis of the current trends in the field.

Due to the nature of technology, much work that was performed in earlier years is now irrelevant, though many concepts may be applied across evolving technological interfaces. As one might expect, the needs determined in earlier studies for enhancing the online learning environment have now come to fruition (e.g. video conferencing, increased internet accessibility, and increased familiarity with computer technology). The focus for this study is directed towards literature that scrutinizes the relationships between online group collaboration factors and process oriented outcomes. Also, a series of well-considered statistical reports detailing pertinent data regarding the progression of distance education is summarized.

2.1 IMPORTANT TERMS

Throughout the literature several terms are consistently used, and require a standard definition that can be implemented as a fitting generalization that works in context with all research performed.

ONLINE EDUCATION

From the statistical literature, course types are broken down into four categories based upon the amount of online content that is utilized (see Table 2).

Table 2: Course Type by Online Content

Proportion of Content Delivered Online	*Type of Course*	*Typical Description*
0%	Traditional	Course where no online technology used — content is delivered in writing or orally.
1 to 29%	Web Facilitated	Course that uses web-based technology to facilitate what is essentially a face-to-face course. May use a course management system (CMS) or web pages to post the syllabus and assignments.
30 to 79%	Blended/Hybrid	Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has a reduced number of face-to-face meetings.
80+%	Online	A course where most or all of the content is delivered online. Typically have no face-to-face meetings.

(Allen and Seaman 2013)

COLLABORATIVE LEARNING

As the amount of information available to students soars to astronomical proportions, universities must divert their teaching methods from those which deliver only facts intended for memorization to those which foster the ability of students to analyze and synthesize material in the process of learning (Ocker and Yaverbaum 1999). Emerging from this transition is the prevalent use of collaborative learning, which can be defined as: "having an emphasis on student interactions rather than on learning as an individual or private activity," in which students "engage in their own knowledge construction by integrating

CONTINUED ON NEXT PAGE ▶

new information and knowledge networks into the learning community (Ku et. al. 2013)." Online collaborative learning is simply the computer-mediated version of traditional in-class collaborative learning (Ku et. al. 2013).

ASYNCHRONOUS AND SYNCHRONOUS ONLINE COMMUNICATION

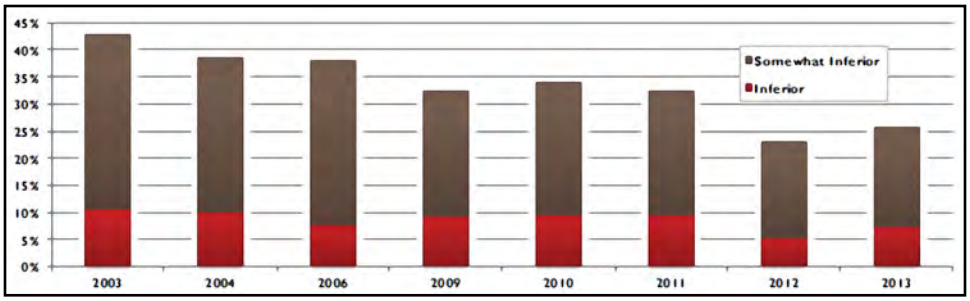
Asynchronous computer-mediated communication is "text-based discussion and interaction that allows participants to exchange ideas and information regardless of the time of day or the distance between users (Ocker and Yaverbaum 1999)." Discussion forums, message boards, and electronic mail are examples of this type of communication; which characterized the early stages of development in online learning.

Online synchronous communication is communication that occurs between group members at the same time, through video conferencing; a chat room; or teleconferencing. Though asynchronous transfers remain the most prevalent means of communication amongst online groups, as synchronous communication becomes more widely available it is quickly becoming an indispensable tool.

VIRTUAL TEAM

An extension of collaborative learning, the virtual team can be defined as: "a group of people who collaborate closely even though they are separated by space (including national boundaries), time, and organizational barriers (Szewc 2013). Though this term is more commonly used to describe teams working in a business environment, it appropriately represents the group of online students from GBC in their endeavor at the 2016 National Society of Professional Surveyors (NSPS) Student Competition.

Figure 1: Proportion Reporting Learning Outcomes in Online Education as Inferior to Face-to-Face (2003 - 2013)



(Allen and Seaman 2014)

2.2 DEMOGRAPHICS IN ONLINE EDUCATION – BABSON SURVEY RESEARCH GROUP REPORTS

The Babson Survey Research Group has been conducting studies on the nature and extent of online education in the United States since 2002. These studies ask the same questions year after year, using responses from over 2,800 colleges and universities to track the evolution of online learning. As previously noted, the growth rate of students enrolled in online courses has exceeded that of overall higher education every year of the survey.

PERCEPTIONS WITHIN THE ACADEMIC COMMUNITY

While online education has overcome many barriers that were present at its inception, there remain widely-held opinions within the academic community that construe this educational format as inferior to the traditional classroom experience (see Figure 1). It is interesting to note that even as technology has vastly improved both synchronous and asynchronous communication capabilities for online students, educators still perceive online learning as inadequate in some regards.

Major concerns linked with online education are: lower student retention rates, the need for increased student motivation, the lack of acceptance of online degrees by potential employers, a lack of faculty acceptance, and the increased time and effort required from faculty to teach an online course (Allen and Seaman 2013). The Babson survey has found that the percentage of academic leaders reporting that they agree with the above statements has increased from previous years.

2.3 ONLINE GROUP COLLABORATION FACTORS OVERVIEW

Earlier research exploring student success factors related to asynchronous online group collaboration in comparison to a face-to-face (ftf) collaborations emphasizes the lack of quality among the interactions in the online groups (Curtis and Lawson 2001) (Ocker and Yaverbaum 1999). Most notably, the studies show that, in general, students are less satisfied with the group interaction process and the quality of group discussions in an asynchronous learning environment than those encountered in a ftf setting (Ocker and Yaverbaum 1999). Contributing to this decreased quality of discussion are components such as: a lack of challenge and explain cycles, time between responses, a lack of comfort candidly engaging with unfamiliar people, unfamiliarity with the technology, and lack of social cues (Curtis and Lawson 2001)(Ocker and Yaverbaum 1999). Consistently, groups engaged in asynchronous online collaborative learning studies have demonstrated the need for synchronous communication to mitigate these factors.

On the other hand, it is well-reported throughout the literature that asynchronous computer- mediated collaboration is as effective as ftf collaboration in terms of learning and quality of the solution (Ocker and Yaverbaum 1999) (see Table 3). This could be due to the amount of time a student has to thoroughly think through and weigh their response when communicating asynchronously, but, perhaps at the sacrifice of the spontaneity found in ftf interactions (Ocker and Yaverbaum 1999)(Curtis and Lawson 2001). As the implementation of the virtual classroom becomes the standard platform for delivery of distance education, students are able to work synchronously or asynchronously at their choosing; thereby increasing the effectiveness of their communication (Szewc 2013).

Table 3: Means, Paired Differences, and Significance Levels for Dependent Variables

	FtF	Asynch	DF	Paired Differences Std. Deviation	Std. Error Mean	Significance (2-tailed)
Quiz scores	57.62	56.43	41	39.52	6.10	0.846
Solution quality	7.77	7.55	9	0.5584	0.1766	0.235
Content	15.60	16.10	9	9.2400	2.9200	0.868
Process satisfaction	4.15	3.80	42	0.9855	0.1503	0.023
Perceived discussion quality	4.12	3.66	42	0.9842	0.1501	0.004
Solution satisfaction	4.08	4.01	41	0.9624	0.1485	0.656

(Ocker and Yaverbaum 1999)

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A Modest Proposal: Nevada Association of Land Surveyors Professional Practices Committee

NALS President Carl C.de Baca, PLS

As a group of professionals, encouraging a high ethical standard of practice among ourselves and our peers should be one of our primary responsibilities. In the interest of education, the Nevada Association of Land Surveyors could and should play a role in investigating complaints of fellow professionals that arise from an apparent lack of knowledge of Nevada Revised Statutes and Nevada Administrative Code with respect to mapping and monumentation. If it is a simple matter of ignorance of the niceties of the law, then notifying offending practitioners as an effort to inform and educate may save someone a painful hearing before the Board of Engineers and Land Surveyors (BPELS). After all BPELS is about compliance with the law and if a letter from us brings about compliance, then that's a good thing, right?

At first glance this may seem like a heavy-handed self-policing proposal, but that is not what I am saying. We are already required by law to contact a surveyor with whom we have a disagreement. This is only a continuation of that logic. Let's say you find a fellow surveyor's monuments that were obviously set to re-monument missing corners of a parcel, (or better yet, an unmapped tract of land), but there is no record map showing those monuments. Or, let's say you are retracing a record map and you aren't finding any evidence of monuments having ever been set. Of course, you will call the surveyor, as required by law, but what happens when that person is vague or unresponsive, or worse, belligerent? It's a big step to turn someone in to the board, but think about this: if you know about a violation and you don't report it to the board, you are guilty of a violation yourself. This proposal offers a third way, between ignoring the violation (at your peril) or turning the surveyor in to the board.

It would not be NALS' intent to usurp the authority of the Nevada State Board of Professional Engineers and Land Surveyors, but merely to augment awareness of laws and standards of practice and to encourage our peers to follow the laws and rules that govern our profession within the State of Nevada. We would hope to intercept a large number of complaints against survey practitioners and resolve the issues in these complaints before they reach the level of civil or criminal investigation and prosecution.

I therefore propose that NALS create a Professional Practice Committee. If you read the minutes of the board meetings, you will recall that earlier this year I established an ad hoc committee to work out whether this makes sense to establish in Nevada. Based on guidelines provided from a neighboring state that successfully employs a PPC, we have assembled a simple outline of how the committee would operate, how it would be assembled and what it's mission and limitations would be. The voting members would be elected by the NALS Board. The committee should have non-voting county surveyor members selected from across the state. A process would be developed for receiving a complaint, investigating the facts of the complaint and if upon majority vote, the committee deems a surveyor to have committed an infraction, the committee would write the person a letter indicating that a complaint and review have been performed, and citing the law that needs to be complied with. If that letter is ignored or rejected, the complaint would be turned over to NVBPELS. If the recipient of the letter recognizes the letter as solid advice and complies, the matter ends right there.

Subjective issues having no clearly identifiable determination, such as competence, proper survey control methods used, and other such matters would under no circumstances be within the purview of the Committee. The Committee would under no circumstances undertake any investigation that would require itself or its members to render an official opinion as to the proper establishment of any title interest or boundary line. In a word – no "witch hunts".

I would anticipate discussion of this proposal at the chapter level and I would expect that some of you would like to express an opinion on this topic by writing the Traverse. I absolutely encourage you to do so and look forward to hearing from you. Perhaps in the next edition of the Traverse, the editor will consider publishing the aforementioned outline, which should be more refined by then. ⊗

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Online Collaborative Learning... continued from page 11

TEAM DYNAMICS

A key component of collaborative learning is the study of how teams "evolve norms and achieve goals mutually;" a concept that has been grouped under the umbrella category of team dynamics (Ku et. al. 2013). Within the team dynamic umbrella there are generally four categories of which it is composed: communication, collaboration, trust, and cohesion (Ku et.al. 2013).

TEAM ACQUAINTANCE

Familiarity among team members has a significant impact upon group processes. According to Janssen et. al. 2009, increased familiarity between team members may help " group members to progress more quickly through the stages of group development, and may lead to higher group cohesion." Results of the Janssen et. al. 2009 study found that increased familiarity led to more critical and exploratory group norm perceptions, more positive perceptions of the collaboration process, had an impact on collaborative activities, and, surprisingly, had no effect upon group performance. However, familiarity led to a more enjoyable collaborative experience among team members and should be considered in the formation of virtual teams (Janssen et. al. 2009).

TEAM EFFICIENCY

Because a high percentage of online students are gainfully employed and may be raising a family as well, their time is often divided between these responsibilities. Resultantly, a team efficiency collaboration factor that considered these unique circumstances was created and used in the analysis. The main component of this factor is time use, and its inclusion in the statistical analysis is provided to gain an understanding of how online team members view the quality of collaborating online through their impressions of the effectiveness of the way their time was applied for the project.

STUDY AREA

The study took place in four phases: active participation in an online team collaborating to produce deliverables for a national student competition, holding interviews with various student teams at the physical competition site, analyzing data, and carrying out extensive literature research online.

Figure 2: Students at the 2016 NSPS Competition

During the first phase of the study, several varying mechanisms were used in concert to ensure the group possessed the ability to connect with each other in a meaningful manner. Firstly, integral to the functionality of the team, was the utilization of an online document sharing program, Dropbox. This allowed each member to make and save changes to project components in real time so that other members of the group could have immediate access to the updated documents, computer-aided drafting (CAD) files, spreadsheets, and PowerPoint presentations. Furthermore, the team held several crucial synchronous meetings using both the Cranium Café and conferencing features of Web Campus (a full-service online portal providing access to a host of essential tools for online learners). Communication via electronic-mail (e-mail) was the most heavily-relied upon method of information transmittal between members, while communication via the telephone was used sparsely in comparison.

The second phase of the study took place at the 2016 NSPS Student Competition held on March 14 in Alexandria, Virginia (see Figure 2).

Here, paper forms were distributed to various student teams who took part in the competition which requested information related to the nature of their education and aspects of their team dynamic (see Figure 3). In addition, personal interviews were held with a number of students and their college advisors to provide supplemental information not listed on the forms. Lastly, an online survey was distributed via Google Docs to members of the GBC Team for use in a statistical analysis. Both the first and second phases of the study were experienced first-hand by the author, shaping the direction of the literature analysis and development of study questions.

Data analysis, the third phase, was performed using a spreadsheet program (Microsoft Excel) and an HP35s Scientific Calculator. The fourth phase was arried out using an online search engine (Google Scholar), as well as online databases containing scholarly journals and articles (ScienceDirect and Elsevier) throughout the course of the study.

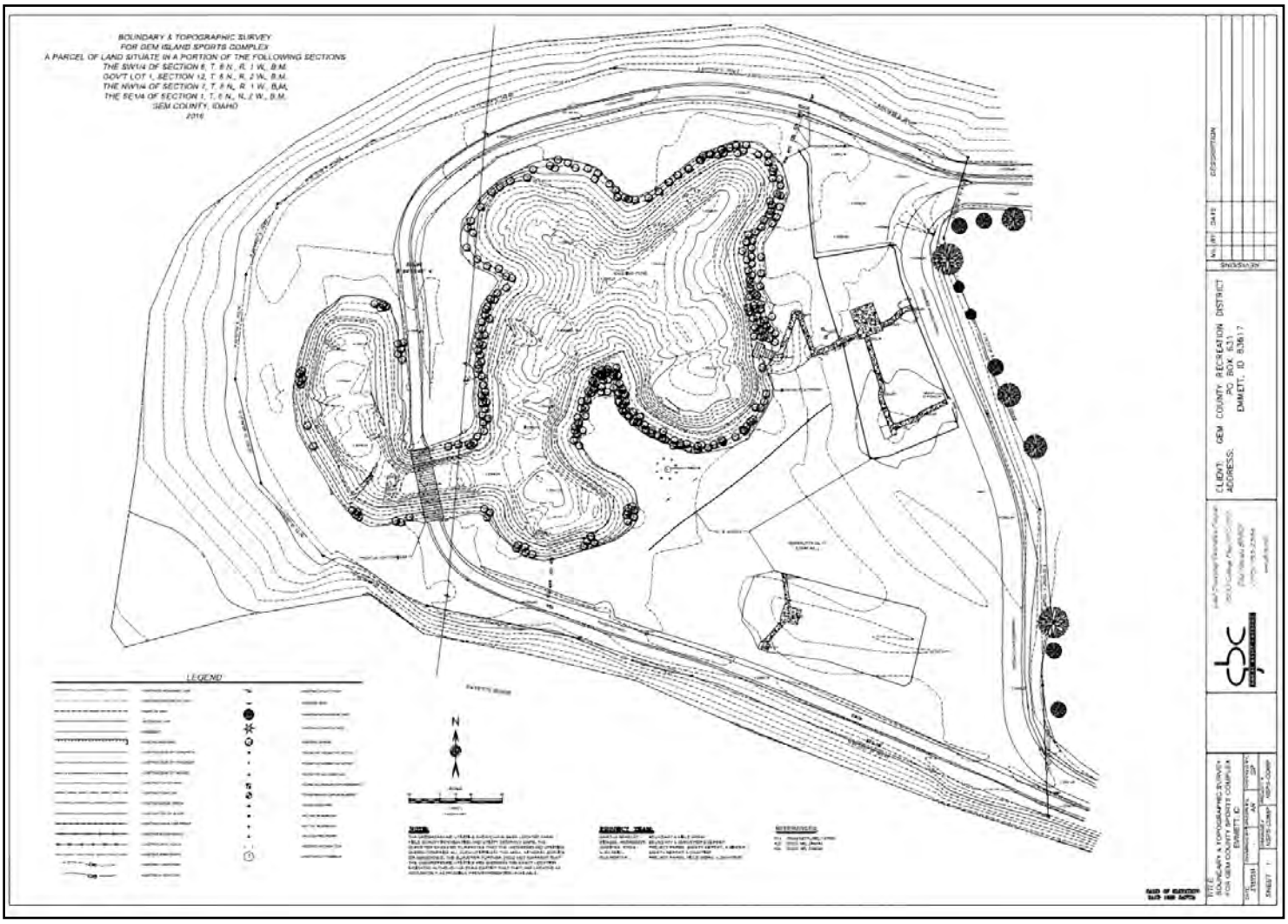
METHODS

4.1 RESEARCH QUESTIONS

Exploratory in nature, this study seeks to add to the current knowledge base insightful information relating three collaboration factors to the success of an online team project from a participatory perspective. The exclusiveness of this work lends itself to several circumstances: direct, blind participation by the author; lack of instructor support to the student team; and outcomes derived from those who had no knowledge of the study. No study was found in which the author directly participated in the collaborative project, though at the time of participation was not aware that they were part of a research effort. Moreover, instructor support has been found to be an important part of team success and was absent in this study (Ku et. al. 2013). Finally, the outcomes for each team were deliberated by judges who were not aware of the work. The major part of this study asks: (1) "How does the outcome of a group collaboration in a competition relate to the processes of teamwork experienced by the

CONTINUED ON NEXT PAGE ▶

Figure 3: Final Plat prepared by the GBC Team



author and reported by students for teams working online and traditionally?," and (2) "Do the final products of online group collaborations lack the quality of those produced by ftf group collaborations?"

4.2 SUBJECTS

Participants in the study were students enrolled in land surveying and geomatics programs at universities from across the United States. These students chose to submit a group project for consideration at the 2016 NSPS Student Competition. Both four-year and two-year degree programs were present at the competition. Four-year degree schools included: University of Akron, Great Basin College, Kennesaw State University, California State University at Fresno, New Jersey Institute of Technology, New Mexico State University, and St. Cloud University; while two-year degree schools included Dunwoody College of Technology and Central New Mexico Community College.

4.3 STRUCTURE OF NSPS COMPETITION

Being that the NSPS competition is designed as a student competition, little to no instructor input was permitted with the hopes that the deliverables would be direct representations of students' efforts. Each team was required to produce a large-scale boundary/topographic map (see Figure 3) that met NSPS Model Standards, a Project Binder that included: a Safety Report, all project documentation, a scientific paper describing the project, and a Surveyor's Report. The final products were to be presented to the judges as if they were clients receiving a briefing from their hired surveying firm. These items were submitted prior to the commencement of the competition where the teams met, gave oral presentations, and received awards. Judges for the student competition were highly-regarded professionals in the field of land surveying, and many own a successful land surveying company. The results from the competition were used to compare collaboration factors with team success.

4.4 DATA COLLECTION

Student perceptions about their collaborative experience working on the NSPS competition project were captured verbally through interview as well as a written survey. The questions on the survey were a combination of open-ended and multiple choice, with the goal of obtaining a clear view of their team dynamic and learning environment.

A Likert scale survey was also distributed to the members of the Great Basin College team that was loaded with three collaboration factors (team dynamics, team acquaintance, and team efficiency) and used in the analysis. The results of this analysis (performed in the manner of Hu et. al. 2013) will show the relationships between the collaboration factors and teamwork satisfaction.

CONTINUED ON PAGE 26 ▶

NSPS Report

by Paul Burn, NALS NSPS Director

Fall Business Meetings - Chandler, AZ
The NSPS Board of Director's Fall Business Meetings were held at the Wild Horse Pass Casino & Conference Center in Chandler, AZ on Wednesday, September 28, 2016, through Saturday, October 1, 2016.

ALTA/NSPS Survey Committee
The committee discussed many issues that have arisen from the adoption of the 2016 Standards. This will be the main content of discussions going forward, along with additional comments received as time goes on, in preparation for the Standards of 2021. It was encouraged to have as many comments as possible sent in, so that all opinions can be considered.

Western States Director's Council
Old business was discussed first at this meeting, including a possible new motion for BOD for discretionary funds to provide the NSPS chair, or local Director, attend the WFPS meetings (3 per year) as a guest. Westfed was present at this meeting, and gave a brief report on their activities. Also, a report on the current state of the BLM procedures in Alaska was given.
President-Elect Jan Fokens addressed the group, and requested that each state society consider a donation of $1,000 to the PAC of NSPS, for the lobbying effort consistently put forth by the Government Affairs Committee and lobbyist J.B. Byrd.

Highlights of the NSPS Board of Director's Meeting
Executive Director Curtis W. Sumner spoke on the following topics:

- Plaque remembering Malcolm Shaw commissioned by Director Akins (OH) and will be presented to Malcolm's family by Director Brooks (NY)
- NSPS Young Surveyors are now affiliates via signed MOU
- U.S. Institute of Building Documentation (USIBD) seeking MOU w/ NSPS
- Draft language created for Alaska DPPS
- International Property Measurement Standards seeking MOU w/ NSPS
- heroX is offering $100K prize for replacement of ALTA/NSPS Land Title Survey
- Membership Poll – majority would like to have CEU's available at national meetings
- Staff is working on a database of speakers for national/state/chapter use.
- Dan Muth, APLS Chairman, spoke regarding efforts from legislative groups to deregulate professional licenses.
- The National Association of Realtors rejected the NSPS request to add suggested language to their Code of Ethics.
- Workforce Development is a main concentration of staff.
- NSPS is now the lead organization behind "Future of Surveying Taskforce" originally introduced by NCEES.

- Bylaws and Resolutions Committee Chair Jan Fokens asked that members forward all educational programs consider creating a student chapter.
- Geodetic Surveyor Certification Committee Chair Mike Dennis reported the group is moving forward and is looking to broaden the certification beyond strictly surveyors.
- Certified Survey Technician Chair Art Haase provided the following details:
- CST applicants up 40%
- two new Board Members (Rambeau & Burch)
- Updating tests to reflect new technology

Education Committee Chair Andrew E. Sturgeon reported on good attendance at the committee meeting and getting good ideas for new directions to entice participation. There has been a good deal of conversation regarding 4 year degrees in surveying and the difficulty many have in obtaining them due to life circumstances and the lack of a program in their area. Great Basin Community College in Nevada is currently offering a 4-year degree in surveying online which many may find interesting and beneficial.

Student Competition Chair Rich Vannozzi shared the theme of the 2017 contest – "High Precision Vertical Control Application" and will be held on Monday, March 13 in Silver Springs, MD during the Spring Business Meetings.

External Affairs Committee Chair Patrick J. Beehler reported that very few committees reported activity and would appreciate more effort by membership.

Government Affairs Committee Chair Patrick A. Smith offered these items:

- Ongoing correspondence w/ USDOL on Davis/Bacon memo reversal
- Continuing to seek legislators for utility location legislation
- UAS legislation w/ FAA Re-Authorization
- Water Resource Development Act (WRDA)
- Creation of the Political Legislation Action Taskforce (PLAT)
- PAC will require additional funding for continued support of legislators
- NAD22 Datum Sample Legislation now available from NGS

Nominations and Elections Committee Chair Jon Warren stated a slate of candidates will be introduced as a motion later in the meeting.

NSPS Political Action Committee Thomas W. Brooks, Jr. requested that every member consider making a contribution to the PAC in order to sufficiently fund the efforts of our GA Committee.

Public Relations Committee Chair Lisa Van Horn provided a short presentation on the efforts of the committee, new materials available for directors to utilize at meetings and contests aimed at promoting the profession.

Young Surveyors Committee Chair Amanda Askren thanked the Board for completing the MOU signed prior to this meeting and provided a short presentation on the progress of the group.

NSPS Foundation Chair Joe Dolan encouraged the Board to donate to specific funds and promote scholarships to all

students. He also reported the 2016 scholarship winners will be announced within the following week.

UNFINISHED BUSINESS
ALTA/NSPS Certificate Chair Paul Burn reported the committee is active and using the CST and hydrographic certification program as a template. Be aware that News and Views often has question and answer section on the ALTA/NSPS Standards, moderated by Gary Kent. Mr. Kent has entertained many questions on survey requests to perform an update. Look for his response in News and Views in the near future. During the committee meeting is was noted that the 2016 standards have addressed a lot of questions and the committee members have been please with them.

F.I.G. 2022 Chair John D. Hohol reported that he and Curt visited Orlando to meet with a conference planner for the proposed Congress. The formal bid will be finalized and made in 2018.

The official adoption of the three-day meeting schedule was accepted by the Board with further emphasis to be made on committees.

NEW BUSINESS
- Motion – Ascension of Vice President to President-Elect
- Motion – Nominations for NSPS 2017 Elections
- Motion – Policy on Elections
- Motion – Policy on Affiliation with NSPS
- Motion – National Surveyor's Week
- Motion – Public Relations Photo Contest
- Motion – NSPS/AAGS Minimum Standard GNSS Survey
- Motion – "Be A Surveyor" Website Administration Duties

The following committees provided written reports prior to the meeting (See NSPS website):
- Professional Practice
- Standards Committee
- Certified Hydrographic Surveyor

KEY DIRECTOR BALLOT & PREVIOUS AWARD
The 2016 Spring NSPS Business Meeting Key Director was presented to Lisa Van Horn.

The recipient for the 2016 Fall Business Meeting Key Director by written vote is Rick Howard.

The Next NSPS meeting will be held March 17, 2017 @ 9:00am In Silver Springs, MD

Western Federation of Professional Surveyors
All western states gave reports on their state's activities, very comprehensively, creating good discussions.

During the West Fed meeting Ray Mathe, representative from CA, mentioned new test/review during license renewal. The licenses would be required to review various surveying issues during online renewal and be quizzed at the end of the presentation. The format is such that if the licensee answers a question incorrectly, they are guided towards the right answer in review. In other words, everyone passes, but has to go through the informative session to complete their renewal. It seems like a great way to instill knowledge and raise the overall level of the profession, which is ultimately what we are all striving for in representing all surveyors throughout the country. Let us not forget the big picture as we meet and discuss the individual issues. ⊗

CANDIDATE FOR VICE PRESIDENT NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS


Carl R. C.de Baca PLS

Carl is a Professional Land Surveyor licensed in Nevada (1987) and California (1988) and currently serves as the President of the Nevada Association of Land Surveyors. His professional career has been very broad-based, acting as Director of Surveying for a large multi-discipline firm specializing, in Land Development, Director of Surveying for another multi-discipline firm specializing in public works and owning and managing his own small business for the last eleven years before recently relocating to Reno, Nevada and joining the firm of Lumos and Associates. Carl has served the profession by being actively involved in the **California Land Surveyors Association**, **Nevada Association of Land Surveyors** and the **National Society of Professional Land Surveyors** for over twenty years. During that time he has served CLSA as a Board of Directors member, Chapter President, Chapter Newsletter Editor, Liaison to the Board of Professional Engineers and Land Surveyors, Editor of the California Surveyor magazine, State Treasurer, State Secretary and NSPS Governor. He has served NALS as Chapter President, Advanced Education Chair, Publications Chair, Editor of the Nevada Traverse magazine, State Treasurer, State Secretary, State President-elect and State President. He has served NSPS as Area 9 Director representing **Nevada, California and Hawaii** for two terms, Chair of the Mines and Minerals Committee, Chair of the NAFTA MRD Review Committee, Chair of the UAV Committee and serves as a Trustee on the **NSPS Foundation**. He is the recipient of the CLSA Distinguished Service Award, the NALS Surveyor of the Year Award and the NALS Article of the Year Award. Carl has served Great Basin College as an Adjunct Professor in their Land Survey Geomatics program and serves on the school's curriculum advisory committee. He has authored numerous articles for the California Surveyor and Nevada Traverse magazines and one noteworthy open letter in the April 6, 2016 NSPS News and Views.

REPRESENTING A FRESH WAY OF THINKING ABOUT LEADERSHIP

WFPS Report

by Nancy Almanzan, WFPS Delegate

The Western Federation of Professional Surveyors (WFPS) held a Board of Directors meeting on October 1, 2016 at the Wild Horse Pass Hotel in Phoenix, AZ. Delegates from 12 western states were in attendance.

WFPS areas of focus:

Developing and Maintaining Programs to Promote the Profession
WFPS is committed to promoting the land surveying profession. To that end, WFPS is currently developing the following programs:

- **Youth Outreach – Land Surveying as a Career**
  - ✓ WFPS has budgeted funds to develop an after school/community program. The program will include 10 hours of curriculum that can be used by state associations and their chapters to promote land surveying as a career. The initial outline of the program is complete. **If you are interested in serving on the committee that is developing this program, please contact the WFPS Executive Office at (707) 578-1130 or admin@wfps.org**.
  - ✓ Continuance of the Teaching with Spatial Technology (TwiST) program which provides teachers with resources to promote land surveying within their classroom. All state associations are welcome to participate in this annual event. The 2017 TwiST program will be held the third week in June. **All state associations are welcome to sponsor teachers to this training.**
- **Public Awareness – Elevator Pitch Contest**
  - ✓ The winner of the Elevator Pitch Contest was Richard Heieren of Alaska. Richard generously donated the reward to the WFPS Scholarship fund.
  - ✓ WFPS will be writing an article which will include several of the submissions received. The article will be disseminated to the state associations and can be used on their website or magazine.

Providing Resources to Benefit State Associations
WFPS is dedicated to providing resources to state associations. Following are a few of the resources currently being developed:

1. **Speakers Bureau**

   This new resource developed by WFPS will provide state associations the ability to search for a speaker by name, geographic location, or by topic. The database will include a photo of the speaker, a bio, price range, and testimonials. The search engine is available on the WFPS website – WFPS.org State associations are encouraged to submit recommendations for the speakers bureau.

2. **Quarterly Book Reviews**

Looking for content for your magazine or newsletter? WFPS will be providing a quarterly book review that state associations can publish. Book reviews will be provided this month to the state associations.

3. **Webinars**

   WFPS is developing a webinar program to provide educational opportunities and a service to the western state surveying associations. This program will provide the western state associations non-dues revenue and an opportunity to provide a valuable service to their members. More information regarding this program will be available in the coming months.

NEW! WFPS Website
WFPS has launched a new website. Visit us today! WFPS.org

⊗

About WFPS

The Western Federation of Professional Surveyors (WFPS) was formed in 1979. The Board of Directors includes two delegates from each of the 13 western states. WFPS serves as a regional voice for Land Surveyors and meets quarterly to discuss practice issues affecting western state surveyors. For more information about WFPS and the state associations, visit WFPS.org

WFPS Executive Office
T. (707) 578-1130 F. (707) 578-4406
admin@wfps.org

Lahontan Chapter Report

by Greg Phillips, PLS, President

The Lahontan Chapter is back in the swing of monthly meetings after a busy summer. We are currently seeking nominations for 2017 board members. While participation in general membership meetings seems to be increasing, it is challenging to find new talent that is able to serve. Below is a list of past and upcoming activity for 2016.

Past Activity

Summer Picnic: This was held for the 2nd year at Bowers Mansion in Washoe Valley on June 24th. David Crook and Bob LaRiviere did a fantastic job coordinating the food and fun as usual. There were a couple of pony kegs of great local beer from Great Basin Brewery. Monsen helped with the surveyor's games which is greatly appreciated. It was a hot day so having the pavilion under the big cottonwoods and the swimming pool next door made it a great afternoon.

Due to lack of participation the last couple of years combined with the effort it takes to put this on, we are contemplating shelving this activity for the next year or two. Please reach out to a Lahontan Board member if you have any suggestions to improve this event, or if you think we should focus our time in a different direction.

Golf Tournament: Our 20th annual golf tournament for the Chapter was held on July 29th at Red Hawk Golf Club. Kevin German, with the assistance of his wife Kimberly, and Halana Salazar knocked it out of the park this year. Cool swag including great shirts came with the golf that finished with a delicious awards dinner. We had over 60 players and netted approximately $1600 for the Chapter and future scholarships. I hope we can get the same group to continue to serve on the committee for this activity in the future.

September Meeting: First meeting of the fall was held at the Twisted Fork on September 7th. Local title officer, Bill Bernard, came to talk with the group about title issues and how they relate to our profession. Many of us have worked with Bill over the years and he is a true friend to our profession and organization. His new company, Reliant Title, was a corporate sponsor for our golf tournament. Let's make sure we return the favor when you are in need of title services.

Future Activity

October Meeting: October 12, at the Twisted Fork, speaker will be Pat Tami, P.L.S., president-elect for the NCEES

Fall Workshop: November 4th, at the AGC Building in Reno. Gary Kent will be giving and 8 hour workshop on the 2016 ALTA/ NSPS Land Title Survey updates.

November Meeting: November 9th' at the Silver Legacy. This will be a Meet & Greet with the NV-BPELS and their new Executive Director, Patty Mamola, P.E.

Holiday Party: December 1, at Pinocchio's in Reno. There will be a great dinner with gift exchange games and a magician/comedian performing. Look for and Evite soon, space will be limited. ⊗

Great Basin Chapter Report

by Christopher S. Konakis, PLS, WRS, President

PAST ACTIVITIES

June Meeting: Canceled due to scheduling issues.

July Meeting: July 11, 2016 at the Gold Dust West Casino, Elko, NV; 3 members present.

August Meeting: August 8, 2016 at the Gold Dust West Casino, Elko, NV; 4 members present.

September Meeting: Septem
ber 12, 2016 at the Gold Dust West Casino, Elko, NV; 3 members present.

PLANNED ACTIVITIES

October Meeting: October 17, 2016 at the Gold Dust West Casino, Elko, NV.

November Meeting: November 14, 2016 at the Gold Dust West Casino, Elko, NV.

December Meeting: Christmas Party – Location TBD.

FUTURE ACTIVITIES

Summer 2017: The Great Basin Chapter plans on monumenting the geographical center of Nevada in a joint activity with Great Basin College. Currently the activity is still in the planning stage but the chapter may request some resources from the state this upcoming year. ⊗

The Power of Ideas... continued from page 8

nothing for granted. They insisted on having two Spanish naval officers, knowledgeable in navigation and astronomy, participate in the expedition. And the French could travel only on Spanish ships in and out of Peru. The Viceroyalty of Peru was Spain's extraordinarily rich cash cow; they were not about to turn the Frenchmen loose amongst all that treasure, or to use the survey as a cover for the smuggling of contraband.

Chosen to participate with the French was Jorge Juan y Santacilia, only twenty-one but already a brilliant mathematician. He entered the Academy of Navy Guards at sixteen, but his studies were interrupted by war with the Ottoman Turks. Wounded in action, he returned to the Academy, completed his studies and entered a promising career as a Navy officer. He was bright, detail-oriented and personally brave.

Jorge Juan's colleague was Antonio de Ulloa y de la Torre-Guiral. He too entered the Academy of Navy Guards at a young age and saw combat in Spain's 1734 war with Austria. Talented and quick-witted, Ulloa was a perfect counterbalance for the methodical Juan. The fact that this mission was essentially a land survey was of no consequence to the Spaniards. In the end, the results would benefit their Navy. These two capable men came on as official envoys for the King of Spain and expected to participate fully in the survey.

Like so many things in life, the whole point of the expedition seemed uncomplicated. The team imagined they would need three to four years to complete an otherwise straightforward triangulation survey, including a year making the round trip to and from Peru. They expected to deal with the heat at the Equator but they were confident they could complete the mission without great hardship.

In fact, the French academicians were completely unfamiliar with the conditions in Colonial Peru. Paris is situated 115 feet above the sea; Quito sits at 9350 feet. The cordilleras of the Andes tower far above that. Too, they were utterly unaware of the vast cultural gulf between Enlightenment Europe and the colonies of South American. Further, these same academicians suffered no lack of ego, a trait that would hinder and ultimately injure them in many ways. But all that lay ahead. First they had to endure the Atlantic crossing. ⊗

End of Part I

(Endnotes)

[1]For his surveys Picard used the *Toise du Grand Châtelet*, a unit of linear measure equal to 1.949 meters, or 6.395 English feet. Other values of the *toise* evolved over time.

[2]In 1670 Richer sailed to French Canada, in part to test viability of two pendulum clocks, crafted by Christiaan Huygens, for use in marine navigation. Both clocks stopped running during a heavy storm at sea, ending the test in failure.

[3]*Oeuvres complètes de Christiaan Huygens*, VII (The Hague, 1888–1950), 54–55.

[4]Jim R. Smith, *The Meridian Arc Measurement in Peru 1735-1747* (Washington, D.C., FIG XXII International Congress, 2002) page 2.

[5]Prior to the creation of the metric system (based on the extension of Picard and Cassini's triangulation) there were proposals to make a standard unit of length based on the pendulum. Mouton (1670), Picard (1671) and Huygens (1673) all proposed a universal foot defined as 1/3 of a seconds pendulum's length, and a "universal *toise*" as 2/3 the pendulum's length, as a world wide standard length of measurement. The concept was pursued even after Richer's work seemed to dim hopes for that.

[6]In 2012, the International Astronomical Union redefined the Astronomical Unit abandoning the former complex calculation and adopting a single number: 149,597,870,700 meters, no more, no less.

[7]Kepler: The square of the orbital period of a planet is directly proportional to the cube of the semi-major axis of its orbit.

[8]In January 1681 Newton responded in writing to Bishop Burnet, who inquired with Newton as to the exact shape of the Earth. See *Robert Hooke and the English Renaissance*, by Paul Welberry Kent and Allan Chapman, 2005, Page 80. Hooke also claimed priority for the inverse square law for gravity. He was also involved with a controversy with Huygens regarding priority on inventing the balance spring mechanism for clocks.

[9]Martin Beech, *The Pendulum Paradigm: Variations on a Theme and the Measure of Heaven and Earth*, (Boca Raton, Brown Walker Press, 2014) page 121.

[10]Descartes avoided rigorous mathematical explanations for his views, writing instead that the Earth, Moon and planets were awash in an invisible, cosmic scale medium he called "ether", which God had set in a circular motion at the Creation. Descartes' reasoning seemed to satisfy, both in terms of perceived celestial mechanics as well as theologically.

[11]Spain's New World colonies changed names as the territorial boundaries were shifted to accommodate more efficient administration. The Viceroyalty of Peru was later subdivided into the Viceroyalties of Granada and Peru. The location of France's "Peruvian " expedition is located in today's Ecuador.

[12]Bouguer is known today for, among many other talents, his extensive work on atmospheric refraction, the study of photometry, and he is regarded as the "father of naval architecture".

[13]Geodesic and geodetic are not interchangeable. Geodesic refers to the shortest possible straight line applied to a curved surface. Geodetic refers to geodesy, or that branch of applied sciences dealing with measurement and shape of the earth.

[14]In 1720, Verguin and the French Jesuit Laval conducted a survey of French Louisiana and the Caribbean, as well as a large-scale hydrographic survey of the Mississippi Delta. In 1731 Verguin was cartographer with the French fleet conducting punitive raids on the Barbary Pirates, preparing detailed maps for the Navy.

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Online Collaborative Learning... continued from page 19

4.5 DATA ANALYSIS

Firstly, results from the NSPS Student Competition were analyzed and compared with data collected during the interview process to determine if ftf collaborations resulted in a more successful product than that delivered by online teams. Secondly, the student attitude survey results were ranked according to their mean scores; variances and standard deviations were computed. From this data, information about the various team collaboration factors can be extracted and used to gain a general idea of their roles in online group collaborations.

RESULTS

5.1 NSPS COMPETITION RESULTS

Results from the four-year degree program division are as follows: First Place – University of Akron, Second Place – Great Basin College, Third Place – Kennesaw State University, Honorable Mentions – University of California at Fresno; New Jersey Institute of Technology; New Mexico State University; and St. Cloud University. Results from the two-year degree program are as follows: First Place – Dunwoody College of Technology and Second Place – Central New Mexico Community College.

Course offerings in the respective departments of the surveying majors at the different universities varied from online only to online or traditional to traditional only (see Table 4). Of those schools that offered the choice between delivery methods, two offered only one surveying course in this category. One university, St. Cloud, offers all surveying-specific courses online but requires an A.S. in a related field from a program that is recognized by the university prior to being admitted to the land surveying program. Great Basin College is the only institution to offer a land surveying degree fully online, while Dunwoody College offers only traditional survey courses. Not all schools that offer both the online and traditional version of surveying courses are fully online; many are blended or hybrid courses.

Table 4: Course Offerings by Institution

Survey Courses Offered	Online	Online and Traditionally	Traditionally
School Name			
4 - Year Programs			
Univeristy of Akron		X	
Great Basin College	X		
Kennesaw State		X	
University of CA - Fresno		X	
New Jersey Institute of Technology			X
New Mexico State University		X	
St. Cloud Univserity	X	X	
2 - Year Programs			
Dunwoody College			X
Central New Mexico Community College		X	

5.2 STUDENT ATTITUDE SURVEY

Due to the small sample size (n = 4), the student attitude survey is not representative of the online student population in general; however, it can be argued that it is representative of those students who are enrolled in online courses to earn a B.A.S. in the field of Land Surveying and Geomatics. The top-ranking statement (see Table 5), "My team members share their professional expertise," was loaded into the team acquaintance factor. The highest-scoring statements were those that represented the team acquaintance and team dynamics factors, while the lowest-scoring statements were those loaded into the team efficiency factor. Interestingly, those statements which scored the lowest also had some of the greater standard deviation values. The overall mean of 4.17 (out of 5) indicates that the three factors are positively correlated with team satisfaction.

ANALYSIS

The results from the NSPS Student Competition revealed that online teams were just as successful as those teams working in a ftf collaboration. Furthermore, the most commonly reported strengths and weaknesses described by the ftf teams were similar to those reported by the online team. Frequently reported as some of the biggest challenges faced by the teams were: securing funding, working out times to meet, and field work logistics. While the first two items were also shared by the online group, the third was not. Most likely due to the format of the competition, the online team had an advantage over the other teams in completing the field work for the project. Because the team was limited geographically, only those members who were within close proximity to one another were able to perform the field work. This greatly decreased the strain on the team to find both the ways and the means to get to the project site and perform field work, as only two of the members were involved in the process. Nonetheless, this advantage also created some disadvantages for the online team as the project progressed. Because only two members of the team executed the field work, the remaining members had to be thoroughly briefed by the field crew in order to fulfill their components of the project. This resulted in extensive email communications, as well as phone calls and meetings, to bring the rest of the team up to date on the project data collection process. Overall, it seems this did not have an effect on the final product, and the decreased logistical strain for field work processes may compensate for the increased time and effort that was necessary to bring all team members into the same understanding of the work that was done.

Another area in which the online team differed from the ftf teams was in meeting times and platforms. While the majority of ftf teams met once or twice every two weeks, the online team met less frequently. Furthermore, the ftf teams often held informal meetings, as many of the team members were enrolled in the same courses on-campus. None of the ftf teams held meetings using a virtual platform, while they did utilize the same online storage

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and communication options (Google Drive, DropBox, electronic mail, etc.) as the online team. Again, it seems that this variation in meeting frequencies and platforms did not affect the outcome of the project.

The student attitude survey shows that all three collaboration factors (team dynamics, team acquaintance, and team efficiency) all positively contributed to the teamwork satisfaction experienced by the online group. Communication and trust are among the most highly regarded variables on the survey, agreeing with previous studies which have shown that those variables increase team effectiveness (Ku et. al. 2013). Although teamwork satisfaction factors are well established for traditional teams, it would be interesting to present the same survey to those ftf teams in the competition and compare the results.

Table 5: Student Attitude Survey Scores

Survey	Items	Mean	SD	Rank
16	My team members share their professional expertise.	5.00	0.83	1
2	My team trusts each other and works toward the same goal.	4.75	0.58	2
5	My team members reply to all responses in a timely manner.	4.75	0.58	2
10	Communicating regularly with team members helps me to understand the project better.	4.75	0.58	2
11	My team members encourage open communication with each other.	4.75	0.58	2
12	My team members communicate in a courteous tone.	4.75	0.58	2
15	Getting to know one another in my team allows me to interact with my teammates more effectively.	4.75	0.58	2
9	My team is receiving feedback from each other.	4.50	0.33	8
3	My team members clearly know their roles during the collaboration.	4.25	0.08	9
8	My team has an efficient way to track the edition of documents.	4.25	0.08	9
1	My team develops clear collaborative patterns to increase team learning efficiency.	4.00	0.17	10
4	My team sets clear goals and establishes a working norm.	4.00	0.17	10
6	My team members communicate with each other frequently.	4.00	0.17	10
7	I trust each team member can complete his/her work on time.	3.75	0.42	13
13	My team members share culture information (i.e. personal beliefs, values, assumptions, opinions, etc.) to know each other better.	3.50	0.67	14
14	My team members share personal information (i.e. interests, hobbies, hours of availability, etc.) to know each other better.	3.50	0.67	14
17	Online collaboration is as efficient as face-to-face collaboration.	3.50	0.67	14
18	More time was spent exchanging ideas about the project, not working out logistics.	3.50	0.67	14
19	Working online as a team does not require more of my time than working in a face-to-face group.	3.00	1.17	19
Overall		4.17		

Research question (1): "How does the outcome of a group collaboration in a competition relate to the processes of teamwork experienced by the author and reported by students for teams working online and traditionally?" was answered through the results of the NSPS Student Competition and the student attitude survey. It appears that the online team had a positive collaborative experience and that the results of the group project were independent of the team style (online or traditional). Future work should further explore the teamwork efficiency factor, looking into the amount of time each student competition team spent of various pieces of the project.

Research question (2): "Do the final products of online group collaborations lack the quality of those produced by ftf group collaborations?" was clearly answered through the results of the NSPS Student Competition. No, the final products of online group collaborations do not lack the quality of those produced by ftf collaborations; in fact, they may be of a higher quality in several cases.

CONCLUSION

The NSPS Student Competition provides a comprehensive basis for comparing students who work collaboratively online and those who work traditionally. Results from the competition can be used to improve perceptions within the academic community regarding online education. As potential employers, the judges showed no hesitation towards acceptance of the online program at GBC and were impressed with what the team was able to achieve. Furthermore, faculty members from the competing schools were present at the competition and also showed a very positive reaction to the GBC program, which may lead to increased faculty acceptance of online programs. Lastly, the learning outcomes from an online program were shown not to be inferior to those of traditional methods, casting a doubtful shadow over this commonly-held belief.

7.1 STUDY LIMITATIONS

While this study presents an opportunity to increase positive perceptions of online education, it is limited in its size and scope. The study was performed on a very small number of participants involved in a very specific competition. The application of these results to the online learning community as a whole may not be wholly appropriate or representative. When taken in the context of its parameters, the study can be used to describe the status of online learning in the field of land surveying and geomatics.

Allen, Elaine I., and Jeff

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TrigStar Report

Congratulations Aaron Sun!

Aaron Sun

Nevada's 2016 Trig-Star Representative to the NSPS Trig-Star competition is a fantastic Freshman named Aaron Sun! Aaron (now a Sophomore) attends E.W. Clark High School in Las Vegas, a math 'magnet' school that has participated in the Trig-Star program for many years.

Aaron is a math enthusiast whose interests are in 'pure' math and math sciences. He has been participating in math competitions since he was in middle school. When Aaron is not hard at work in his math and other studies, he enjoys playing for the E.W. Clark soccer team and being a part of the Nevada State Champion Science Olympiad Program!

As a Freshman at E.W. Clark last school year, Aaron was eligible to participate in the 2016 NSPS Trig-Star Competition. Aaron earned the title of the Nevada Trig-Star by scoring the maximum points available in a time of 55minutes, 15 seconds. ***His great score and time propelled him to the National level, where he placed 3rd, earning the Richard E. Lomax National Trig-Star Award of $250!***

Aaron is proud of his accomplishments and said that he really appreciated this opportunity to participate. He stated that the Trig-Star Program changed his view of applied mathematics and how Trigonometry applies to different occupations and scenarios.

Aaron is planning to study Aeronautical Engineering or Astronomy at Cal-Tech to prepare himself for a career at JPL in California. We have no doubt that Aaron will do well in his future endeavors! ⊗

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Congratulations Russ Wonders!

Russ Wonders with the first place trophy in the annual mapping contest!

Every year at the November Past President's meeting of the Southern Chapter, a mapping contest is held. All members are invited to enter. After dinner, the Past Presidents judge the maps and declare the winner. This year that winner was Russ Wonders, P.L.S.

In the approximate ten-year history of this event, Russ has now won first place three times!

Thanks to Paul Burn for sending this in.

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