

GigaPan School Exchange: Diversity and Inclusion in the Community

First Steps: The School Introduction Process

Christopher Strebel¹, Clementina Acedo¹, Illah Nourbakhsh², Randy Sargent², Laura Tomokiyo^{2,3}

Abstract:

GigaPan School Exchange: Diversity and Inclusion in the Community is jointly organized by the UNESCO International Bureau of Education (IBE) and Carnegie Mellon University (CMU) in collaboration with the UNESCO Associated Schools Project Network (ASPnet). This project aims to encourage and facilitate the development of competencies related to Learning to Live Together (LTLT) and inclusion based on their collaborative work on topics relevant to their schools and communities. It also aims to promote dialogue and exchanges between school-age students on selected topics such as inclusion, Learning to Live Together, equity, cross-cultural inclusion and environment with a view to foster a more in-depth approach to cultural and social issues, as well as enhanced inter-cultural understanding across different geographical regions and cultures. A major focus of the project is to use GigaPan technology and integrate it within a curricular framework to establish a robust Information and Communication Technology (ICT) in Education project capable of delivering tangible improvements in both classroom experience and learning results. This report details the technology introduction project carried out at three pilot institutions from April 22nd through June 30th 2008. The documentation offers both a chronology of the process as executed, and a reflection of the relative shortcomings of the pilot project. However, the familiarization of students with the GigaPan technology and their participation in exchanges and dialogues via the GigaPan website set up by CMU constitutes only a first step for what the project is supposed to achieve. Based on their mastering of the GigaPan tool and web-related interactions, students and teachers are empowered to inquire into possibilities for a comprehensive project design and implementation on relevant topics of inclusion and Learning to Live Together that can be integrated in both the formal and non-formal curriculum.

¹ UNESCO-International Bureau of Education

² Carnegie Mellon University

³ This document has also been revised by Dakmara Georgescu

GigaPan School Exchange: Diversity and Inclusion in the Community

First Steps: The School Introduction Process

Abstract.....	1
1. Background.....	4
2. School Introduction	4
2.1 School Selection	5
2.2 Falk School (Pittsburgh, Pennsylvania)	5
2.3 Lavela School (Soweto, South Africa)	7
3. Sample Conversations from Soweto Panoramas	10
3.1 Successes of the Conversations:	12
3.2 Weaknesses of the Conversations	15
4. Program Evaluation	16
4.1 Successful Outcomes	16
<i>1 High Level Support</i>	16
<i>2 Hands-on training of every student</i>	17
<i>3 Elimination of dead time</i>	17
<i>4 Project prestige</i>	18
<i>5 Engagement</i>	19
<i>6 Connection with community</i>	19
<i>7 Growing sophistication of comments</i>	19
4.2 Challenges and Risks	19
<i>1 Teachers Unaccustomed to Computers</i>	20
<i>2 Little Experience of ICTs within the Curriculum</i>	20
<i>3 Communication Protocol</i>	20
<i>4 Bottom-up structure</i>	21
<i>5 Inter-discipline dynamics</i>	21
<i>6 Incorporating pre-existing technology topics</i>	21
<i>7 Technology vs. content focus</i>	22
<i>8 Stitching bottlenecks</i>	22
<i>9 Computing infrastructure</i>	22
<i>10 Mismatched schedules with Lavela</i>	23
5. Conclusions	23
<i>Improvements to the Conversations</i>	24
<i>Next Steps</i>	25
7. Appendices	27
Suggested Format for First Visit to School	28
Instructions for Enriching GigaPan Conversations	30

1. Background

GigaPan Dialogues proposes to study how a new panoramic imaging technology, coupled with a designed curriculum, can enable learners to interact meaningfully across borders to learn about community, culture and the history of their respective regions. The development of a deeper understanding of self, of one-another and a consideration for the beliefs and values of others all represent long-term goals of this project. This brings the themes of Learning to Live Together and inclusive education to the table with new opportunities for dynamic, web-based and interactive learning that makes positive use of new digital media. From the Letter of Agreement between UNESCO-IBE and Carnegie Mellon University, the specific objectives of GigaPan School Exchange are:

1. “develop and share good practices in linking curriculum and new technologies (GigaPan),
2. empower students to use new technologies in the context of motivating participatory and productive learning experiences,
3. explore local and international issues pertaining to inclusion and Learning To Live Together with a view to foster constructive exchanges, cooperation and solidarity,
4. develop inquiry and research skills in students and teachers,
5. promote inclusive school settings,
6. encourage exchanges and sustainable networking.”⁴

The first pilot sequence for Dialogues has involved technology transfer at the school level: can educators and learners make use of the GigaPan digital panorama technology to capture culture and inclusion in a manner concordant with the broader educational goals of the project and the school? What level of technology introduction and support is required to achieve this, and what social and administrative issues must be resolved to sustainably scale this program with a designed curriculum?

This report describes and evaluates the technology introduction process we have undertaken, documenting both the process and its strengths and weaknesses as well as our conclusions in regards to the longer-term effort based on results.

2. School Introduction

In the early planning of the project, it was decided that two school pairings would be necessary to ensure at least one successful exchange. Each exchange was to have one partner school in Pittsburgh, local to the GigaPan researchers, and one partner school outside the United States (referred to as an “international school”), to be selected through consultation with the UNESCO Associated Schools Project Network (ASPnet). Initial controls were that the students and teachers speak fluent English and that the school offer a minimum computational infrastructure including high-speed internet and computers with 2G of RAM, 40G of hard disk space.

⁴ GigaPan Letter of Agreement

2.1 School Selection

Initial candidates for the Pittsburgh schools were the Falk Laboratory School of the University of Pittsburgh (Falk), the Creative and Performing Arts High School (CAPA), and the Miller African-Centered Academy (Miller). These schools were selected based on past participation in UNESCO projects, flexibility in their curriculum, and an interest in incorporating culture into education. Falk was approached in December of 2007, and quickly agreed to participate. Of the two remaining schools, Miller was approached first because of student age (both Miller and Falk are K-8 schools, and it was thought that the program would be more appealing to younger students) and because of structural changes ongoing at CAPA.

Ultimately, the US based education team did not reach an agreement with Miller, but at around the same time ASPnet had identified the countries of South Africa and Trinidad and Tobago for international partners. This necessitated implementation on both Trinidad and Tobago, bringing the total number of partner schools to four, so the decision was made to try to run the exchange with Falk as the single Pittsburgh school.

Selection of the international schools, once ASPnet had identified the countries, was made by the respective UNESCO National Commissions. Due to communication difficulties with the first school selected by the National Commission of South Africa, a second school, the Lavela School in Soweto, was approached and became the South African partner school. Naparima Girls' School on Trinidad and Bishop's High School on Tobago were selected by the ASPnet Coordinator of Trinidad and Tobago based on past successful participation in UNESCO projects.

2.2 Falk School (Pittsburgh, Pennsylvania)



Falk School during in-school training and use



Falk School GigaPan students recognized by the Pittsburgh Mayor

On 20 December 2007, Laura Tomokiyo and the US based education team (Rachel Burcin, Harry Clark, and Jim Reid) met with Barbara Bianco, technology teacher, and Phyllis Scherrer, grade 5 teacher. The background and objectives of the GigaPan School Exchange were described, and a GigaPan robot was loaned to Ms. Bianco. Both teachers were very excited about possibilities for incorporating the exchange into the school curriculum. On 3 January 2008, Ms. Bianco informed the team that she planned to shift the Falk middle school technology curriculum to a GigaPan focus immediately. The US based education team worked with her to create several layers of curriculum and lesson plans.

Falk runs its technology classes in 5 cycles of approximately 6 weeks. Two middle-school classes meet for 35 minutes each day for the duration of the cycle. Realistically, after announcements, only 25-30 minutes is available each day. One of the classes is a 6th-grade class and the other is a combined 7th-8th grade class. The US based education team worked with the instructor to create several layers of curriculum and lesson plans, included in the appendix to this report. To make the cycle successful, the curriculum had to both touch on all areas of the GigaPan exchange and incorporate technology objectives that were part of the existing curriculum. The following general strategy was suggested:

- Week 1: Learn to use the GigaPan robot, incorporating both teacher-student and peer-to-peer instruction. Take and stitch a “personal items” panorama, where each student brings in 3 items of significance and all items are laid out for taking a GigaPan. Incorporate instruction on digital photography and image processing.
- Week 2: Learn to use the website, including image browsing, snapshotting, posting and deleting comments. Students find and describe their own personal items. Incorporate instruction on internet privacy, online communication, and descriptive writing.
- Week 3: Discussion of community: what is community? What defines community at a city, school, and personal level? With this in mind, what locations in Pittsburgh would the students choose to take GigaPans of to share with a school in a different country? Incorporate online research of Pittsburgh communities and mapping.
- Week 4: Planning and execution of field trip to take panoramas in Pittsburgh communities. Create field surveys to compare communities (example: how many people do you see walking by in a 10-minute period? How many restaurants are visible?) Stitch and upload panoramas; annotate by adding general description, snapshots with comments, and results of the surveys. Incorporate instruction on Word (building surveys) and Excel (recording and graphing survey results)
- Week 5: Create a website, print document, or video documenting the experience.
- Week 6: Closure on any technology curriculum goals that were not met in the context of the GigaPan experience.

Because there was not yet a partner school online, no actual exchange was possible; to satisfy the objective of reflection on an unfamiliar culture, the students chose community locations as their first sites of interest for GigaPan image acquisition, researched the locations, and interacted with community experts who could answer their questions.

2.3 Lavela School (Soweto, South Africa)



GigaPan Soweto/Lavela (South Africa) student portrait

From 22-23 April 2008 Christopher Strebel traveled with Illah Nourbakhsh (Carnegie Mellon University) to Lavela High School in Soweto (Johannesburg, South Africa). Lavela High School is comprised of some 1200 students, ages 11 to 23 and grades 8 to 12. The school has 42 teachers. Currently about 25 students use ICTs regularly. The students differ in the amount of ICT exposure they receive. Often there are students that need to “chased out” of the computer room. In addition to some classroom time the students have ample after school time to learn and use the computers.

An initial conversation with the instructors was used to better understand the general school context and how ICTs had thus far been integrated into the classroom. It was determined that computer technology was mainly integrated into the curriculum as a supplementary competency; enabling students to augment the breadth and depth of research. There are about 7 teachers who have provided students regular research work using computers. The teachers remarked that there are three teachers who are generally perceived to have very advanced computer skills while the rest are still in the early learning stages of using ICTs.

The conversation with instructors also explained the circumstances as to how the school obtained its computers and how obtaining them fit into an overall regional ICT and education strategy. The School received its computers eight months prior to the GigaPan visit from the Gauteng Department of Education.

“Each public school in the province will be issued with a 25-workstation computer laboratory, with Internet and e-Mail, to be used for curriculum delivery. The main outcome of the Government's White Paper will thus be attained:

*‘Every South African learner in the GET and FET bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community) by 2013.’*⁵

At that time, the teachers claimed that 18 schools have been provided with 25 computers with Internet connections. When the government installed the computers they provided some brief training courses in how to use computers and the internet. These courses lasted about a week and primarily covered Microsoft Office programs.

Finally, the conversation focused on barriers to learning and expectations concerning the new technology. One of the biggest impediments to using technology is that load sharing can slow the network. As a result, sometimes sites can't be accessed at an adequate speed. Furthermore, recently electricity had become more of an issue in South Africa. These impediments were fairly rare and the school was relatively happy with connectivity and functionality of the computers. The teachers' biggest concern was that many of them did not feel confident in using new technology. As a result, they said it was tricky to understand what sort of work they could assign and how such work could be adequately assessed and integrated into the rest of the curriculum.

Teachers mentioned that their primary expectations concerning technology were that it will help not only students but also potentially themselves in being more competitive in the job market. The teachers had no specific expectations concerning the GigaPan project primarily because they were not aware of what the new technology could empower them to do. They were however hoping that embarking on the project could highlight their school and advances being made there.

Day 1

Upon arriving at the school the first event was a meeting with the principal John Mngadi and deputy principal Lulama Thobejane. The purpose of this meeting was to explain the objectives of the mission and gauge the level of support and expectations of school management concerning the project. Mr. Mngadi conveyed his appreciation for having chosen his school for the project and stated that the project has his full support.

Christopher Strebel met with several teachers while Illah Nourbakhsh went to introduce the project to the students. The meeting with the teachers focused on several topics: school background, existing school ICT infrastructure, the regional ICT and education strategy, barriers to learning and expectations.

After the meeting with teachers, there was an introduction of Christopher Strebel to the class assembled in the computer room. The introduction focused on introducing students to UNESCO, the IBE, telling them about the forth coming International Conference on Education (ICE, November 2008) and some of UNESCO's initiatives in E-learning. The introduction went further with a discussion concerning inclusion, community and how the GigaPan could foster trans-national exchanges between schools on the aforementioned subjects.

The students were then broken into 3 groups of approximately 10 and were given a basic GigaPan training. Each of the groups was given the assignment to take one GigaPan documenting pollution near the school consisting of a least 30 snap shots. During this assignment Illah Nourbakhsh

⁵ <http://www.gautengonline.com/> (August, 2008).

installed GigaPan stitching software on all the computers in the lab. Christopher Strebel supervised the groups and gave them pointers in taking their first GigaPans.

During the previously mentioned events, 4 different press groups arrived to document the GigaPan activities. The press consisted of reporters and photographers for Business Day, Pretoria News, The Times, and the Star. They interviewed students, the principal and those executing the GigaPan mission.

The next item on the agenda was to travel to Pretoria via Johannesburg to meet with Desmond Fillis, Secretary-General and Director, Multilateral Affairs– International Relations of the South African National Commission for UNESCO. Also attending the meeting was Zodwa Tsajwa from Mr. Fillis's office and Lulama Thobejane of Lavela's Vice-Principal's office. Each of the participants briefed Mr. Fillis on their activities in relationship to the project. Mr Fillis's office fully supported the GigaPan project and was anticipating a visit to the school. He mentioned the possibility of presenting the GigaPan project and other school activities as part of a scheduled celebration for UNESCO ASPnet. Mr. Fillis stated that he is really hoping to see the pilot project showcased at the International Conference on Education (ICE) in Geneva, November 2008.

Subsequently, there was a meeting in Sandton with Clive Kellner, who runs one of the largest government supported galleries in the Gauteng area. His gallery, Johannesburg Gallery, comprises of some 4000m², and is visited by over 80,000 people per year in space that is located in down town Johannesburg. The idea was to obtain gallery space to display student work in a location both easily accessible to the students and that was close to where they live. The premise was by showcasing student work it would not only empower the students, providing them addition confidence in ICTs but also strengthen ties between the school and the surrounding community. Mr. Kellner looked at two 7 meter print outs taken by the GigaPan and was very enthusiastic about the new technology. He stated he would definitely be interested in showing the work in his downtown gallery despite the fact that he normally plans exhibits two year in advance. He also was confident he could organize a showing in Soweto to enable more students to be able to attend.

Day 2

The second day focused on consolidating the training of the students in the GigaPan. The students began by learning how to view and comment on GigaPan images posted by the Falk School in Pittsburgh USA. The Falk School is a school located in Pittsburgh, USA that is also taking part in the GigaPan pilot. As a result of this instruction the South African students immediately started communications and discussions with students at a school on another continent.

The next item of the day was to train 6 groups of 4 to 5 students. The training was given by both Illah Nourbakhsh and Christopher Strebel. The small group sizes ensured that each student had an opportunity to try all the steps in operating the GigaPan. The smaller group size was intended to really solidify the learning from the day before, teach some of the logic behind how the system works, as well as introduce some more complex features. The objective was that at the end of the training all students would have experience working on all steps of taking a GigaPan and posting online.

The learners, in the six groups were then given the task of taking a GigaPan of over 40 photos of an area of the school that was important to them.

The final critical piece of the training was showing students in the six groups how to use GigaPan stitching software. This step involves manipulating the multiple pictures taken by the GigaPan and gluing them together to form one continuous photo. It is this final holistic photo that is technically called a GigaPan Panorama and is the one of the end products of the technology.

The fact there were four distinct tasks during the morning meant that two groups could be trained while the other groups were working on other tasks. In this way the students were continually learning different aspects of the GigaPan with almost no dead time in between. There was then an occasion to discuss the potential future avenues for the GigaPan project. At this point, Illah Nourbakhsh left the students with two GigaPan challenges or assignments in order to keep their technical skills honed in the technology.

Finally, there was a meeting with all managers of each curriculum area within the school, followed by a full staff meeting. In both the teachers were very excited about the potential of a gallery exhibit and very appreciative of their school being chosen and the work being done to introduce new technology to the students. It was mentioned in the managers meeting that they appreciated learning how other schools are integrating computers into the curriculum. It appeared as if having some background in both ICTs and education was extremely helpful at this stage of the project, as it enabled some convergence in the discussion between the two fields.

3. Sample Conversations from Soweto Panoramas

There were five GigaPans taken of Soweto from April 29th until June 12th, four by the students of Lavela High School and the first from a tower was taken by Illah Nourbakhsh to get the discussion started. The pictures themselves covered three main themes: (1) Soweto (Soweto from Tower, Twin Cooling Towers), (2) the Soweto riots of 1976 (Tsietsi Mashini Memorial, Regina Mundi) and (3) General culture (traditional Xhosa meal).

Details of Soweto Panoramas:

Soweto Twin Cooling Towers Author: Lavela Administrator Created: June 12, 2008 Snapshots: 6	Tsietsi Mashinini Memorial Created: May 16, 2008 Snapshots: 36	Soweto from tower Created: April 29, 2008 Snapshots: 130
Regina Mundi Created: June 10, 2008 Snapshots: 7	Traditional Xhosa Food Created: May 12, 2008 Snapshots: 21	

For each panorama the students took numerous snapshots.⁶ In fact there were 200 snapshots taken of the five GigaPans.

Fifty five of the conversations consisted of the students exchanging with each other. An exchange was considered as one student posting a snap shot with a comment and at least two additional comments. For example a student from school A may have posted a snapshot and two students

⁶ A snapshot, refers to the student selecting a sub area of interest within the panorama. Once the sub-area is selected the student can add a title and comment. Snapshots are the building blocks around which conversations regarding the panoramas take place.

from the other school responded or Student A posted a comment, student B responded and a student from school A responded again. The reason an exchange was considered as 3 or more comments is that it consisted of some back and forth commentary between the students. In other words they were creating a simple dialogue over something of interest and they were exchanging by either further explaining the snap shot or commenting in more depth on the subject.

Life Style: Comments on how people live	51
Public Buildings: Public sectors buildings	33
People: Comment were often about people and what they were doing	19
Random Object: Often there were inquiries into what a miscellaneous object was	19
Flora/Fauna: Comments on Plants and Animals	18
Environment: This category included both concern for the environment and general climatic observations	17
Commerce/Industry: Comments on Businesses	17
History: Comments providing additional perspective on the photo or history of the surrounding area	15
Food: Comments on the food	12
Leisure: Comments on Leisure activities	10
Legend: Comments on local legends (for example Nelson Mandela)	10
Transport: Comments on local transportation	9
Socio-economic: Comments on socio economic factors	9
Jokes: Students made jokes about some of the images	6
Geography: Comments on where things are geographically	6

The conversations could be summarized in terms of 15 categories: life style, public buildings, people, flora/fauna, environment, commerce/industry, history, food, leisure, legend, transportation, socio economic, jokes, geography and miscellaneous objects. Categorizing the conversations provides several useful insights, for example:

- (1) the fact that there are so many categories illustrates the versatility of the GigaPan to allow students to cover numerous topics,
- (2) categorization allows one to see which topics occurred most often,
- (3) it provides an example of how various conversations fall within various school subjects like history, geography, social studies, biology, etc.

Understanding that students are delving into their subjects within the GigaPan may allow or inspire teachers from the subject to integrate what is being done in the GigaPan into their classes. In fact this integration appears to have already taken place. This can be seen in the “Tsietzi Mashinini Memorial” conversations where the students from Pittsburgh made several references to the fact that they had been studying Nelson Mandela, and some South African history in their classes.

Often one comment could fall into several categories. For example consider the following conversation:



Why is a trash bag up there? A.R.L

Comments:

1. no thats not a trash bag

-Posted 3 months ago by [Lavela School \(lavela\)](#)

2. yes that one was left by father christmas when he fell

-Posted 3 months ago by [Lavela School \(lavela\)](#)

3. Is that a trash bag?CD

-Posted 3 months ago by [P1C3 Falk \(p1c3\)](#)

4. Is father christmas the person that leaves pressnts at night on christmas? If so here he is called santa. MR

-Posted 3 months ago by [P1C3 Falk \(p1c3\)](#)

In this conversation the student from the Faulk school begins the conversations by referring to a trash bag on the roof of a building which could be classified as a random “miscellaneous object” that student discovered. A student from South Africa responds by making a “joke” by stating that it was left by Father Christmas. The student from the United States asks if Father Christmas is the same thing Santa. This final comment could be classified as “lifestyle” since it teaches the students about the similarities and differences in culture and lifestyles between their two communities. As a result this particular conversations was classified in three categories: random object, jokes, life style.

3.1 Successes of the Conversations:

Finding Similarities

The students in Soweto and Pittsburgh recognized similarities between each other from mundane subjects like they both drink coke and coffee to a general concern about pollution and protecting the environment. Similarities help the pupils sees that they share things in common and that their interests and concerns are familiar to students across the globe. As one student put it, “yea we also drink a lot of coke, we are not so different after all”.

Exploring similarities is an important aspect of learning to live together. “One of education's tasks is both to teach pupils and students about human diversity and to instill in them an awareness of the similarities and interdependence of all people.”⁷ Understanding similarities amongst people helps students learn empathy towards others and understand that though there are cultural differences there are a good deal of similarities. The GigaPan students not only began to see similarities between their communities but also used these parallels to help build common

⁷ <http://www.unesco.org/delors/ltolive.htm> (August, 2008)

understanding and a better mutual understanding and conversations around each others communities.



Air Pollution

When is it gonna end? I wish it would end very soon.

Comments:

1. I hope air pollution ends soon too. Our world will be very polluted soon.- V.Y. -- Posted 3 months ago by [P1C3 Falk \(p1c3\)](#)

2. Is this pollution? B.D.

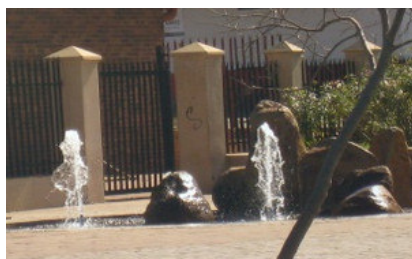
-Posted 3 months ago by [P1C3 Falk \(p1c3\)](#)

3. AIR POLLUTION ITS DAMAGING OUR OZONE LAYER WE NEED TOO DO SOMETHING VERY SOON AND FAST

Posted 3 months ago by [Lavela School \(lavela\)](#)

Differences

The GigaPan conversations were also successful in allowing students to explain and explore differences that they perceived between their communities. For example, the conversation below begins with US students asking if like in the US there are coins in the fountains in Soweto. A student from Soweto students responds there not coins in the fountains and in the ensuing conversations explains the reason for this difference.



Water Fountain

That is a nice Water Fountain. Do you throw coins into the Fountain? A.D.

Comments:

1. No we dont, why do you ask?

Posted 2 months ago by [Lavela School \(lavela\)](#)

2. It is common in the United States to throw coins in fountains for good luck. This comes from the folklore of the wishing well (http://en.wikipedia.org/wiki/Wishing_well). It is not very good for the fountain and any fish that might live in it, so recently we see "donation boxes" next to popular fountains to put coins in. But children still like to throw them in the water.

Posted 2 months ago by [Laura Tomokiyo \(lmt\)](#)

3. Well thats verry interesting you know,we don't do that.People would still the money, don't they still it there?

Posted 2 months ago by [Lavela School \(lavela\)](#)

Learning about differences can be as important as learning about similarities. This is especially important when students are able to see the variations within the context of their own frames of reference. "...students learn more and more easily when academic knowledge and skills they are expected to lean are filtered through their own experiential and cultural frames of reference"⁸

Joking together

The students also found things to joke about. For example the use of irony and wit when one student took a picture of a playground and stated it looked like fun and other student responded "actually it's not." This sort of ironic joke highlights that fact that while playgrounds are fun both groups of children are now beyond the age of swings. Joking back and forth and seeing that certain topics are funny builds a rapport and connection between the students.

Not only does joking create a connection between the students but it also makes the assignment see like fun. If the GigaPan is perceived as being not only as cool and new but also it seen as an amusing tool this is likely to further encourage participation and the sustainability of the project. In other words, if the learning experience provided by the GigaPan is enjoyable the students are likely to be motivated to use it. Having the tool seen as an exciting exercise is preferable to it being perceived as standard tedious assignment.

Of course the conundrum is to make sure that the GigaPan stays exciting with jokes but also make sure none of the jokes offend anyone. This very issue should be addressed in the lesson teaching the students about how to write a good comment. Learning what can be a joke and what is inappropriate is an important part of cultural understanding and Learning to Live Together.

Exposure to another Culture

Exploring similarities, differences and joking together meant the students were sharing their community and culture with students in other regions. Cultural awareness and exposure is an

⁸ Mankolo Lethoko, *Curriculum Development and education for living together: Conceptual and managerial challenges in Africa*, International Bureau of Education Geneva, 2003 p14

important part of Learning to Live Together. “For peaceful coexistence on this planet, knowledge and appreciation of other cultures is important. Children learn prejudices from the world around them. Ongoing exposure to other cultures can help to increase tolerance and good will as children learn to acknowledge and appreciate the differences in people that create our interesting world. This also enriches the educational experience.”⁹

3.2 Weaknesses of the Conversations

Additional Perspective needed.

There needed to be more perspective around the panoramas. For example, a short text describing the background of the photo and why it was taken would have provided more context for each photo enriching the cross cultural conversation. To begin with the conversations were somewhat cursory in nature. Specifically the conversations were either very short consisting of a few words or sentences or did not contain much back and forth dialogue between the students.

Additional directions were provided to the schools during the semester to help improve the conversations. These directives help form the base of the “Instructions for enriching the GigaPan Conversations” (see below) which was developed to help improve the comments and provide guidance and incentive to include additional perspective to the conversations. Below one can see how effective the instructions were. The conversation begins with a fairly casual comment and after the school received the principles for enriching the conversations the response provided both context and background for the photo.



Cool

What does this park stand for!

Comments:

1. It is a memorial park its dedicted to the school kids who gave up their lives on 16 june 1976. When the government

introduced the new cillabus that stated that all learning should be done in Afrikaans the school kids of that year rebelled against the government. They marched to the re-union buildings in Pretoria, Now in doing so the were police shooting these kids telling them to dismiss, many kids lost their lives that day our brothers nd sisters. learn more on www.soweto.uprising.com. -SAMM

Posted 2 months ago by [Lavela School \(lavela](#)

In addition to providing the historical context for the memorial the Lavela student also provides the link to a website with additional information. This allows the students in the United States to do additional research on the subject if they wish and squarely places the memorial within a larger historical context.

Sustainability of Conversations

Another weakness was the sustainability of the conversations. Many snapshots were unanswered or commented upon. After the semesters ended the schools were provided with the “Instructions for enriching the GigaPan Conversations”. Within the instructions there is advice on how to increase the sustainability of the conversations. One idea is to make sure students respond to at

⁹ M. Oluwakemi, L. Banks *Curriulum Development for Learning to Live Together: The Caribbean Sub-Region* International Bureau of Education, Geneva 2002, p43.

least one snapshot a week. When one considers the whole class this means at least twenty five to thirty snapshots should be responded to, thereby nourishing the conversations. Furthermore, an additional point was to advise students to pick snapshots that they either have a question about or that can be used to explain an interesting aspect of their community. The idea is that well chosen snapshots can illicit questions, comments and dialogue further sustaining the conversation.

Additional Research

Students should integrate more research into their GigaPan conversations. Providing links to additional research not only provides other students additional material to consult if they wish to know more about a subject, but also adds to the academic rigor surrounding the GigaPan conversations. The additional research should be able to bring more context and content to each GigaPan conversation.

Providing additional research is not only an important part of nourishing the conversations but also an key skill for the students to master in its own right. Research on the internet is an important skill both professionally and academically; but because it is a different medium from books and libraries it needs to be taught to students so that they can use the tool correctly. For instance, determining what constitutes a credible site or source is very important to internet research because almost anyone can post an internet page. Students need to be aware that some of the information they may find may be unreliable. Encouraging students to do Internet research to add richness to their conversation will help train the students in assessing online sources. Again some guidelines on how to achieve a higher level of research were provided in the “Instructions for Enriching GigaPan Conversations”.

4. Program Evaluation

4.1 Successful Outcomes

Numerous success factors demonstrate the potential for this program to achieve high rates of engagement and retention as an international program. These are listed and described below.

1 High Level Support

At Lavela the project was supported by the principal’s office. At the beginning of the project both the principal John Mngadi and deputy principal Lulama Thobejane expressed the fact that they fully supported the GigaPan project. As a result of this support, the school’s management team was flexible in receiving new communication instructions and relaying them to the students. Support from the principal and vice principal was also important in terms of ensuring a high degree of flexibility in the program implementation. Because Lavela was the first school to receive and be trained in the technology internationally¹⁰ there were several last minute changes to the program. The fact that the school, administrators was able to rapidly adapt their schedules meant that both students and teachers were able to maximize the exposure to the program. Such flexibility would not have been possible without high level support.

¹⁰ Since the GigaPan development team is based in Pittsburgh they were able to introduce local students to the GigaPan. Lavela was the first school outside the United States to receive the technology or the first internationally to be part of the project.

2 Hands-on training of every student

At Lavela, the first day consisted of breaking the class up into three groups to learn the general functionalities of the GigaPan on the three available robots. It quickly became clear in such large groups that only some students quickly took the initiative to try a use the camera; others were content to stand back and allow their peers to test the different functions. As a result, it was unclear whether all students accurately understood all the tasks required to create a GigaPan photo. Furthermore, it appeared that some of the students were not entirely comfortable with the general functionality of the GigaPan.

This posed a potential risk to the sustainability of the GigaPan. If only some students could understand the basics of operating the GigaPan it meant not all of the students would be engaged in creating the GigaPans. Those not participating in the creation of the GigaPans would soon become sidelined meaning fewer and fewer students would be part of the project.

In addition to fewer students participating in the actual GigaPan class activities, if all students are not trained in the technology there are other potential problems. For example, if the students aren't properly trained they risk breaking a GigaPan. Also without working on GigaPan there is less a sense of ownership from the students to value GigaPan and thus making sure that it is properly taken care and stored in in secure area. Finally, fewer students trained means fewer students can train others to pass along knowledge.

In order to ensure that all students were able to use a GigaPan and had tried all of its main features it was decided that the groups had to be as small as three to four. Groups this size would enable everyone in the group to have hands on training in the technology. Once all students had tried each step and there was time to train students in some of the more technical steps in creating a GigaPan.

3 Elimination of dead time

One important success factor for the April 2008 visit to Lavela was the ability to eliminate dead time in teaching. The fact that the class was broken into groups of three or four meant that there were six groups with only two trainers. In practical terms this meant that while two groups were being trained four groups were not. Instead of having the groups sitting around waiting for training, the GigaPan team developed a method of rotating all teams through various activities. This was important, because it was felt if the students were just left waiting for instruction they would become bored and some of the enthusiasm and momentum built by the excitement of the new technology would be lost. The rotation meant that all groups were consistently engaged in GigaPan activities and developing their capacity in various GigaPan related skills.

The table below helps illustrate how the rotation strategy worked. The left hand column depicts the various activities that were created for the student groups.¹¹ The bolded activities “robot training” and “stitching training” required the GigaPan team to actively train the group of students. For the rest of the activities the students were able to work together in groups on exercises to solidify what they had been taught. The gray cells make it easier to see that only two groups were being trained at any one time and that the stitching training could only begin once

¹¹ To simplify “commenting” has been included twice. The first time for students who were waiting for robot training. At the end when the students had finished with the second training “stitching” they went back to “commenting”.

the robot training was completed due to the fact that only two people were training one group each.

The top vertical row represents time in 15 minute increments. The classroom time was divided into 15 minute periods with six periods in total this means the entire exercise fit into an hour and half. In the other cells there are numbers that representing the six groups of students. In other words reading the table from left to right one can see what activity each group was engaged in every fifteen minutes.

	15 min	15 min	15 min	15 min	15 min	15 min
ACTIVITY						
Comment Training	1,2,3,4,5,6					
Commenting exercise	3,4,5,6	5,6				
Robot Training	1,2	3,4	5,6			
Team exercise		1,2	3,4	5,6		
Stitching Training				1,2	3,4	5,6
Commenting exercise			1,2	3,4	1,2,5,6	1,2,3,4

Note that these 15 minute periods are meant for illustrative purposes only as a suggestion as to how the various activities can be broken up and allow various groups to rotate through activities. In Soweto there was no exact time limit placed on the various activities except for the “team exercise” where the students were given 15 minutes to take a GigaPan.

The various activities were meant to teach the students in small groups all aspects of the GigaPan activity. For example in the list of activities, students were first taught how to create comments on existing GigaPans and create a conversation with students in other parts of the world. They then worked on creating their own first comments by themselves to see that they could accomplish this step without supervision. Second, they were given a more in depth GigaPan training on the intricacies of using the GigaPan Robot as well were trained in some of the technology’s special features. The team exercise that followed was to make sure as many students as possible were able to use the robotic camera. Finally the Stitching training showed students how to use the software that collates all the photos together into one large panorama.

Developing a method of rotating students through the various activities meant they were actively engaged at all times. The intention was to keep the simulation and innovation level up as much as possible. In addition, the students learned all steps of making a GigaPan panorama from taking the photos, to stitching, to communicating and comment with their peers across the globe on the photos

4 Project prestige

The prestige of the project has been one of the reasons that selling the GigaPan project was successful. The prestige associated with the project can be attributed to several factors such as: the fact that UNESCO was backing it, the professor and an inventor of the robot was there in person at Lavela, the national educational commission had been contacted, the arrival of members of the press and that local art galleries were planning on hosting exhibits of the students work seemed to entice the school management to state that the GigaPan project had their full support. The school officials were clearly aware that their school would be in the spot light both professionally due to the interest of the South African Department of Education and visibly by being highlight both by the press and having their students work on display in a national gallery.

The visibility given by the press and the galleries seem to have ensured the sort term sustainability of the project.



Soweto students, families and teachers at the Gallery Opening

5 Engagement

Nearly every middle-school student at Falk is now comfortable using the GigaPan robot. The robot was sufficiently easy to use, and interest was sufficiently strong, that such a new technology quickly found its way into the hands of *every* student throughout a set of grade levels. This is an unusual and hopeful trajectory for a new, university-created technology.

6 Connection with community

The GigaPan process and curriculum demands that learners develop a deeper understanding of their neighborhood, their history and their community. This in turn triggers more meaningful relationships between the learners and other community organizations and individuals. For instance, Falk students have visited a number of Pittsburgh communities to take panoramas, and have learned about them through online research and visiting speakers. The school has also developed a relationship with the Frick Art and Historical Society.

7 Growing sophistication of comments

Early comments reflected the students' initial excitement at using the website. At first text was very short, conversational in style, and often as simple as "what is this?" As the students became more sophisticated, they tended to make more reflective comments and probing questions. At least three factors contributed to this growth: change in teacher instruction; subject material of panoramas; and development of student perception of what they could learn from the exchange.

4.2 Challenges and Risks

Below we list and describe factors that have been ascertained as important risk factors in the deployment of a GigaPan School Exchange project.

1 Teachers Unaccustomed to Computers

At Lavela, teachers are not yet accustomed to using computers. Lavela High School received its computer lab only eight months prior to the GigaPan training. As a result, the teachers and the school administration have not yet developed a strategy to integrate ICTs in classroom activities and within the curriculum. Furthermore, while it appears that the students have mastered being able to research topics on the Internet, teachers have not yet become comfortable using the Internet. The lack of comfort in using computers and the Internet was a challenge because it limited the school and teachers in terms of taking initiative in the project as they were unaware of the possibilities and the myriad of classroom activities that could be linked to a GigaPan conversation.

The fact that teachers are unaccustomed to computers provided a challenge because it aggravated several other areas. For example, lack of familiarity meant they were less able to communicate by email, the teachers were less sure how to provide guidance to the students. It was difficult for them to anticipate problems like framing the panoramas within a larger discussion and reacting to breakdowns in online communication simply because of a lack of experience in dealing with such issues.

2 Little Experience of ICTs within the Curriculum

Computers have not yet been integrated into the Lavela curriculum. Apart from teachers telling students to research some topics on the Internet, it appears that regular classes are not yet using computers for standard classroom assignments. This was a potential challenge because there isn't a school culture of using ICTs within the curriculum. As a result, the GigaPan was essentially the first major school project using ICTs and the Internet.

The implication of being one the first projects was that there wasn't a clear understanding of how to link the GigaPan with other school activities. Creating a strong link between the GigaPan and other school activities increases the value and use of the technology within the academic setting. Not understanding how the GigaPan could fit into the rest of the academic program increases the risk of being able to sustain the program in the long term. This challenge was alleviated by creating the GigaPan as an extracurricular activity. The project as a result, was seen as an additional way to motivate and retain students, particularly those interested in technology.

3 Communication Protocol

There is up to this point no official communication strategy between the schools and the GigaPan team. For example, sometimes it took a considerable amount of time to hear back from the schools. This could be because of school holidays or in Lavela's case because the teachers and administrators are new to the internet and email.

There were a few ways in which communication was ameliorated. First the GigaPan team had three levels of contact the Principal/Vice Principal, the teacher in charge of the GigaPan class and a student leader. As a result, if there was no communication from one of the parties the second or third contacts could be used to expedite a response. This also helped by keeping all parties better abreast of what they were each doing. Though this aspect has worked well it could be further applied and strengthened in the future.

Further improvements in communication may be envisaged for the future. For example, it might be a good idea to establish a formal communications plan between the various parties. This would further facilitate and strengthen communication. Another improvement that could add value to the project is establishing lines of communication between the schools. The schools could then

contact each other regarding how they are each implementing the GigaPan, how they are integrating the ICT within their curriculum and provide each other strategies and tips for using the GigaPan and other ICT technology.

4 Bottom-up structure

While the administration at Falk was very supportive of the project, the Director did not require or invite particular teachers to participate in the project, but rather gave us the freedom to approach individual teachers directly. We reached out in several different ways. Ms. Bianco requested time to present the project at a middle-school staff meeting to inform and engage teachers. Illah Nourbakhsh gave an informational presentation open to all faculty. A letter was sent out to all faculty describing the project and giving sample scenarios using GigaPan in Science, Social Studies and Language Arts. In addition to these efforts by the US based education team, Ms. Bianco ran professional development sessions to familiarize faculty with the GigaPan. The only teacher that volunteered to participate was the Spanish teacher. However, foreign-language communication is outside the scope of the current pilot. This teacher is currently working with Ms. Bianco independently, using the GigaPan.org site for image browsing only.

5 Inter-discipline dynamics

The technology program at Falk is part of a “humanities team” separate from the core subjects. There appears to be excellent communication and a good support structure within the humanities team, but efforts to integrate the GigaPan School Exchange in curricular areas like Social Studies may have been helped by a stronger connection between Technology and core subjects.

6 Incorporating pre-existing technology topics

Care had to be taken to ensure that all topics that were already part of the Technology curriculum were not pushed aside by GigaPan. Particular challenges were:

Identifying relevant skills

The GigaPan can be used to introduce and build on many basic technology skills, including digital photography, word processing and online composition, file organization and manipulation, robotics, hardware and software maintenance, and web interaction. Skills not inherent to the process are also easily integrated; for example, a teacher that wants to teach students how to build web pages can have students create a web page about a specific GigaPan, embedding panoramas and pulling in online research in a contextualized project. While these concepts were discussed in the abstract early on, a holistic strategy was not developed, and the 5-week cycle took on a scattered feel, moving back and forth between GigaPan and other topics.

Handling perception of replacement

Concern that GigaPan was replacing more important topics in Technology came from students, parents, and other faculty. While parents did not oppose GigaPan per se, they wanted to be sure that their children were prepared for high school, being familiar with Office software like Microsoft Excel and Word. Other faculty wanted to be sure that students were coming to their classes knowing how to properly format compositions (centering the title, paragraph spacing, etc.) Most grade 8 students were applying to competitive high schools, and were also concerned that they would not be prepared for the transition.

7 Technology vs. content focus

For the reasons outlined above, it became clear that the placement of GigaPan Exchange project within the Falk Technology program was a problem. In order for this placement to be successful, the GigaPan team would have had to work more closely with the Technology teacher to develop a seamless program that incorporated all pre-existing technology topics and make the argument to the school community that the program was enhancing and not interfering with the Technology program.

The end goal of the GigaPan School Exchange, however, is not just to have students use the robot and website to contextualize technology topics, but also to have meaningful dialogue with students in other parts of the world, and to develop their own analytical and communications skills. The real substance needs to be in developing a structure for students to discuss, reflect, and collaborate on the taking of local GigaPans, and to use the panoramas posted by the other site as a springboard for learning. For example, a panorama posted on the Mashinini Memorial in Soweto sparked discussion on Apartheid, and this sort of discussion could have been developed in much more depth in a Social Studies context.

8 Stitching bottlenecks

To further the school's goal of maximizing each student's hands-on technology time, the class would often go out into the field with several GigaPan units, take several panoramas each, and then come back to the classroom to stitch them all. There were typically two sections of middle-school technology running back-to-back at any given time, and the second class would need to come back and start the stitching process on computers that already had processes running from the first class. Only some of the computers were able to handle this load, but the organization of the class did not make it easy to restrict which computers were used for stitching. There were also normally several other classes, as well as after-school programs and other activities using the computers where stitching processes were running. As a result, when the students came in the next day, out of a class of 10 students, one or two might have a successfully stitched panorama. Stitching at a reduced quality was not regularly used as an alternative to full-resolution stitching.

9 Computing infrastructure

The Falk Technology lab is administered partly by the teacher (Ms. Bianco) and partly by a contractor from the University of Pittsburgh computing facilities team. The lab computers have access to a shared drive, and initially all images and panoramas were stored on this drive so students could sit at any computer. Not all of the computers seemed to have equal access to the shared space, however; Ms. Bianco reported having restricted read/write permissions from some computers, and that the shared drive disappeared from the list of accessible drives on some computers mid-semester. This issue had not been resolved as of the end of Fall 2008.

Students at Falk currently save all images to the desktop and stitch directly on the desktop. This means that they cannot bring up each other's images on their own computers, and have to stitch at the same computer they saved their images on.

10 Mismatched schedules with Lavela

The Falk students were very eager to have direct communication with their peers in Soweto, but there were many mismatches in the school schedules. For example, although the US spring semester runs from January through May, Falk has a theatrical production that involves the entire middle school for most of the month of April, causing a long gap in the dialogue. End-of-term exams interfered as well, and while the Lavela students returned from their winter term in July, Falk students were by that time out of school until September. A summer arts program was recruited to correspond with Lavela, and did excellent work, but there was a clear sense of frustration that the schools were not in synch with each other.

5. Conclusions

Program-level recommendations can be made based on the experiences at Falk School and Lavela School:

- Secure buy-in from administration and clarify commitment at the school level
- Remove GigaPan from a technology focus. The program needs support by an individual (teacher or otherwise) who is comfortable with the technology, but the program itself belongs in a content area where there is flexibility and expertise to explore topics. In fact, it would be best that schools identify and select relevant topics of Learning to Live Together and inclusion and develop specific projects in the context of curricular and/or extracurricular activities. This would give students and teachers a chance to use the GigaPan tool and the website in a meaningful and productive way, thus avoiding the limitation of the student conversations to simple chatting. GigaPan school projects ought to provide students with systematic and meaningful learning opportunities so that they can be adequately equipped with the relevant values, knowledge, skills and attitudes implied by Learning to Live Together, social justice, fairness and inclusiveness. Integrating meaningful assessment and evaluation strategies is just as important given that both students and teachers are in need of relevant feedback based on which fine tuning of the project can be undertaken, and the overall quality of the project inputs, approaches and results be improved.
- Find ways to support collective participation. A stitched panorama should be a success for the whole class, not an individual. Commenting in conjunction with a class discussion can raise the quality of the comments as well as develop discussion skills.
- Present schools with a data management plan – when and what to archive, where to store images and GigaPans. Are images deleted from the computer? Backed up on disk? Most schools have very little experience with accumulating and archiving lots of data, so they will need specific instructions, such as “save all files to desktop. Every week, burn a DVD with all images and .GigaPan files and delete files from the computer.” I had thought it was overkill to ask them to back up, but recently an error on our end resulted in four school panoramas being overwritten, two irretrievably.
- Synchronize exchanges and plan ahead
- Account for both real-time and asynchronous communication
- Account for both formal and informal communication
- At least two teachers, ideally a minimum of three should be working together at a school to execute an exchange. This allows them to:

- Develop ideas for GigaPan projects in their own classrooms and across classrooms, or jointly in an afterschool context
- Support each other in content enrichment as topics arise
- Support each other in logistics (field trips, stitching, ...)

Improvements to the Conversations

For phase two of the GigaPan project the teachers of each school were provided with additional instructions in August 2008. The instructions were given to lessen some of the aforementioned weaknesses. For example, encourage sustainability, encourage students to provide additional perspective, and research around the snapshots.

The instructions were provided just after the start of the Spring Semester for Soweto, before the start of Autumn semester in Pittsburgh and before the commencement of the Trinidad Tobago phase of the project. As a result, the impact of these instructions can only be assessed in the next phase of the project.

This report has provided background on what has been accomplished from April 22 through June 30th 2008 within the context of the GigaPan project. The report examined what has been successful in the first pilot stage of the project and also looked at the challenges encountered and how they were overcome or mitigated. This information should provide pointers for future project stages or for future GigaPan schools as to what may be expected and help anticipate challenges.

Though the GigaPan is still in its pilot stage it might already be useful to look at how the project is meeting the objectives laid out in the GigaPan Letter of Agreement between the International Bureau of Education and Carnegie Mellon University. The objectives are as follows:

“The primary objectives of the GigaPan project are to:

1. develop and share good practices in linking curriculum and new technologies (GigaPan),
2. empower students to use new technologies in the context of motivating participatory and productive learning experiences,
3. explore local and international issues pertaining to inclusion and Learning To Live Together with a view to foster constructive exchanges, cooperation and solidarity,
4. develop inquiry and research skills in students and teachers,
5. promote inclusive school settings,
6. encourage exchanges and sustainable networking.”¹²

In terms of meeting the objectives of point one, developing and sharing good practices, this report provides a vehicle for distributing not only the good practices but also areas for improvement. The good practices from this first stage of the GigaPan project are also expected to be disseminated at the International Conference of Education within a video of Inclusive Education, within a video dedicated exclusively to the GigaPan and potentially in other international conferences (for instance in the web4dev conference in New York, February 2008).

Concerning point two, the GigaPan project has clearly been a success in empowering students to use new technologies in the context of participatory and productive learning experiences. All of the students in Soweto were trained with the GigaPan and students from the school regularly

¹² GigaPan Letter of Agreement

contribute and exchange with their peers in the United States. The students were empowered to use the GigaPan technology immediately and were starting conversations on the second day of their training. Finally, the project is an example of students being empowered in new technologies with the operative word being “new”. The students rapidly learned the new GigaPan technology and at the time the schools had some 20% of the 40 cameras that existed in the world. The students were thus early adopters of the new technology. As such, they were quickly empowered not only to use the technology but to become real participants in helping drive the project and the technology and continue its sustainability.

The third objective can already be considered a success as well. The students have already begun to explore local and international issues pertaining to inclusion and Learning to Live Together with exchanges concerning South African history, US and South African culture (food, leisure activities, life style, etc). These exchanges have increased the understanding of the students concerning the similarities and differences between their communities. Several times students acknowledged that there were many similarities between them, thereby increasing the solidarity between the two groups.

In terms of point four, developing inquiry and research skills in students and teachers, this has been a mitigated achievement. It is clear that from the two hundred snap shots the students had many inquiries concerning features found within the panoramas and asked many questions to illuminate their understanding of the details found therein. However, there is currently not much that has been done in the way of developing research skills. This is expected to improve because the “Instructions for Enriching GigaPan Conversations” has a component which is directly related to improving online research skills in conjuncture with GigaPan activities and these instructions were recently provided to the schools.

The fifth objective is to promote inclusive school settings and the GigaPan provides a common platform to share between schools in different countries. This means providing a common working relationship between students. The GigaPan offers the potential to create a low cost inclusive setting where schools across the globe can work together.

Finally with regard to objective six, the first three months of the project might make it a little early to address the sustainability of the network but there are a number of encouraging signs that this is progressing in a satisfactory manner. The fact that the students are part of an exclusive group of GigaPan users has not only empowered the students but motivated a high level of sustainability.

In general the project has been successful up to this point; especially considering it is not the full time activity. The success of the project both in terms of student engagement and coverage in the local media demonstrates the GigaPan is cross cultural educational project that can be deployed using minimal resources.

Next Steps

One of the next steps is to begin the project in Trinidad and Tobago in September 2008. It is hoped that some of the lessons learned and improvements can help these new schools integrate the GigaPan project more quickly, more completely and in a sustainable way into their particular academic settings. This next step should increase the size of the pilot project to four schools with one additional school being added from Trinidad and another from Tobago.

Another future development is the planned follow up visit to Soweto in October 2008. This follow up visit is important on several levels. First it will help investigate how sustainable the project has been. More concretely it will try and assess how many students in the class remember how to use the GigaPan and are on a regular basis contributing to the conversations. The results from this inquiry will provide valuable insight as to what sort of follow up needs to be provided and how often follow up is needed in order to ensure longer term sustainability.

Second, the future visit to Soweto will be focused around exhibiting the students work at the Johannesburg Gallery. The gallery is one of the largest in the city and will showcase what the students have done and the success of the project up to the present. It will encourage the students, teachers, parents and school officials by highlighting their work and community to a larger segment of the public in South Africa. The gallery results will also be covered by the local media and there will be a UNESCO film crew that will cover the event. The subsequent UNESCO video will promote the project successes and highlights at the International Conference on Education and beyond.

The intensive training of the teachers and the appropriate preparation of schools to carry out comprehensive and content-related GigaPan projects constitutes another follow up priority. *GigaPan Curriculum Guidelines* will be developed to support the identification and choice by teachers and students of school-and community relevant topics, based on which they can engage in informative exchanges with colleagues from across the Globe. The Curriculum Guidelines will also play a role in the capacity building for the development and implementation of curriculum-related school projects focusing on Learning to Live together and inclusion. They will support schools and teachers with regard to the meaningful integration of such projects in the school environment, life and curriculum (i.e. relationships with the existing curriculum and subjects; possibilities to integrate new topics and approaches as cross-cutting dimensions; implementation of interactive pedagogies; developing effective and realistic work plans - e.g. usage of school time and resources; project management issues; assessment and evaluation items). Teachers from the different schools engaged in the GigaPan project all over the world will also benefit from a systematic and intensive training organized by CMU and UNESCO IBE in Pittsburgh (tentatively June 2009).

The follow up process will also entail the development of informative dissemination materials (i.e. brochures, posters) as well as research/academic papers analyzing the project approach and outcomes with a view to draw attention to the project added value and potential to enrich the international pedagogical debate on Learning to Live Together, inclusion and the usage of ICT for enhancing the quality of learning and its positive impact on personal and community development.

6. Acknowledgments

This project would not be possible without the full support of a great many institutions, educators, engineers and funding agencies. We wish to thank the government of South Africa, the participating schools' teachers and administrators, Google Corporation, Benedum Foundation, Pittsburgh Foundation, the UNESCO IBE administration and staff, Carnegie Mellon University's engineers at the CREATE Lab and at Carnegie Mellon Silicon Valley as well as staff and administration and all others who lent financial, technical and administrative support to make this project launch a reality.

7. Appendices

Suggested Format for First Visit to School			
	Activity	Suggestions	Est. Time
1.	<u>Meet School Management</u>	<ul style="list-style-type: none"> * Personal introductions * Present the project * Present prestige of the project (UNESCO, galleries, ICE) * Evaluate school support * Explain commitment needed * Determine resources the school can commit. * Determine who will be contact persons (3 levels) 	30-60 min
2.	Student Introduction	<ul style="list-style-type: none"> * Presenter from CMU and UNESCO introduce self, organizations and GigaPan * Show a GigaPrint and a GigaPan on the computer, robot * Layout the programme for the next 2 days * Talk about the concept of community, inclusion 	60 -90 min
3.	First GigaPan training	<ul style="list-style-type: none"> * In large groups train students on GigaPan, batteries, tripod, mounting the GigaPan, turning on the camera, setting zoom, no flash, AEL, AFL 	30 min
4.	Group Exercise 1	<ul style="list-style-type: none"> * Take a GigaPan of pollution around the school (15 photos) 	30 min
5.	GigaPan comment training	<ul style="list-style-type: none"> * Show students how to log in to their web space * Show how to take a Snapshot, comment edit * Talk about the general rules for commenting- sensitivity, sharing culture, learning to live together, representatives * Present comment guidelines document 	30 min
6.	Second GigaPan training	<ul style="list-style-type: none"> * In small groups of 3-4 train groups in GigaPan details, stitching and try uploading. 	Depends on class size

		* Groups should always have a task assigned	
6.A	→ GigaPan Details	<ul style="list-style-type: none"> * Stopping GigaPan, restarting, resetting factory conditions, batteries check, full panorama, low light setting, etc. * Check that each student can use batteries, on/off, AEL, AFL 	15 min per group
6.B	→ Stitching	<ul style="list-style-type: none"> * Show stitching, deleting and format of panorama of photos. * Go through the whole stitching process. 	15 min per group
7	Group Exercise 2	* Take a GigaPan of an area of the school (30 photos)	15 min
8	Wrap up	<ul style="list-style-type: none"> * Summarize what students have learnt * Talk of how what they will be doing fits into a bigger picture * Present challenges * Say who will be in charge of what * Present deadlines for future work 	30 min
9.	<u>Wrap up with Management</u>	<ul style="list-style-type: none"> * Present what has been accomplished, * what equipment has been donated * What needs to be overcome * What is the plan going forward * What is expected of all parties 	30-60 min
10.	<u>Present to Teachers</u> This can be done anywhere in the above process	<ul style="list-style-type: none"> * The importance of project, exposure it will give the school * How to address it within the curriculum * How they can help provide pieces to nourish the content of the conversations 	30-60

Instructions for Enriching GigaPan Conversations

Overview

Students should engage in more research around the GigaPan. Furthermore, it is important the students gain an understanding that some sources found on the internet are credible while other sources may be unreliable. Gaining an appreciation of what constitutes a credible source on the internet is an important skill to help students analyze and synthesize the information that they are consulting.

Additional GigaPan Instructions

1. Each panorama should have at least one paragraph explaining the entire GigaPan photo.
2. Students should research and find 2-3 websites that provide addition perspective on the photo.
3. The students should explain to a teacher why they choose these web sites, and why they feel the chosen sites are credible (i.e. the source is: a reputable newspaper, the official site of the memorial, the text is written by a verifiable eye witness, etc)
4. Students should provide the links to the website (web addresses) at the end of the one paragraph explanation (see point 1). Each link should be accompanied by a sentence explaining what students will find at the related site.
5. Each student should respond to at least one snapshot per week.
6. Each student should take a snap shot of an area within the GigaPan panorama that (1) they either have a question about or (2) they think they can use to explain an interesting aspect of their community. Students should ask questions that are open ended or make comments that illicit responses (for instance NOT “I see a coke bottle do you like Coke?” But rather “what other drinks are popular in your community?” “Are there some drinks only for special occasions?”

Skills improved

1. Internet research
2. Evaluation of Internet sources
3. A better understanding of associations and links on the web, which in turn creates a better understanding of how to organize and link useful information in a coherent manner.
4. Learn how to nourish an online conversation
5. Through more in depth conversations develop a greater understanding of others communities.