CONNECT!ONS Med!aLit moments

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In This Issue…

Theme: Media Literacy and Computational Thinking

Interpretation is a strange beast. We're always interpreting the world around us, and, as the core concepts of media literacy point out, interpretation is conditioned by our values, lifestyles and beliefs. And yet we must always rely on interpretations of what we see, hear and read to make reasoned decisions on matters large and small, and even life and death. To make wise choices possible – the ultimate goal of media literacy – we must take account of both the qualitative and quantitative sides of our interpretations.

As we've argued in the pages of *Connections*, certain answers to questions are less valuable than the quality of the process by which we arrive at our conclusions. Take, for example, a news article mentioned in our interviews with Robert Panoff, director of the Shodor Foundation for computational thinking, based in Durham, North Carolina. Panoff said:

"If people are making arguments with quantitative evidence, it takes a little bit of time to think about, what are they really trying to tell you? There was a big article in the *New York Times* years ago talking about the impact of the Internet on travel agencies and how small agencies were being hurt disproportionately compared to large agencies. And their evidence was that the writers had looked at travel agencies that had closed in the previous three or four years. Among large agencies, meaning agencies that had three or four or more agents, more than 30% of the travel agencies had closed, but amongst small agencies, the number that closed was more than a third. But I'm reading this article, and I'm thinking, that's the same number or it could be, right? And I don't have any more data than what was published in the *New York Times*. But what if it turned out that there were exactly 34% of each small and large firms that closed? As a percentage, couldn't you describe that as more than 30%?"

How often will news readers continue reading an article which includes statistical evidence that does not point to a well-defined issue? Rather than resist the urge to come to a quick conclusion, the immediacy of coverage and the abbreviated format of news may encourage readers to do just that. Readers of the *New York Times* article may have rushed to the support of smaller agencies. And yet the evidence to support that judgment was less than impressive. The quality of the reasoning processes encouraged by the *NYT* article was less than ideal. Computational thinking is devoted to enhancing the development of such process skills.

In this issue of *Connections*, we present an interview in which Robert Panoff shares his knowledge of computational thinking. In our first research article we present some of the connections between media literacy and computational thinking. In a shorter article, we traverse some of the more unexpected connections between media literacy and computational thinking, particularly in the work of Ursula Wolz—programmer, consultant and academic who demonstrates the connections between journalism and computational thinking. And in our MediaLit Moment for this issue we ask students to identify the creative techniques used in movie trailers.

Research Highlights

An Operational Definition of Computational Thinking
What is computational thinking?

The International Society for Technology Education (ISTE) just adopted in 2016 a new set of educational standards for students that call for students to develop skillsets enabling them to become agents of their own learning, and "Computational Thinker" is a key element of that skillset: Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer, Computational Thinker, Creative Communicator and Global Collaborator (http://www.iste.org/standards/standards/for-students-2016). Regarding Computational Thinking (CT), ISTE stated: "Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions." More detailed descriptors of skills for each learning arena, including CT, are also provided by ISTE.

In 2011, ISTE and the Computer Science Teachers Association (CSTA) collaborated with leaders from higher education, industry and K-12 education to develop and publish an Operational Definition of Computational Thinking for K-12 Education. Here are the elements of that definition:

Computational thinking (CT) is a problem-solving process that includes but is not limited to the following characteristics:

- Formulating problems in a way that enables us to use a computer and other tools to help solve them
- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Automating solutions through algorithmic thinking (a series of ordered steps)
- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- Generalizing and transferring this problem solving process to a wide variety of problems.

Of particular interest to us at CML are the dispositions or attitudes that are considered essential dimensions of CT:

- Confidence in dealing with complexity
- Persistence in working with difficult problems
- Tolerance of ambiguity
- The ability to deal with open-ended problems
- The ability to communicate and work with others to achieve a common goal or solution.

Intersections between Media Literacy and Computational Thinking

A networked model of education, suitable for 21st century education and embodying the 4 C's of Creativity, Collaboration, Critical Thinking and Communication, centers around learning inquiry processes as well as content knowledge, so that learners are prepared to interrogate media and information anywhere, anytime. The Shodor Foundation's work in computational thinking embodies these qualities, providing many resources for teachers and students alike, with materials that are modular, interchangeable, and explorative. Shodor's Executive Director, Robert Panoff, remarks, "With computational thinking and dynamic visual interactivity, every equation becomes an exploration." Panoff emphasizes "pathways, not pipelines," meaning that students may pursue competence in computational thinking regardless of age.

With the ISTE/CSTA definition of computational thinking, the role of process skills becomes much more visible than in some other disciplines-- "Generalizing and transferring the problem solving process to a wide variety of problems." In discussing computational thinking as a skill set for the 21st century, Masha Mohaghegh and Michael McCauley highlight ". . .the importance of the algorithm and solution design process, rather than the solution itself, and, while coding and programming language syntax is important, conceptualization is more essential, as it can be transferred to other areas of study" (p.1528).

While it's a given that visual literacy is part of media literacy, computational thinking utilizes visualization for deeper understanding of problems. Panoff likes to point out the "big lie" of mathematics textbooks with sentences beginning, "As you can see. . ." Instead, visualization becomes an essential component of practice.

The ISTE listing of attitudes and dispositions that are essential dimensions of computational thinking (or CT) include "The ability to deal with open-ended problems." While the context for these problems often has to do with problems in engineering, the Empowerment Spiral of media literacy practice – Awareness, Analysis, Reflection and Action -- certainly involves an open-ended pursuit of solutions to urgent issues of media and society.

Computational thinking empowers students of all ages. For example, in the TangibleK program created at Tufts University, a curriculum geared towards pre-K to second grade students aims to teach a particular subset of mental tools to young children that are useful for applying computational thinking in a robotic context. The curriculum is based in MIT scientist and educator Seymour Papert's theory of constructionism: a "learn by doing" approach to education; recognition of the importance of objects for supporting the development of concrete ways of thinking and learning about abstract phenomena; and understanding that powerful ideas can empower the individual. "A powerful idea is a central concept within a domain that is at once epistemologically and personally useful, interconnected with other disciplines, and has roots in intuitive knowledge that a child has internalized over a long period of time" (Bers, p.4).

While analysis through media literacy processes has typically focused on qualitative analysis, the skills associated with computational thinking encompass the quantitative side of the media literacy equation for deconstruction and construction. Where re-iteration and successive approximation characterizes searches for engineering and CT solutions, both media analysis and media production involve repeated processes used to reach an intended goal. Furthermore, the Core Concepts/Key Questions of media literacy serve as “objects” that can be applied to media content anywhere/anytime, using both quantitative and qualitative tools of analysis.

Collaboration and project-based learning are common to both fields, and real-world applications projects are the norm.

The operational definition of CT is also a framework which combines a discrete set of skills, habits of mind and dispositions which form the basis of CT practice--in much the same way that the Core Concepts create guidelines for inquiry.

Where media literacy is concerned with the credibility of information, CT deals with similar issues. Panoff asks questions such as these: “What’s the quality of the data that you’re working with? Does it provide you with valuable information? How do you know? Do we have a better understanding now that we’ve done this work?” And he asks why it matters: “How or why is this an important way of looking at the world?”

Assessing risk, and arriving at reasoned judgments are common to both CT and media literacy practice. As CML has long stated, the ultimate goal of media literacy education is to “make wise choices possible.” This takes proficiency in both qualitative and quantitative reasoning.

Though CT is grounded in mathematics and the sciences, creativity and innovation is an inherent part of CT. According to Mohaghegh and McCauley, “It is a combination of logical, arithmetic, efficiency, scientific, scientific and innovative thinking, together with qualities as creativity and intuition” (1525).

Like media literacy processes, CT practice doesn’t just solve problems. Examining values and assumptions is also clearly part of CT. In one of his interviews, Panoff relates a story about observation and reflection. “My mother told me always to do something before I cross the street. What do you expect she told me? She said, “Look both ways.” So I look to the left, I look to the right, I step into the street, my mother jerks me back and yells at me, “Robby, what are you doing? Didn’t I tell you to look both ways?” “I did.” “Didn’t you see that car coming?” “Yeah. You told me to look both ways. I did.” I was told an algorithm. The algorithm is ‘look both ways,’ and I did. But I’m still getting in trouble because basically, I followed the precept of ‘do as you’re told.’ I did, but there wasn’t this extra step of knowing the reason why I was making these observations. The process of crossing the street involves looking both ways, but the purpose is to use that information to make a decision. I look to see whether a car is coming, and whether the driver can see me. If they can see me, they’ll stop and I’ll be safe. I was told to look both ways, and I did, but the reason I’m making these observations is that I’m going to use that information to make a decision whether to step from the curb or not.

Novel Connections Between Journalism and Computational Thinking
In an article for *ACM Transactions on Computing Education*, Ursula Wolz and her colleagues at The College of New Jersey documented the results of a program implemented at Gilmore Fisher Middle School, Ewing, New Jersey, supported by a three year grant from the National Science Foundation Broadening Participation in Computing program. Wolz and Kim Pearson are the cofounders of the undergraduate program in Interactive Multimedia at TCNJ. Like the TangibleK robotics program at Tufts (see our first research article for more), constructionist theories of development advanced by Seymour Papert and Sherry Turkle formed the theoretical basis of the Interactive Journalism Institute for Middle School.

The project aimed for broadened participation in computing; required a multidisciplinary collaborative perspective that extended beyond traditional STEM disciplines; aimed to infuse the program in existing educational institutions; and insisted that the program be accessible to K-12 teachers. For the project, Wolz and Pearson recruited students who were not identified as "math and science types," but instead had a bent towards language arts. They also intentionally recruited teachers who are normally isolated from the STEM disciplines.

In explaining their motivations, Wolz and her colleagues write, "Our work is multidisciplinary, informed by the following perspectives: 1—computational thinking and the pipeline crisis in Computing and Information Technology – 2—interactive journalism and its isomorphism to computational thinking – 3—creating equity through sustainable professional development. The unifying theme is that expanding participation in the computer science pipeline will require inquiry-based student engagement that allows young people to be innovators rather than simply users of computing technology. The experience must create a supportive, cooperative culture for students and their teachers that extends beyond the classroom in which all members develop confidence and competency" (3).

In addition, Wolz and her colleagues write, "Civic media is only one of many fields recognized as computing dependent. For example, professional journalists have been using and building databases since the early 1990s, and a number of news organizations that won Pulitzer prizes over the last 15 years had "database editors" on their teams. Underlying both computing and journalism are foundational principles of information access and dissemination, fact analysis, process description and decision making for results presentation. Both journalists and computer scientists embrace these neutral terms to describe how to construct a news item and a software artifact, respectively. As Adrian Holovaty has observed, journalism and computing are both concerned with gathering, organizing and presenting structured data" (7).

The first summer institute of the three-year program consisted of two weeks, scheduled in early July 2008. The first week was exclusively for teachers, who partnered with college faculty and trained undergraduates with expertise in interactive journalism to complete a story assignment. In the second week, the teachers worked with middle school students recruited from their school. In the second summer, the returning teachers and trained undergraduates took primary responsibility for both weeks. They were funded through NSF and were journalism, computer science, English and interactive multimedia majors.

In the first week for teachers, lecture was minimized. Technical and conceptual training were front-loaded, leaving significant time for researching, writing debugging, editing and production late in the week. During that week time was allocated for teachers to reflect on their process as a group. Teachers also contributed to assigning students to beats based on their knowledge of the students' learning styles, leadership skills, interests, and personal dynamics. A teacher, an undergraduate student and three to five students covered a beat together.

The second week was a one-week camp with the students. Days began with warm up exercises for team building; after lunch students participated in activities with computing themes, as well as activities to build cooperation across beats. The majority of the week's curricula focused on teaching the basics of interactive journalism, and explicitly pointing out its relationship to computational thinking. Topics included, what news is, what it means to cover a beat, and how journalists file an online article consisting of text, graphics, video and animations. Next, students were gently introduced to procedural animation via Scratch. Then they were given explicit models of animations that illustrate news stories, and encouraged to write their own.

While the article includes an evaluation of the success of the overall project, including afterschool programs and infusion into general language arts and social studies curricula, that first summer institute was especially noteworthy: "Our intent in this demonstration project was to gradually, over two years, relinquish ownership of IJIMS and to eventually see adaptation of the model in mainstream classrooms. To our delight, the teachers far exceeded our expectations. They and their students produced a magazine in the first summer that incorporated all the elements of journalism and computational thinking we identified" (8).

Sources Cited

Wolz, et al., "Computational Thinking and Expository Writing in the Middle School *ACM Transactions on Computing Education* 11.2 (2011): 22 pages

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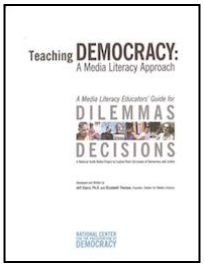
CML News



It's Election Season (oh my!)
Looking for a curriculum to teach during election season? Free download *Teaching Democracy: A Media Literacy Approach*. Find it here.

Media Literacy in Colombia
Eduteka (http://eduteka.icesi.edu.co), a Colombian education organization which is affiliated with the Icesi University School of Education Sciences, sponsored a conference June 3, 2016, EducaTIK, in Cali.

CML's Tessa Jolls and Robert M. Panoff, Executive Director of the Shodor Education Foundation, provided keynotes for the conference, followed by day-long teacher workshops on June 4.

Spanish translations of CML's work and peer-reviewed articles are also contained on Eduteka's website.

CONSORTIUM for MEDIA LITERACY

Uniting for Development

About Us…
The Consortium for Media Literacy addresses the role of global media through the advocacy, research and design of media literacy education for youth, educators and parents.

The Consortium focuses on K-12 grade youth and their parents and communities. The research efforts include nutrition and health education, body image/sexuality, safety and responsibility in media by consumers and creators of products. The Consortium is building a body of research, interventions and communication that demonstrate scientifically that media literacy is an effective intervention strategy in addressing critical issues for youth.

Resources for Media Literacy

CML Interview with Robert M. Panoff, Executive Director, Shodor Education Foundation

CML interviewed Robert M. Panoff on June 27, 2016. The Shodor Education Foundation, established in 1994, is a nonprofit organization serving students and educators by providing materials and instruction relating to computational science (scientific, interactive computing) http://www.shodor.org.

CML: What is your definition of interactive computing?

Bob: We actually use three words: dynamic, visual and interactive. So the dynamic part is that, once you start doing something there is action that continues with or without your intervention. The visual part is that you see multiple representations, that could be the changes of numbers, the changes of and colors, the changes of an image. Take, for instance, an example that we use frequently with students:

http://www.shodor.org/interactivate/activities/RabbitsAndWolves/

In this interactive model, you have actual rabbits moving on a screen or cartoon images of rabbits moving on a screen. But it's visual and you have multiple ways of interpreting what you're seeing. And the interactive part is that you are determining and controlling aspects of what you're doing while you're doing it. It's not simply static on a page. You could be interactive with a book because you're the one turning the pages, but we mean something more than that. We mean that the actual interaction with the mathematics, changing the parameters, changing the values, are such that you can get a deeper understanding of what you're studying, what you're looking at, what's being presented to you. Because you're actually engaged in the process of steering or running the application.

CML: Your Project Succeed Environmental Science workshop on global warming and forests gives students maps, tabular data and even Excel spreadsheets from the U.S. Geological Survey to help students think about the possible effects of global warming on different species of trees. Just seeing the data represented in so many different formats was truly an interesting experience.

Bob: The other part of what we do is, in all of these things, we make everything available to everyone. If you go to the top of the Rabbits and Wolves page, you'll see there's an instructor button, or tab. It looks like manila folders. If you click on the instructor folder, there are suggestions for teachers, there are standards that help them align to different states or national standard arrangements, there are discussions, there are lesson plans. If you're actually going to teach this Tuesday morning at 9:30, is there anything else we can provide that would help you be successful? We've also realized that in both the homeschool and traditional brick and mortar school models, these are things for which the instructor doesn't have to be a teacher, and the teachers could be the students themselves.

A lot of these could be self-directed activities. Right now, all summer long, we teach different topics different weeks. So all this week in the morning we have kids learning iPhone programming concepts, and in the afternoon, they take a class called "Modeling Your World," which explores everything from atoms to galaxies and the environment in between, so every day of the week they study a different part of science that could be used with, or could be studied with, computer models, and they learn how to actually build those models by seeing how models have already been built. The lessons for that are then made available, so if teachers want to take that material and bring it into a regular classroom, or they want to do an enrichment after-school program, or they want to do a Saturday program, or a summer program, we've already knocked all the hard parts out, and so they could take our materials and adapt them and choose to adopt them, and then they can become very good at it.

It's a model where we're trying to invert the normal process where the school board tells the teachers what they have to teach, and then the teachers have to do all the adaptations on their own and then eventually they become adept at it; whereas in our model a teacher could go on our website and become adept – and then they could adapt the materials and then ultimately choose to adopt them. Instead of the "adopt, adapt, adept" model, we start with teachers becoming confident themselves and then give them the ability of modifying things to fit their own classroom and then they can choose to use them or not. We are not selling anything, it's not a canned curriculum that school boards are forcing on teachers. Most of our stuff teachers or students are choosing to use them themselves.

CML: That's so powerful -- it's the approach that CML uses too, with our framework -- teaching people, What is it? How does it work? What does it mean? How can you apply it to different contexts, different subjects, different situations? And then, how can you see if it's really working? This is an inquiry-based approach that invites learning rather than dictates set answers.

Bob: Yes, we've categorized inquiry processes into four basic types: **Open Inquiry,** where there is very little teacher guidance at all. It's just let the students do whatever they want and if they're interested and capable they can figure out things on their own. Then there's **Seeded Inquiry,** where you show students something interesting and show them how you did it or how you learned it and what they could be capable of doing and then that gives them an idea to get going. Then you have more complicated approaches, including what we call **Guided Inquiry**, where you have a set of instructions that might be a little more detailed and the discussion about what people are learning also has to be moderated because the students may not realize what they are doing or how they are doing it. And then the last approach, which people tend to overdo sometimes, is called **Directed Inquiry**, where you basically give students a glorified worksheet that says "Do this, do this, do this, do this, do this. Now tell me what did you get?" Right? And so, there's very little inquiry in **Directed Inquiry**, and there's very little inquiry ultimately in **Open Inquiry,** since students often are lost and overwhelmed. The other two approaches **– Seeded and Guided Inquiry** -- seem to be quite successful.

CML: Would you please give an example of why you find **Open Inquiry** less successful?

Bob: Our current best example of the weakness of **Open Inquiry** without any direction is, "If I ask you 'What is the boiling point of radium?' Do you happen to know it?"

CML: No.

Bob: What would you probably do if somebody were to ask you and you were in front of a computer?

CML: Google!

Bob: Okay, but the first number that pops up that Google shouts at you is about 1140 degrees Celsius, if you look at the very first link right under that number it's more than 1700 degrees Celsius, if you look at the next link it's 1500 degrees Celsius.

CML: Wow, interesting.

Bob: So the question is if you just say, "Oh well, just look it up, whatever you get from the internet! Well how do you know?" If you didn't know what the boiling point of radium was to begin with, do you have any better idea what it is now?

CML: No.

Bob: And the numbers are not even close. It's not like you are talking about a third or fourth decimal place rounding error or a small difference in how something was measured. There's a lot of stuff that's out there in science which is just totally inexplicable. The phrase I use all the time is “indefensible.” I'm not saying it's right. I'm not saying it's wrong, I'm saying there's no reason to believe it. It's indefensible. You have no way of telling yourself which is, quote, unquote, "right or wrong" but what you do know is the numbers are all over the place.

CML: Right.

Bob: And then there are other more subtle ones like, you're measuring properties of the earth, the mass, the radius, the volume and you get eight different answers from eight different websites, and they are all close but they are not the same. And why is that? And so, without some guiding, without some intervention, students can be left with the idea that we don't know anything. Or -- and this is unfortunately the more common case -- they don't even notice there's a difference. They just take the first number. And they say, "Okay, there it is."

CML: And then the next question is, "Well then how do you help them resolve this?" Because they are getting different answers, so it can get into the whole importance of content knowledge. What is the content? What's defensible? What isn't? What are the criteria? How do you go about that and what are the parameters?

Bob: Right, and one of the things that we've learned is that sometimes you have to go off grid and go find an expert. And that expert may not be in the business or have the time to put up a webpage, you know? But, if you talk to somebody at Duke, or Harvard, or CalTech, or UC Irvine, or somebody credible and you say "Okay, if I needed to know this, which of these values is closest, and do you have any idea what was done?" It's pretty clear that Google by itself is not the arbiter of these things. Pre-Internet I would take kids to the library and have them look up properties of planets or properties of materials, and they would ask, "Why are these numbers different?" But it still depends on who measured it, how it was measured, and the kind of experimental design that was used. It would get them to understand that, most of the questions in science do not have a unique, singular answer. It's a process of inquiring and judging that gives you the confidence that you've learned something.

A lot of properties in science depend on how they're measured. And some are more accurate measurements, some are more precise measurements. The question we always ask is, "How do you know?"

CML: *How do you know?* And then, in a way*, what is your own application? And how important is it?* So there's a lot of judgment involved. You have to assess the risk of being wrong. [laughter] Or, the precision involved. So it really raises serious issues that come up in terms of the content versus the process. Where are the lines with content? They're not as definite as people like to think!

Bob: There's a whole range of things that people are doing these days that, from a science standpoint, are highly questionable. Computers do not use exact numbers; they use approximations of numbers. Then the mere fact that we're using a computer to do these different calculations, introduces another layer of uncertainty that can be handled, but you have to know that it needs to be handled. And there's a lot of details in how the math is done at simple levels that, again, depending on how you calculate something, you can get surprising answers because you weren't expecting them.

One of the things we teach about computers is, the difference between arithmetic, which is exact, and what we call "numerics", which is the computer's approximation of arithmetic. Especially with decimal numbers or fractions, you learn somewhere in school about infinitely repeating decimal representations of fractions. There are some fractions that are not exact, if you were to figure out what they were, there'd be a repeating pattern of so many digits, and then again and again. Those would be the rational numbers. The ones that don't repeat are irrational, like pi.

CML: Right.

Bob: So if you were to use pi on a computer, what you're really using is some of the digits of pi, because at some point your computer says, "Look I'm going to give you only 16 digits. I'm not giving you an infinite number." So you're going to cut some off, and now you don't have pi, you have almost-pi. What happens is there's an entire field of applied mathematics which cares as much about the algebra of inequality as the algebra of equality.

So, one or two numbers close to each other, because they're on a computer, they may never be exactly the same. So if you want to ask the question, "Did the car hit the truck?" Well how do you know? Well, because they were at the exact same location. Well…computationally, if you had one equation telling you where the car was, and one equation telling you where the truck was, you may never get a place where they were exactly at the same place at the same time. There might have been a time slip because time is not continuous on a computer. Right? And so, if you're trying to reconstruct an accident, let's say in a law case, you're going to be approximating that. It's not going to be exact but it may be defensible. You may learn something from it. And that's the whole goal, to be able to say, "When have I learned something, and how do I use that knowledge to learn something else?" And then you set limits. You say, "OK, within this realm, within this limit, this is what we can say," and that may be good enough. TV shows illustrate this principle all the time. If you're viewing a TV show on law, the characters will never say what's true. They'll say, "Can you give us your opinion to within a reasonable degree of scientific certainty." And that's what you're hoping for, is a reasonable degree of scientific certainty, and then helping kids realize they could do that too.

CML: And in a sense, the lessons are that ultimately, we have to learn to live with some ambiguity. There just aren't 100% guarantees on anything.

Bob, do you have a list on your website that details issues that teachers need to be aware of regarding algorithmic thinking, computational thinking, and numeric thinking?

Bob: Either fortunately or unfortunately, most of the people that actually take the time to write something like that and get it published take very extreme views that embody their own way of looking at the world. I don't know if anyone's done a survey of the range of things that people do. But, on one end, you have a view of the world in which everybody should learn how to program.

Because, in this view, it's all about computer programming. And some of us believe that modeling is more important than programming because you can always hire and outsource programming, but what's never been outsourced is the job of telling the programmer what to do. So the next higher level is modeling and that's what some people think is computational thinking. And then you have other people who say, "Oh, nobody ever has to write anything. Everybody just buys applications like Excel or Word." I mean nobody writes their own word processor, you just use Word. Nobody writes their own spreadsheet, you just use Excel. So what we really need to do is to teach the awareness of what are the applications that people use on an everyday basis to use a computer or to interact with data. We don't really need to teach anything more, they say. And again, these are all very different views of what kids should learn how to do. Obviously, they could build on each other. You could learn what's in Excel, and you could learn how to program on your way to learning other things, but you don't have to.

CML: Great Britain is requiring coding for all students now. So they are taking that first approach that you mentioned.

Bob: Yes, and Switzerland is taking the approach that modeling is most important.
The guy that wrote one of the best NSF-funded modeling programs called, “Agent Sheets and Agent Cubes,” was actually born in Switzerland. He's now a professor in Colorado. Now, he’s going back half-time to Switzerland to make sure that every kid in Switzerland knows how to build a computer model, not necessarily write a computer program.

I don't know if England is going to go the way of the US, but in the US, one of the real problems we have right now is that there’s been this big push for computer science, and many undergraduate schools are seeing a massive increase in the number of students who say the name of the degree they want to go after is computer science. The problem is that what many colleges mean by computer science isn't necessarily what business or the country needs. They're dumbing it down. They're taking out the math and science requirements. So students know how to make a loop, but they don't know what that loop loops. If you told them, "Write me a code that loops integers from one to 100 in steps of two," they could do that, because you just told them everything. But can they solve problems?

Med!aLit Moments

Short Cuts, or How to Understand a Movie Trailer

Movie trailers are art forms of their own—and yet it's so easy to watch them flash by without fully understanding their rhythm and structure, or the media tools used to sell the movie before its theatrical release.

Have students identify the elements of a theatrical trailer

AHA!: Movie trailers aren't just slapped together. They're totally planned out!

Grade Level: 6-9

Key Question #2: What creative techniques are used to attract my attention?
Core Concept #2: Media messages are constructed using a creative language with its own rules

Materials: High speed internet access, LCD projector, screen

Activity: Play a trailer for your students, and ask them if they can identify what's attracting them to it. For lack of better material, you might try this series of trailers profiled in an article in the *New York Times:*

http://www.nytimes.com/interactive/2013/02/19/movies/awardsseason/oscar-trailers.html?_r=1&

Here are some elements of trailers for students to consider, with credit to Stephen Garrett in *Film Maker Magazine* online, January 13th, 2012. Film trailers generally take their cuts from beginning to middle and end of the film. And they tend to function as small stories in three acts: introduction to characters and environment, obstacles and complications, and intensification of conflict. If they don't tell those three-act stories, the editors may be more interested in establishing a tone or mood to match that of the film.

Sometimes the filmic elements themselves take center stage. Does the trailer rely most heavily on dialogue? Do they dwell on the lush cinematography or set design? What do the music cues tell you about the film? Does the trailer focus on actors' performances? Or is it the genre that determines most of the creative choices of the editors? A trailer for a *Harry Potter* film will be much different from a trailer for an offbeat comedy about two characters on a road trip.

Once your students have had a chance to tease apart the elements of the trailer, ask them to rate it. Did it grab your attention and entice you to see the movie, or did it seem like a hodgepodge of outtakes that were less than exciting?

Extension: For a subsequent class, ask students to think of movie trailers they thought weren't all that great. What do they think the editors should have done instead?