# 9

# The Performamatics Model of Sharing & Networking: *We’re All Connected*

These young people are among the first to grow up with an expectation of continuous connection: always on and always on them (p. 17) [[12](#_ENREF_12)].

## Interconnectedness and What We Are Learning

By now you must have realized that we do not shy away from using technology, whether directly in our teaching or in the administration of our *Sound Thinking* course. A great deal of time, thought, and effort go into maintaining a very detailed course website where students can access the course syllabus, obtain contact information for each other, review class notes, retrieve assignment parameters, check their grades for each assignment, and find links to a host of resources to help them succeed in the course (please see our course website at soundthinking.uml.edu). Since we also wanted our course website to serve as an archival repository, until recently (more about this later) we linked it to a social networking site. The additional site provided opportunities for student input.

The purposes of all the web support is to enable students to interact with us and their peers beyond the classroom and to facilitate their ability to post their reflections, respond to instructor-initiated questions, pose questions themselves and answer questions posed by other students, ’upload and share music and video links with the class, and post their completed projects so that everyone can see what everyone else did on a given project. In addition, each class is videotaped, archived, and linked to our course website.

### Our Philosophy Behind the Connectivity

Our goal in making all of this information readily available is to ensure that everything a student needs to know regarding any aspect of the course can be accessed anytime, anywhere. If, for whatever reason, a student can’t be in class, the assignments, notes on what was covered in class, and an actual video of a particular day’s class are always available 24/7. We all know that on many levels, and for different people at various times in any course, there will be those moments where the learning curve will seem insurmountable. Those moments are most likely to occur at 2:00 AM.

To that end, we encourage you to adopt some form of class web as an extension of your face-to-face meeting time. If you have the time, interest, and expertise to build it yourself, that’s great. But if you don’t, there are several good course website software platforms and free hosting sites readily available, and your school probably already has a license for at least one of them. A course website can provide your students with asynchronous, step-by-step tutorials to help them work through issues whenever and wherever they arise. In “theory,” with all this online support there should be no excuse for students not knowing when assignments are due and what the parameters of those assignments are. We will have more about that “theory” later.

The fact that we use two different websites for our course is the result of two professors coming together and combining aspects of their teaching approaches into a single, hopefully cohesive, whole. It is, to a certain degree, a reflection of our different teaching philosophies and styles. Jesse creates a very detailed website for each of his classes. His websites include comprehensive class notes that are posted before each class.  He teaches directly from those notes, and they remain online so that his students can refer back to them after class. Gena prefers a more spontaneous element of discovery in her classes. We therefore worked out a way to compromise on how much information gets posted before class and how much after. (*Perhaps a screenshot or two could go here.*)

Genaalso prefers using discussion boards and other interactive media to extend her class discussions. She sets up a web space for students to reflect on the readings and class activities, and also provides a space to which students can upload their work. Her goal is to promote and encourage reflective and critical thinking among her students. She sees the discussion forum as an opportunity for students not only to answer her questions, but also to answer those of other students and to pose questions of their own. As of this writing, the class discussion forum that we use in our course is Piazza (piazza.com).

Since both approaches have educational merit, we decided early on that it made sense to incorporate both types of web-based interactions. It is easy to link each site to the other rather seamlessly. Many of your schools most likely have licenses with course web providers, so you may find it just as easiest to work within your school’s system. When we began teaching *Sound Thinking*, our school’s website did not offer some of the media rich capabilities we were looking for. In addition, we wanted to have access to the site well after the semester ended. To that end, we found a social networking site that provided the features we were looking for with an easy-to-navigate interface at no additional cost, so we went with that.

## Social Networking and the Social Construction of Learning

Brown, Collins and Duguid argue that “learning, both outside and inside school, advances through collaborative social interaction and the social construction of knowledge” (p. 40) [[4](#_ENREF_4)]. As suggested in earlier chapters, we contend that there is great value in developing a collaborative classroom environment through group projects. We also believe that opportunities for social interaction should extend beyond the classroom through these online exchanges, where questions might arise when students begin delving into their projects.

Our colleague, Alex Ruthmann, in his work with Steve Dillon, who was a Senior Lecturer at Queensland University of Technology, advocates for a practice of relational pedagogy “where teachers actively design musical experiences informed by their students’ musical and technological experiences” (p. 177) [[11](#_ENREF_11)].Ruthmann proposes projects where students are “actively engaged in social music making with technology” (p. 177) [[11](#_ENREF_11)]. He suggests that doing so will not only give students a sense of pride in their work, but also helps bring the students in the class together as a community. From a music teacher educator’s perspective, creating a sense of community within the class is a major focal point for modeling student/teacher interaction. From a CS teacher’s perspective, classroom community models behaviors that pave the way for students to participate in collaborative work environments well into the future.

Over the period of time we have been teaching this course, we have used two different social networking sites. After our original site changed the terms of use and made many of the multimedia functions fee-based, we migrated to another site. However, during the last semester we taught this course, that social networking site unexpectedly ceased operations. Interestingly enough, it was during the semester the site went down that we noticed less cohesion among the students compared to previous semesters. We attribute that partly to the fact that there were fewer opportunities for students to share their work and ideas as a result of not having a social networking component. As a result, that sense of community we experienced in past semesters never fully developed.

Further evidence of the importance of creating a community can be found in the Scratch programming environment. The Scratch mantra “imagine, program, share” (p. 2150) [[3](#_ENREF_3)]. gets to the heart of why their programming environment has been such a hit with students and educators alike. In addition to developing a fairly intuitive visual programming environment, one of the hallmarks of the Scratch environment is a web-based gallery and forum where programmers at any level of expertise can share their creations, get feedback, and comment on and contribute to each other’s projects [[3](#_ENREF_3)].

An area of great interest, where the power of Scratch to develop computational thinking is particularly prominent is how this online social space supports members’ initiatives to “remix” other people’s projects. This remixing often sparks new ideas that the original programmers might not have been able to come up with on their own, or helps to extend ideas toward more complexity than the original creators had thought of. In their case studies of the different types of Scratch programmers, the authors contend that “sharing was an essential aspect of each Scratcher’s development as an interactive media creator” (p. 2155) [[3](#_ENREF_3)].

As you might guess, there is great potential for connectivity and interactivity to take place. However, “potential” is the key word here, as Gena and Jesse have learned. To paraphrase a great movie quote, “Just because you build it, they won’t necessarily come.”[[1]](#footnote-1) We have experienced aspects of our experiments in social networking and connectivity that are extremely beneficial to the educative and collaborative process, as well as the many challenges inherent in doing so. We have also fallen victim to some of the faulty assumptions we professors may harbor concerning technology and the role it plays in our students’ lives.

## The Digital Native and Other Myths

### Our Perceptions

If your students are anything like ours, they most likely spend a great deal of their time “being connected,” through their cell phones or other digital devices. We have reached the point where for our students, the computer is most often the preferred device for entertainment, reading, writing, and creating [[5](#_ENREF_5)]. In addition, our students are no longer hampered by issues of location and time [[1](#_ENREF_1), [5](#_ENREF_5), [8](#_ENREF_8), [9](#_ENREF_9), [10](#_ENREF_10)]. There are even studies to suggest that on certain campuses, the majority of distance-learning classes are actually populated by students who are mostly on-campus students [[7](#_ENREF_7)]. As points out, these students would “’rather text than talk” (p. 1) [[12](#_ENREF_12)].

All of these alternatives to real-time interaction provide us, as well as our students, with much greater flexibility and control over our interactions. If we follow much of the research on technology and how it is shaping our lives, the assumption is that putting all this information out there is a “slam dunk” in favor of our students readily participating, perusing, interacting, discussing, and reflecting on the information we put online. In fact, many of them are doing just that, but perhaps not in ways that we think or hope they are.

### Their Realities

Turkle points out how the technology allows us to communicate with a network of “friends” we may never actually have met face-to-face, while we may simultaneously be disengaging from our real life interactions [[12](#_ENREF_12)]. How many of us have sat in restaurants observing two people on a date of some sort, interacting with their cell phones instead of each other? How many of us have actually done that? As for those students who are physically in class, is all this connectivity contributing to the learning environment or is it an invitation to *appear* to “multi-task,” but actually to engage in non-class related activities? Are they really taking notes? Or are they shopping, texting, blogging, or checking/updating their status on Facebook?

Turkle reported that she suggested to her students at one point that they close their laptops and take notes with paper and pencil to eliminate the temptation to stray from the topic at hand. She admits that that experiment did not last beyond a one-semester trial. She and several colleagues, however, have not too surprisingly observed that the students sitting behind open laptops in class generally do not do as well as the others [[12](#_ENREF_12)]. Yet in a computer science classes, where the computer is a necessary tool, the temptation to wander from the task at hand is something that comes with the territory. However, in a computer lab where all machines are under your control, as opposed to a classroom where everyone brings their own laptops, there are software applications that can give the instructor access to everyone’s screens. In such situations, the students must beware.

If everything is out there available online, and our students are seemingly tethered to their digital devices, you would think there would be no excuse for not posting required reflections, or knowing what the assignments are about, or when they are due.

Over the years we have been teaching this course and others that regularly include web-based interactions, we have observed that there is a fairly sizable group of students who do actively participate. In general, these are the motivated students who participate in class and do their assignments in a thorough and timely manner. These are the students who use and refer to the class website on a regular basis. We have also observed there is always a group who post required assignments late if at all, and when they do, they may miss half of the required parameters. But as we both realized long ago, for many students an *assignment*, regardless of how you deliver it, is still going to feel like *school work*, and it just won’t have any traction unless your students are personally motivated and invested in the work [[6](#_ENREF_6)].

So yes, today’s students use technology, but often mindlessly, at least in their everyday personal interactions. For many of our students, navigating our websites and working with required software programs might feel like more of a time-consuming burden. The medium of delivery is irrelevant for these students. With all the technology in the world instantly available at most everyone’s disposal, we professors just may not be able to compete with the lures of the Internet, no matter how engaging we think we might be.

## What Are We Learning From This?

School assignments vs. Facebook, iTunes, YouTube, gaming, online shopping and a host of other digital distractions is, like it or not, the “new normal.” As Gena observed during our first collaboration, which was the creation of a remedial website for her music students to prepare for their music teacher licensure exam, just putting the information out there does not necessarily guarantee that students will refer to it [[6](#_ENREF_6)]. We need to be more proactive in giving students a reason to go to the website. Perhaps we can think about running the class completely paperless, with no handouts. This might just create the necessity for students to “check in” on the website on a regular basis. Creating more discovery opportunities through linkages between in-class activities and the website, where perhaps we embed new information not covered in class and vice-versa, can pique student curiosity.

As suggested by Brennan, Monroy-Hernandez, and Resnick, we should not assume that just because our students grow up surrounded by and immersed in interactive media they are pre-disposed toward understanding how these technologies function [[2](#_ENREF_2)]. Nor, as the authors suggest, are our students inherently interested in becoming *creators* rather than *consumers* of technology. But we believe that if an assignment can appeal to a student’s personal interests on some level, the temptation to participate in the creation process will overtake their initial resistance.

We encourage you to provide opportunities for your students to present their work. However, we are also aware that the reality of having multiple complex projects, combined with the sheer number of students you may have and the limited number of class hours, may make it infeasible to do presentations during class time. An online forum can go a long way toward resolving the conflict. In the absence of a viable alternative to the social networking site we were using, the most important aspects we discovered for fostering class participation and inter-personal connectivity, particularly when the class is made up of students from a variety of majors, are being able to post assignments online and see what their classmates have done. These activities get to the crux of the *Performamatics* experience: the performance/sharing phase of creating and programming.

## Performance as Computational Thinking in Action

For the purpose of our interdisciplinary approach, we define “performance” as presentations of our students’ creations in a public forum. Sharing work online is one viable performance method in this sense, but we also believe that it is paramount for today’s students to be able to present, and in many cases actually *perform*, their creations before a live audience. The importance of developing and honing presentation skills and the ability to effectively communicate one’s work or concepts — as well as the presence of mind to think on the fly in front of a group of one’s peers and/or strangers — cannot be overstated. As mentioned previously, it is easier than ever for your students to retreat into their digital devices and disengage from communicating in real time with real people.

A major part of this interdisciplinary work between music and computing is to develop computational thinking skills in our students. But another equally important focus is to develop in our students the ability to express themselves, collaborate with, and communicate ideas to a variety of people who may not have their same skill sets or think about things in quite the same way. There are several components that go into how we measure these skills:

1. how they approach, develop, and reflect on their projects,
2. their ability to share ideas and collaborate with their teammates, and
3. their ability to articulate the concepts underlying their project verbally and to demonstrate the project in action.

While all these modes of assessing students’ CT skills are at play in all projects, it is in the final project where the third component is most emphasized in our *Performamatics* model. We make a very big deal out of the final project presentations. These are done in a public showcase where we either go out into the local community or invite the community onto our campus. Using the Artbotics class as a model, we have scheduled our presentations in the evenings at local art galleries and in museum spaces. We provide food, advertise the event, and we have students create titles for their projects so that we can put together a program as we would for any performance.

The performance aspect creates an aura around the final project that goes beyond the fact that it will be weighted more heavily than the rest of the class assignments. Because there is the prospect of an audience beyond just their peers, we have observed that students put a great deal of time and effort into these projects. They want to “look good” and not come off looking foolish. They are also invested in really personalizing these projects to their own interests. We have now lived through several semesters of angst, doubts, bursts of creative flashes, and “ah-ha” moments from our students. We believe that the whole final project package, in terms of creation, demonstrating computational thinking, presenting, and performing, is a terrific opportunity for students to synthesize everything they have been working on during the semester.

But that is our view, that is, the perspective of the professors. What ultimately matters is how this impacts the students’ perspectives on the merits of this interdisciplinary approach. Therefore, this might be an appropriate time to let our students’ “speak” for themselves.

## In Their Own Words

### On Performance

At the end of the semester our students are asked to post their reflections of their final project as the last blog for the course. They are asked to reflect on what they had hoped to accomplish and what they learned both musically and computationally. In addition, they are asked to reflect on how the collaborative nature of the project affected the outcome, and to express their thoughts on the performance aspect as well. With regard to what the performance aspect contributed to the final project, one student aptly stated:

Our project would have been nothing without the performance. Our program is actually dependent on our being there to move the execution along. It’s very unlike a lot of the other projects we have completed over the course of the semester, in which a single click of the mouse or tap of the space bar will send the whole code running through itself on its own. So my thoughts? All positive. It was great fun.

The student goes on to discuss the performance aspect and how it contributed to the fact that he found working on the project to be a fun experience. As the following statement attests, they did a great deal of debugging, but the specter of having to “perform” for an audience heightened the motivation for this student and his partners.

We were sure to make fail-safe code, as well as run countless tests so [that we could] rest assured that nothing would go wrong. And it turned out great. We got some laughs and threw in a few last minute surprises of our own in regards to how endless the possibilities were. I would not have had as much fun with this finalassignment had it not been performance-based.

We all know how crucial it is for students to be motivated. The next comment speaks to the importance of making the information you are trying to impart relevant to the students.

I think we learned how to take our prior knowledge of scratch and apply it to what we actually like.

A student commenting on how much she learned through everyone’s presentations mentioned:

… using Scratch as an interactive accompanist was so cool! I would never have even thought to incorporate live music with Scratch. This really opens the door for using technology as a performance element in the general music classroom.

One of the CS students had the following sentiment with regard to the performance aspect of the final project.

This project was an obvious closing assignment to the semester because it allowed us to do really anything we wanted, with the only restrictions that we use what we had learned. It makes sense to have a project that incorporates using the program to write code that will support a performance, because that completes the circle that is the construction of the instrument, and the performance with the instrument.

In discussing the musical dimensions of this project, one student wrote:

It made me think about the hierarchy of understanding in music. We think about music in different levels of abstraction. Underlying most of it is the beat, which lies inside the bar, which lies inside the form. Tonality is made up of scales and chords. By having these concepts exist in the code, the computer is able to start to interpret things similarly to how we interpret it.

Another student, in discussing how this project in its conceptualization and culmination through performance stretched his thinking, stated:

The aspects of this project [took] everything we had been learning about coding with Scratch throughout the semester and brought it to full fruition. We not only had to code, but to combine that into a live presentation with things going on outside of the coding. We had to take concepts which in live performance on an instrument are pretty basic, but putting them into code proved to be difficult.

Not every learning experience is a positive experience, however. When we ask our students to stretch their thinking and take risks, there is always the possibility that things will not go according to plan. No matter how much preparation we put in, there is always the possibility of the unexpected, as this student’s comment suggests:

I also learned that with computing there’s a ton of room for hiccups and technical difficulties. Again, it was extremely disappointing that our project didn’t work correctly at the Revolving Museum, but unfortunately that’s just the way computers and technology go.

Another student commented:

I learned that performing music live is one of the most nerve-racking experiences imaginable… I also learned that there is a big difference between practicing music alone and performing live. When you are live things don’t always go as planned.

These are important life lessons for everyone, in that things won’t always go smoothly, whether you are a performer, programmer, or teacher. Learning to deal with problems and mistakes in the moment and not get flustered is an invaluable skill to develop.

### On Collaboration

Group projects can add an additional layer of stress for many students as well as fot the professors. It can often take the entire semester for certain students to adjust to the idea of not working on a project solo or to acknowledge that other people’s opinions might be equally as valid as their own. The following student statement really drives home the importance of the value of collaborative work.

I learned that everybody has something to offer.

This sentiment was echoed by another student, who stated:

It’s always interesting to work with other people because we have different ideas.

But even those sharing common ground can find collaborating a beneficial experience as shown in this student’s comment:

From working with my partner I learned how easy it can be when both partners have the same idea for what they want the project to be. Both my partner and I wanted to make an interactive instrument, and we both had ideas contributing to the final project.

But what about the person who generally hesitates to speak up for fear of getting their idea shot down by others? One of our students learned an interesting lesson:

At first we had no idea what we were going to do, but once we threw ideas out onto the table we came up with one idea that combined all of our ideas together. I learned that when you have ideas it is best not to keep quiet, because they can be implemented into a project and it could possibly make it better.

The project she is referring to was truly collaborative, with everyone making an equal contribution to the outcome.

For students planning on teaching, working with someone who does not share your background can help alter your approach to how you might teach, as suggested by this student who wrote:

When I want to work with more advanced concepts and my partner(s) are not of the same musical level, I have to find new ways to describe my western classical training to someone without any or a only a little.

Another student who had worked with this particular partner before made an interesting observation about his partner:

… things that I showed him in previous assignments he brought up during production of this one, which made it easy because he retained any programming tricks I showed him. Scratch may be crude coding to more experienced programmers, but it is still obvious that the central ideas ultimately sink in.

Not all collaborations will work well and some will invariably work better than others. Oftentimes one negative experience can leave students with the idea that group projects aren’t workable. This comment from one student who was becoming disillusioned with group projects is particularly rewarding since, like everything else in life, learning to work with others takes time and patience:

When we encountered a problem with the code, we all took part in the problem solving. I was happy that my partners were interested in making our project the best it could be. In past projects, I sometimes felt as though when my partner and I encountered a problem, my partner would give up and leave the problem solving up to me. This project showed me that three people working together can achieve much more when they all care about the finished product.

Getting students to care about their work, particularly in a general education class, is no small feat. Designing learning experiences that allow enough flexibility to find and express shared interests when working on group projects will help to increase student motivation.

### On Computational Thinking

The next student’s comment speaks to the importance of fun in the learning environment. Not only were she and her teammates having fun, they were problem-solving computational issues:

This was such a fun project to do. The challenge was to give the program many facets while still keeping the coding and physical operation through the program simple.

Another student identified learning the value of modularization:

I learned that if you break down what it is you want to accomplish, then the tasks become much more manageable to figure out.

He continued by elaborating on the goals for his group’s project:

I chose to do this project because I thought that it would be interesting to see how many different musical elements the IchiBoard could handle at once. I learned that even a simple device can control and change an extraordinary number of musical elements.

Learning and problem-solving computing issues through music — and music issues through computing — helps students develop the habits of mind needed to be successful, as expressed in the following sentiment:

I learned how much you can push the boundaries of music in this assignment. The project was able to manipulate the song a lot and also do it in real-time while the song was playing. This taught me a lot about what it might be like to do a live performance with a real instrument.

Throughout a semester, our students learn a great deal about music, about computing, and about working with others. Perhaps the crux of why we do what we do is best explained by this student:

This assignment, I feel, was more than just [about] musical compositions or performances. There were so many unique and different outcomes from every other group. It was amazing how some made a storytelling more enjoyable while others made a simulation of learning Spanish with Dora. I think this assignment shows that there can be a lot done with just one program and one IchiBoard. As long as you let your imagination run wild and free, anything can be accomplished. This assignment let us do our own thing and decide what we wanted to do. It may have been a bit difficult to decide what we wanted to do, but when decided, it made the project/assignment more enjoyable.

Letting students tap into their imaginations and reconnect with the sense of curiosity they had as children are what we hope to foster through the various projects.

## Making Connections

The term “making connections” has multiple implications in the context of our interdisciplinary work. We talk about connecting to things, to people, to concepts, as well as making connections between one domain and another, and to the wider world. Sometimes we are referring to connecting to and through technology and at other times we are referring to the interpersonal connections that are needed to be successful in any endeavor of significant size and impact.

We are confident that taking an interdisciplinary approach to computing and music will yield opportunities for you and your students to make multiple connections to music and computing content, to other areas of interest, and, most importantly, to other people. As you already know, it is easier than ever to connect with people, places, and things. We hope the information in this book helps to make those connections more meaningful for you and your students and opens up new possibilities and ways of thinking.

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1. The original quote “If you build it, they will come” is from the movie *Field of Dreams* released in 1989 from Universal Pictures, directed by Phil Alden Robinson and starring Kevin Costner. [↑](#footnote-ref-1)