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REPORTS FROM THE FIELD



SCIENCE FOR MONKS

Science For Monks

Summary of Findings:
The Sera Jey Science Center Interviews

August 2018

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Reports From the Field:

Inverness Research supports the Science For Monks program through a process of “groundtruthing” where we help the program articulate its theory and intentions, and then make site visits to the field to check the congruence of theory and field realities. This report is part of a series of Reports From the Field where we ask senior researchers to write about their site visits sharing what they learn from their in-depth interviews, observations and discussions with monks and faculty. The reports are intended to maintain an informal tone and reflect the researcher’s impressions as well as the data they have gathered.

Background on this report

This document was written by Scott Stambach, a teacher, author, and senior researcher at Inverness Research. It chronicles a one-week exploration into the history, operations, and vision of the first ever monastic Science Center at Sera Jey Monastery in Bylakuppe. In addition to the center’s history, the report also shares the voices of the monastics and teachers who played a role in its creation and ongoing evolution.

I) A Brief History of the Sera Jey Science Center

On July 6, 2013, in celebration of His Holiness the Dalai Lama's 78th birthday, the first science center in the Tibetan monastic tradition was inaugurated at Sera Jey Monastery. This achievement was born of the fruit of over a decade of collaborations between the Tibetan government in exile, the Tibetan monastic community, scientists, educators, and philanthropists.

This journey to an independent science center began in 1999, when His Holiness started exploring the possibility of Tibetan monks and nuns learning science in their monasteries. At his behest, the Tibetan Library in Dharmasala began translating scientific texts into Tibetan and searching for willing academic talent from the west to hold workshops. In 2000, the library found two science educators, Earl Carlyon and David Crismond, Ph.D., who offered to run a 4-week science workshop for 50 monk scholars. The results were promising and ultimately successful enough to inspire similar annual science workshops.

The early momentum of this project led to a partnership between the Sager Family Foundation and the Tibetan Library in 2001, which began funding annual science workshops and eventually turned into Science for Monks, an organization that could be dedicated to executing the Dalai Lama's vision by organizing western scientists and educators to run workshops. These workshops 1) teach foundational scientific concepts to the monks, 2) model progressive teaching strategies, 3) cultivate leadership qualities in the attendees, and 4) help build a sense of scientific identity and agency in the monastic community.

Around this time, other international organizations started making strides with their own visions and missions. The Swiss-based group Science Meets Dharma, for example, began sending volunteer teachers in 2001 to the monasteries to run science workshops around whatever scientific knowledge they felt proficient enough to teach. Most of these teachers (about 80%) did not have prior teaching experience, essentially making it a Teach for America-like model of monastic education. In 2008, Emory University got involved in the effort, designing curriculum, translating textbooks into Tibetan, and accepting Tibetan monks into a three-year science program called the Emory-Tibet Science Initiative (ETSI).

These efforts proved effective at infusing a culture of scientific thinking and curiosity into Tibetan monasteries. And yet, there was also a collective understanding among the monks themselves that if science was going to become an enduring part of their monastic culture, they were going to have to take ownership of their own science educations. And so with this insight,

the science leadership at Sera Jey Monastery made the decision to build a home for their own science program.

The initial undertaking was led by Geshe Nyima Tashe (one of the attendees of the first science workshop in 2000) and he did so with strong backing from the monastery's administration. The firm support was likely the combined result of encouragement from the Dalai Lama and the early success of existing science workshops, classes, and projects.

Initially, the science center (in 2008) was almost inconceivably humble, consisting of a small room (roughly 100 square feet) and a couple of shelves. Soon thereafter, Science for Monks donated 10,000 rupees (\$150) to populate it with tables and bookshelves. The first full-time Tibetan lay teacher wasn't hired until 2011 (with financial support through Science Meets Dharma.) In 2011, Science Meets Dharma stopped sending teachers to India, resulting in an overall pivot away from western teachers. This prompted the Science Center to rely exclusively on lay Tibetan and monastic teachers. Although student enrollment started out voluntary, the science center found it easy to find willing students and began with an initial class-size of 35-40 students. Science classes were taught in larger monastic classrooms while a formal designated Science Center was being built to support the program. The center's first university-trained monastic teachers, Ngawang Norbu and Thabke, started teaching in 2013 after returning from Emory University (2010-2013) where they received a formal science education in the first ETSI cohort.

In 2008, Science for Monks shifted focus from running content workshops to building a Science Leadership program with the mission of sharing progressive teaching techniques like inquiry and student-led instruction, cultivating confidence in writing and expression, and opening monks up to a diversity of opportunities to lead outside the realm of teaching and administrative work.

By the summer of 2013, Sera Jey Science Center was officially complete, and the center's leadership was handed over to Geshe Ngawang Norbu, who grew the community's first science center into a thriving educational institution with a docket of classes, projects, exhibitions, and research collaborations.

The inauguration of Sera Jey Science Center in 2013 paved the way for a succession of new science centers popping up throughout India.¹ As of the writing of this report (just five years

¹ It is important to clarify that the definition of "science center" can vary greatly from monastery to monastery. In some cases, a monastic science center can be as simple as a single classroom dedicated to all science education at

after the inauguration of Sera Jey) there are now approximately ten independent science centers up and running in the Tibetan monasteries throughout India. The following is a list of current science centers established in the various monastic centers of India.

Dharamsla

1. Sager Science Center, Library of Tibetan Works & Archives

Solan

1. Menri Monastery

Mundgod

1. Gaden Jantse Science Center
2. Gaden Shartse Science Center
3. Drepung Gomang Science Center
4. Drepung Loseling Science Center
5. Jangchup Choeling Nunnery

Hunsur

1. Dzongzar Choede Science Center

Byalkuppe

1. Sera Jey Science Center
2. Sera Mey Science Center
3. Tashi Lhunpo Science Center

II) How the Science Center Works

In the five years since its inauguration, the Sera Jey Science Center has evolved into a very active, multi-faceted, monk-directed organization. It is led by director Geshe Ngawang Norbu, an ambitious administrator who takes the Dalai Lama's vision for science education seriously and has made the science center his "passion project." Over the course of our interviews, Norbu revealed a combination of vision and assertive follow-through that can be rare among Tibetan monastics, who tend to fall on the side of humility and shyness. He is forthright about initiating projects and ideas that aren't necessarily fully cooked in order to make progress that

that monastery. This is the case with Menri, Jangchub Choeling, Dzongar Choede, and Tashi Lhunpo monasteries. At other sites, a science center is collection of rooms, spaces, people, and teams designated for teaching, inquiry, basic experimentation, exhibitions, and other projects. Sera Jey and Sera Mey are examples of these more complex and established centers.

can be studied and improved upon. One of his recent ambitions is reaching out to Indian, European, and American universities to engage in research partnerships with monks and possibly even host monastic students as research assistants so they can bring research acumen back to the Sera Jey and lead their own research projects. Nganwang was clear that his long-term vision for the Science Center is nothing less than a fully-functioning and publishing research facility exploring topics and questions that are of immediate relevance to human beings.

Another key player at Sera Jey is Jampa Khechok, the science center's head biology and neuroscience teacher. Khechok also plays a part-time role as an administrator especially when it comes to logistics and hosting guests who visit the science center. According to Norbu, one of Khechok's most essential roles is consultation and ideation for projects. The two monks make a successful team because Khechok often puts a practical spin on Norbu's more wild ideas.

With respect to curriculum, Sera Jey follows a five-year sequence designed by Emory University and implemented and shaped by the monastic teachers. Each year of the program contains a scaffolded Life Science, Physics, and Neuroscience curriculum, along with a Philosophy of Science Course during the first year. A rough outline of the curriculum and textbooks can be found at <https://tibet.emory.edu/emory-tibet-science-initiative/distance-learning/index.html>.

In addition to this five-year program, there is also a "special science" sequence designed by Ngawang and Khechok for advanced students who have developed some proficiency in English and exhibit the potential to become teachers and science leaders. Currently, these classes are taught by three part-time teachers: Tenzin Lhakpa, Karma Rinchen, and a female teacher named Kusang Wangmo. Two students in this special science program, Kalden and Lobsong Phuntsok (Tony), run a basic math course designed to teach monks the foundational skills necessary to be successful in physics and chemistry. Kalden and Tony co-teach this course twice per week to about 63 students (although attendance is about half that) and spend 1-2 hours a week planning their lessons.

Science classes are held Wednesday through Sunday and typically go from 9:30 to 10:30 in the morning and again from 11:00 to 12:00. Some classes, however, are held at night due to scheduling difficulties. (Scheduling, it turns out, is one of the greatest challenges facing the Science Center—because of it, attendance varies greatly and often dips down as low as 50%.) On average, two science class are held per day (not counting math or special science). A typical student at the science center attends an average of 4 hours of class per week.

Beyond the responsibilities of running classrooms, the science center monastics are also engaged in outreach activities like networking with universities and research institutions, running large-scale educational exhibitions, and collaborating in scientific research. We will discuss these projects more below; below we summarize a few of the collaborations that have resulted from these partnerships. One example is a project in which western neuroscientists study the long-term neurological effects of monastic debate. Currently, findings from this research are being written up for publication and will have several Sera Jey monks named as co-authors on the paper. For Norbu and the rest of the science staff, this achievement is a huge milestone for the center and a source of deep pride. As mentioned earlier, Norbu hopes to build on this success by sending monks from the special science program to receive formal university-level lab training from Indian universities, with the ambitious goal of beginning their own research projects by 2025.

There are several ways projects are brainstormed, funded, and carried out. Many of the ideas for projects and collaborations begin with the director, Ngawang Norbu, who then consults with a small team of teachers and administrators to flesh out the idea and think through logistics and resources. Chief among this team of consultants is Jampa Khechok who is crucial for shaping Norbu's big ideas into practical, actionable projects. Once the team decides to start a project Norbu must meet with a monastic board of about 40 members who ultimately sanctions the budget proposal. Four members of the board are then assigned to release the approved funds.

Table 1 - Staff Structure at Sera Jey Science Center

Player	Job/Role	Duties/Responsibilities.
Geshe Ngawang Norbu	Director	Big picture vision and direction of science center, securing funding from projects, outreach, scheduling, staff recruitment.
Geshe Ngawang Sherab	Librarian of Science Center	Maintaining library and administrative duties.
Jampa Khechok	Full-time biology and neuroscience teacher/part-time administrator	Lecturing, visitor hospitality, some scheduling and administration jobs.
Kalden Gyatso	Monk and Part-time math teacher	Basic math lectures.
Tony (Lobsang Phuntsok)	Monk and Part-time math teacher	Basic math lectures.
Tenzin Phuntsok	Full-time Tibetan lay physics teacher	Leads physics instruction.
Tenzin Lhakpa	Lay Tibetan and part-time special science teacher	Teaches advanced physics lectures for special science class.
Karma Rinchen	Lay Tibetan and part-time special science teacher	Teaches advanced physics lectures for special science class.
Kusang Wangmo	Lay Tibetan woman and part-time special science teacher	Teaches advanced physics lectures for special science class.

Other projects tap into financial and planning support from Science for Monks, who offers “mini-grants” to monks who propose science-related projects. Recently, SFM mini-grants have supported the construction and launch of a science center at Dzongkar Choede, which is home to about 300 monks, as well as a 2-day exhibition “My Earth, My Responsibility,” in celebration of the new science space at the monastery. Science for Monks also helped fund the “World of Your Senses” Exhibition in Tawang, which is described in more detail below.

III) The Mission of Sera Jey Science Center

What follows is a summary of what monastic leaders and teachers at Sera Jey believe to be the purpose, goals, and mission of the science center.

1. To increase the number of paths to truth

“Once you learn new ideas through science you see this is just another way of understanding the world. Science is a really good combination with philosophy. It is another way of investigating. Like, how can we improve our health. Lots of carbs and lots of dals and you get diabetes and have high blood sugar. When you learn science you learn how we reduce this and not eat more foods. These are the things that we can only learn through science not philosophy. Same goes for climate change.”

2. To help preserve Tibetan culture

“The science center is essential for the preservation of Tibetan culture. How should we share compassion through science?”

3. To deepen the connection with the greater Tibetan lay community

“With modern education we can reach out to Tibetan community.”

“The young generation thinks we are outdated.”

“I can make a better contribution [to the Tibetan community] through science knowledge. It makes a big difference to share our worldview through these two traditions.”

4. To modernize traditional monastic education and cultivate 21st Century monks

“We want to make a bird with two wings, modern education and traditional education mutually supporting each other.”

“To be a 21st century Buddhist monk, you need the science education.”

“We need to have a proper modern education in a monastery. Science is much closer to philosophy than we think. And to do lots of research on mind training, and EEGs to see how our mind works and brain works.”

“For me, the main goal or destination is to get the knowledge from the science fields especially quantum physics, this is very important for the philosophy field especially monks. 21st Century monks need to learn things, otherwise they are a little bit backward.”

IV) What is Sera Jey Science Center Doing (Besides Teaching Science)?

There is an emerging recognition from these interviews that the work done outside the classroom (exhibitions, research, outreach, workshops) reflects the heart and soul of what the monastic science community is trying to accomplish. When monks are asked why this work (exhibitions, workshops, research) is important, the answers hover around a deeply-felt conviction that it helps them fulfill their purpose as Buddhist monks—*sharing truth that has the potential to benefit all of humanity*. The monks are also enthusiastic about helping the Dalai Lama fulfill his vision for a community of “21st Century Monks.” In many ways, they see this work as an act of devotion and commitment to their spiritual leader. Moreover, they feel a sense of empowerment coming out of the experience of mastering knowledge about the universe and the biological world while being able to share it with their communities.

1. Science exhibitions and workshops

- A. ***Tawang “World of your Senses” Exhibition:*** Over 22 monks from Sera Jey organized a 3-day exhibition on the science of the five senses for an audience of middle and secondary-aged students. According to the monks and laity who attended, the exhibition proved to be successful in building up self-efficacy for the monks, connecting them with the broader Tibetan community, and shifting the perception of monks from traditional monastics to modern-educated scholars.

From an 18-year-old monk: “This was one of the best experiences of my life. I feel something in me. In my life, I’ve only learned about things but never experienced it. Now, I know what is inside my eyes.

“This is changing how people are seeing monks...the students were feeling amazing.”

- B. ***Ladakh Climate Change “My Earth, My Responsibility” Exhibition:*** Sera Jey monks led by Jampa Khechok organized an exhibition about the perils of climate change in Ladakh, India, a city that has long struggled with environmental issues.

“We trained monks on climate change. I thought we better take this topic to Ladakh where there are climate issues...students were participating in this exhibition.”

“People wonder, how do monks learn this? How do you know enough to have an exhibition? We say ‘science leadership workshop.’ They say ‘you monks have knowledge of modern education and traditional and people are very impressed and curious.’ It changes the stereotype for the monks. It changes their mindset.”

2. Networking with universities and institutions

Monastics at Sera Jey science center, especially Ngawang Norbu, are engaged in regular outreach and relationship-building with scientific institutions in India and around the world with the ultimate aim of collaborating on research and recruiting talented educators to lead workshops.

“I have contact with an Indian scientist who wrote a scientific paper on quantum entanglement. He assumed that the idea of quantum entanglement disproved an ancient Buddhist master’s idea about relations. I have encouraged the monks to read the paper and the old texts. We are hoping to clarify his work. We assume that there is a translation mistake happening.”

3. Collaborative Research Projects

Currently, there are several research collaborations being carried out between Tibetan monks and western scientists. Often these projects are focused on exploring the neuroscience of Buddhist practice. One of the richest examples is a study of the neuroscience of monastic debate. A team of nine monastics at Sera Jey and several psychologists and neuroscientists are studying the cognitive and psychological qualities of monastic debate, including emotional regulation, logical reasoning, attention, and memory. There are other projects in the pipeline, and many other potential ideas being explored by the science center.

“We already have a paper co-authored by monks recently submitted, at least two. This will encourage the community.”

“One goal is to train them to be actual scientists, to learn by doing research.”

“There is a project coming up. We have signed a contract with University of Pisa.”

“What I’m trying to do is combine the topics of quantum physics and consciousness, and find a topic of research, the monks will be interested.”

“One possible study is two meditators meditated together and then separated to separate rooms and then see if there is some synchrony in EEG activity.”

V) Challenges Faced by a Young Science Center

1. **Finding qualified and enduring lay teachers:** The most frequently cited challenge is attracting and maintaining strong Tibetan lay and monastic teachers with a solid grasp of English and science. With respect to lay teachers, there is a pattern of short-lived commitments that have been frustrating to students and administrators alike. According

to the monks interviewed, there are two fundamental reasons for this reality. First, the monasteries are not able to pay lay teachers an alluring wage, and second, there are not a lot of options for entertainment and nightlife at the monasteries for lay teachers to enjoy. Consequently, employments are often brief and the talent may vary.

“The student shows lots of interest, they have a huge expectation, they are so excited to learn science, but because of lack of teacher experience, students will not get as much information as they expected so then will lose interest.”

2. Monks are great philosophers but are still learning how to be great science students:

One of the first things Director Ngawang Norbu noticed when he started teaching was that students struggled with the basic learning strategies. A good example is taking notes. To help cultivate note-taking skills, he instructed students to write a summary of the day’s lesson after every class. But later when he read these summaries, he discovered that they were short and shallow, not much more than a couple of sentences. He realized that this shyness could be overcome by a clever tactic: *“So what I did instead of taking attendance, I asked them to write three questions from lecture and told them that I would pick three questions and answer them the next class. This was quite successful.”* Unfortunately, when he tried to get the lay teachers on board with this strategy, he found them to be set in their ways and not willing to try new tricks. It also became clear through these interviews that while Tibetan monks are penetrative and insightful students, when it comes to top-down philosophy classes they are less comfortable with the more egalitarian ethos of a modern science class.

“If we ask questions, or ask students to get more engaged in class, they are uncomfortable.”

“We use logic and the power of reasoning to teach them. Sometimes we use debate techniques to teach them. They don’t have basic math but they do have logic.”

“They don’t know how to write. They write like they’re in kindergarten.”

“They have no idea what a calculation means.”

“When they don’t have the background knowledge they get bored.”

3. Scheduling: The difficulty of balancing science instruction with traditional monastic classes was mentioned repeatedly. While Sera Jey’s administration is supportive of science instruction, primary importance is given to philosophy, debate, and prayer. If there is a conflict between a science class and a traditional class, the traditional class always takes precedence. Moreover, the full schedule of a Tibetan monk leaves little time for studying science outside of the classroom.

“They are too busy to give homework.”

“The administration is very supportive, but one challenge we still have is that if the class is from 10-11 at night and there is a prayer session at the same time we have to skip class. We don’t have permission to skip prayer sessions.”

“We have a challenge with class schedule. We have a monastic schedule, and the best time [for science] is 10:30 until 2. But the monastic training in philosophy is the most important. As a result, not all of the students can come at the same time.”

“The biggest problem for us is the time. Our main aim is to become a good Buddhist philosopher.”

- 4. There are few structures for teachers to improve practice or receive consistent professional development:** According to Ngawang Norbu, there is an enthusiasm gap for teachers who are interested in improving their practice. Some teachers like Kalden and Tony (who teach the basic math class) talk frequently about their teaching, plan together, talk about students, and debrief lessons. Other teachers, especially the lay Tibetan teachers, have less time and interest in honing their practice. Some possible reasons for this include modest pay and limited investment because of the often-temporary nature of teaching at the science center.

- 5. Tibetan monks struggle with foundational math skills:** This first generation of monk science scholars has had little exposure with basic math. As a result, they have limited procedural math skills and an underdeveloped number sense (to the point where they may learn that $6 \times 3 = 18$ but can’t explain why it’s true). The science center has combatted this deficit by creating math classes and attempting to reach students in physics through their strengths, namely their philosophical and debate acumen.

“When we had the good fortune of having scholars, scientists, and physics professors here to introduce quantum physics for monks, they would find out it’s not easy. They didn’t have the math.”

“If possible we should teach monks with a more philosophical approach.”

“One of the challenges is the students themselves, is they lack basic knowledge of math and how to take notes. Last year we taught a special class on note taking.”

- 6. The current average age of science students is quite old:** Because of the newness of the science program, the average age of a monastic science student makes it difficult for students to easily pick up English and new science concepts.

“Students’ age is a big deal. The majority of students are over 35. It is a little bit late for them to start new subjects, especially English-related subjects.”

7. Possible financial barriers (monks might hesitate to accept outside money for science projects because it looks like they are getting preferential treatment): This is a concern that SFM director Bryce Johnson expressed in a conversation with Geshe Nyima Tashe.

8. Projects are not always completed, and monks might not have a good grasp on how project ideas become a reality: SFM leadership has observed that there seems to be initial enthusiasm about a certain project, but it doesn't always come to fruition. Does it happen because people get distracted, or because they don't have the resources they need to complete a project? When we asked about this, the responses were often vague, creating a sense that few individual monks are sure about how things get done. Here are the responses we received when asked about how projects are executed.

"All projects come through a conversation with Geshe Nyima Tashe and Norbu. They will come up with an idea and then write Bryce"

"We don't have enough knowledge and understanding of tools to do it on our own. Till now I don't think we have the knowledge to do it on our own."

"We don't have to apply for grants. There's no application process."

"We try to choose [projects] for what makes the most sense for us and for western scientists."

9. There is a lack of next generation leaders with a clear vision or ambition for the future of the science center.

"What I'm doing here is something that I have a strong interest in, and there is no one else who will take over. Most of the monks are very nice. They are not willing to take on the troubles. Our academic state is fragile. There are not many newcomers from Tibet. We must make sure that the traditional Tibetan education is not disturbed. So you must be very diplomatic when you do this work...When I can present to His Holiness 15 young monks who can take over this work, lead, and do research, then I will step down."

10. Monks have less incentive to do research for external reasons, such as personal advancement or to establish their careers.

"The monks do not have the same carrots as western scientists."

VI) What Do the Science Centers Need Right Now?

1. Well-trained and experienced lay teachers

"The teachers teaching here are just undergraduates, but don't have much teacher training. We need teacher training."

“We need more math teachers! Even we sometimes struggle with questions from students. Students want to know ‘why do we need to learn this?’”

2. Well-trained and experienced Tibetan monastic teachers

“[We need] teachers who speak Tibetan. That understand philosophical and debate strategies. That can use the scientific terms in Tibetan. That understand how students learn.”

“At the end of the day, monks will teach their own course; in the meantime we need better teachers. They could not only teach science, but also teach us how to use these tools.”

3. Research facilities

“We don’t have the best facilities, but it’s an okay facility.”

“We have all these chemicals and tools, but we’re not sure how to use them. I’m figuring how to use these chemicals. I use Google or Youtube sometimes. If there was a good teacher from the states it would make a huge difference.”

“We need a good science center to provide facilities to monks: teachers, classrooms, textbooks, online teaching, lab equipment. We can’t just talk talk talk.”

4. New roles/personnel

“An administrator of science. Someone who could take care of conferences, who should we invite, who should we be talking to.”

“Someone to maintain the library and labs.”

5. Outreach with the community: Monks have expressed a strong desire to share the benefits of their practice (from a rigorous scientific perspective) with their communities.

“How can we express the benefits of compassion to ordinary people?”

6. More research projects and partnerships: The monks mentioned several interesting possibilities for future research and collaborations with western scientists. Some examples offered by the monks are listed below:

- a. Longitudinal studies exploring the physical and mental benefits of Buddhist practice
- b. A study of the health of barley, a grain that Tibetans eat copiously. They believe there may be micro-organisms that live on these grains which can negatively impact the health of Tibetan citizens. They would like to engage in a study that explores this hypothesis.

- c. An exploration of Clear Light Meditation (*Tukdam* in Tibetan). This is the phenomenon where monks maintain a meditative state for weeks or months after death. While the challenges of this research are obvious, laying the groundwork for research by studying the history of the phenomenon, interviewing experts, finding meditators believed to have this ability, and designing potential experiments, might be a valuable project to get monks thinking about how research is done.

"We want to do research on what kind of micro-organisms are on barley.

There are conflicting opinions on how healthy it is for our digestion."

"We want to study clear light meditation. Monks can still meditate for two weeks after they've died. These things are happening. If the brain has completely stopped then where is consciousness coming from?"

VII) The Monks' Vision of their Science Center in 15-20 years

1. More research projects with more investment and leadership from monks

"I foresee that after fifteen years, there will be more monks doing actual science research."

"Last year, we started a program to have our special science students to do independent research, but I realized it's too early. They weren't ready for that...but if everything goes according to plan, this group of special science students will start doing research in 2019."

"I can imagine in the future that our science center will not just be for monks, but for people to come here and do real research. It could have a huge impact on modern education."

2. A fully realized physics, life science, and neuroscience laboratory

"It won't happen this year, but we have a plan to build a new lab for physics neuroscience and biology. But it will take time. The first step is publishing some papers."

"We will have a better facility and better knowledge of science."

"We need different kinds of facilities to do research. We want to study clear light meditation. Monks can still meditate for two weeks after they've died. These things are happening. If the brain has completely stopped then where is consciousness coming from?"

3. More community engagement

"Monks will want be spreading Buddhist values through science."

4. Monasteries will have greater relevance and value to the Tibetan lay community

“Preservation of Tibetan philosophy doesn't just depend on philosophy. It also depends on science. If Tibetan students have a college education, it will be easier for us to communicate with them if we also have a modern education. I can use terms like relativity, and increasing well-being through scientific understanding. If you talk to them through nothing but philosophy you will lose them.”

5. The science center will publish its own science journal documenting original rigorous scientific research: This is currently Director Norbu’s most sought ambition—having monks do authentic scientific research that ties into their spiritual practices and can be shared with world. He has the ambitious timeline of handing the first issue of a Sera Jey Scientific Journal to the Dalai Lama by the year 2025.

“There is still work to do, but it’s getting there. I think it would be better if we had some kind of science journal.”

“By 2025, I hope to give a copy of our very first Sera Jey Journal of Science to His Holiness. I hope that it could serve as a source of inspiration and relief for him that his vision will be achieved.”

6. More talented, young monk teachers

“Lay Tibetans can’t stay long because they get families. There is no entertainment we can provide for them. They will not stay more than 2-3 years. That’s why I thought it’s better to invest in young Tibetan monk teachers who know English. They are the future.”

VIII) What Would Sera Jey Science Center Do if They Had Unlimited Resources?

1. Build a modern, stocked science lab

“We need a good science lab. In the lab, I think there would be a good stock of chemicals and equipment, a good projector. Pipettes. Also more science books. Many of the Indian textbooks are good but not really updated.”

2. Send monks to get a western university research training

“I would have monks go to University to get training on how to do research in a lab. Hopefully, in 1-2 years I will be able to send 1-2 monks from special science to go to western labs, and then another 1-2 monks ”

3. New, better, more modern textbooks

“We have started translating textbooks on Buddhist psychology. We have one draft ready. What we are trying to do is not to present that draft as a traditional Buddhist textbook, but to have more like a western textbook, with glossary and colorful images. We want to learn from modern educational methods.”

“Four or five scholars are looking to create Buddhist textbooks that are fit for a modern populations.”

4. Build a smart classroom

“I have a dream to set up a smart classroom for special science classroom. I believe this is their classroom. There will be a smart board where they can have interactions with faculty from scientists in US and Europe online, take classes online.”

IX) What Effects are the Science Centers Having on Monastic Life and Culture??

While the impact of this journey on the broader monastic community is still in its early stages, the monks have mentioned at least two significant areas where they see noticeable and quantifiable changes.

1. Monks working in the Science Center are experiencing a greater degree of self-efficacy and leadership confidence.

“Yes, I’m getting more confidence in my leadership. When I started I wasn’t, but now I have more confidence. I try to see what is the best way to get to the students. I use powerpoint.”

2. There is now burgeoning critical mass of monks embracing science education.

“It’s not a dream come true in one day. It’s a very slow process. But now we have almost 400 monks studying science. We have tons of translations of neuroscience into Tibetan. So it’s a huge change.”

X) Lingerin g Questions and Ideas for Follow-up

1. How reproducible is the success of the Sera Jey Science Center? How much of the speedy progress has to do with Ngawang Norbu’s unique vision and assertive leadership? How can SFM help cultivate similar vision and leadership at other monasteries?

- 2.** There is much discussion about monks doing rigorous, original research and publishing. This is a challenging task requiring a lot of resources—time, training, and money. How can SFM support this endeavor in strategic and practical ways?

- 3.** How could modest but consistent teacher-centered support structures be introduced into the culture of the science center such that all teachers are talking about their teaching, sharing best practices, and engaging in professional development?

- 4.** The next generation of monk leaders is currently being trained in monasteries and SFM workshops. How can SFM help to effectively position these leaders now to achieve the goals and ambitions that the monks have enumerated above in this report?

- 5.** Are there ways to help prepare young monks for their science education so that the transition to new content and pedagogy goes more smoothly? For example, what would it take for monks to begin developing number sense earlier in their monastic educations? Is there will and support for such opportunities to become embedded in the structures of monastic schools?