



THE SCIENCE OF EDUCATION MINING THE MIND

“Exploring Why Joannie and Johnnie Do Not Learn” SOME BEGINNING THOUGHTS ON THINGS CADRE-II Fall 2009



I. My views on why Joannie and Johnnie do not learn:

Disconnected.....social/familial issues.....reading comprehension.....inappropriate measures of “learning”.....inadequate scaffolding of knowledge.....too broad with little depth.....teachers are spread too thin (large numbers in classroom, too much to cover, teach to test).....language difficulties. (tb)

I think they do not learn because they don't pay attention. They don't pay attention because we either did not do a good job of getting them hooked or our teaching is not relevant to the things they are paying attention to. (nd)

Evidence from the video (Biology Teacher Bob “I thought I made it clear”) revealed his thinking and beliefs that his explanations were what allowed students to learn. Often teachers have a “covering compulsion” thinking they have to transmit large amounts of knowledge to students.....Teachers’ focus and familiarity with didactic instruction does not allow deep understanding of concepts.....From the video, it appeared that the teachers were not familiar with inquiry learning processes and did not orchestrate their classroom learning environments and curricula in order for students to learn.....often teachers are uncomfortable with a student-centered classroom and are uneasy about giving up perceived control.....Students only learned 10% of the chemistry concepts in the film, showing that there was too much content to learned in the course (mile-wide, inch-deep).....Students memorize concepts but do not incorporate the knowledge at higher levels of thinking (Bloom’s Revised Taxonomy) and apply it or use it in a meaningful way – Teachers allow this because many also learning in this manner.....Teachers often lack experience with professional learning communities or professional development which encourage and/or support inquiry learning and do not understand its value.....While standards have their place, districts, administrations, curriculum committees and teachers have bought the idea that students can learn the many concepts in the standards at the specified grade levels – their underlying beliefs are that students should learn all of the concepts yet do not explore how the learning environment and pedagogy affect learning.....Teachers do not have adequate exposure to inquiry learning and constructivist teaching in college pre-service education programs.....Student teachers primarily practice what the cooperating teacher does in the regular classroom and are focused on procedural concerns (Moore, 2003) – Moore reports that almost without exception the student teachers focused mainly on managing the class and lesson planning than with theories of learning.....My brief informal study observing student teachers revealed that at the point of possible inquiry engagement the student teachers turn the focus back onto themselves to finish the lesson ‘in time’.....Student Teacher beliefs: student teachers have told me that ‘inquiry learning takes too long’ which reveals their attitudes and beliefs.....Pre-service and in-service teachers often lack confidence in their own content knowledge which can affect beliefs about their instruction; research is beginning to address these issues and connecting teachers’ subject matter knowledge and pedagogical content knowledge (Abell, 2007) – so a lack of prior educational research and educational training in this area has impacted current teacher behavior. (sc)

They have had negative experiences with schooling.....Their family does not value learning as much as it does “achieving” or “enjoying”.....They have emotional baggage that interferes with their learning.....They choose not to focus on learning. (rd)

They are not motivated and they are bored. They want to “be” a professional without working to “become” a professional. (te)

Teacher does not accept who they are and wants to conform to a certain standard.....Distracted by other students.....Low self-confidence.....No support at home.....Distracted by life at home.....Perceives teacher does not care about them.....Teacher does not engage all students into learning.....Teacher does not teach actively (worksheets only).....Teacher is impatient.....Teacher is not qualified.....Teacher is burned out.....Student is unengaged.....Student doesn't like school.....Student has emotional problems. (ah)

J&J did not learn because: a) they were not taught phonics nor mechanics of word attack skills; from my experience, sight words, vowel sounds, etc. were replaced by the whole language technique. This was terrible. This affected their ability to express themselves, b) their teachers socially promoted them rather than struggle to overcome lack of needed basic skills, c) in primary J&J never received help when they got “stuck” on a concept. They were pushed along. (dh)

Joannie and Johnnie are students in the American public school system and are in a grade somewhere between grades 7 and 12. They have been consistently taught by teachers that follow a very traditional method of teaching which usually follows one of two scenarios:

A) Their teachers have provided them with sets of science facts and vocabulary. They have had to read and outline the chapters in their science texts. They have been required to answer the questions at the end of the chapter. Their teachers have then given them tests and quizzes based on the questions that they answered from the end of the chapter.

B) Their teachers have provided them with sets of science facts and vocabulary to explain those facts. They have had to read and outline their science texts. They have had to complete the end of chapter questions. They have performed a “cookie-cutter lab” which is more like baking a cake than investigating scientifically. They have read the lab from their lab manuals. They have listed the necessary materials, rewrote the purpose in their own words, rewrote the step-by-step instructions, performed the lab, observed and wrote down what happened and finally wrote a conclusion. The conclusion usually reads, “I loved this lab. Can we do more labs like this? You are the best science teacher and I really like you!” In either case the results look like...

1. The students are regurgitating all very well and are getting great grades on their assignments and tests. Mom and Dad are happy, the students are happy, the teacher is happy and all is right with the world; OR,

2. The students are bored and do not do the work (perhaps they talk or do their hair during class). They have poor grades on assignments and tests. Mom and Dad are upset, the student doesn't care, the teacher is upset and it is concluded that they just are not trying hard enough to concentrate on their work.

In either case, their standardized test scores are very low. Administration wants to know why. It is easy to blame the students, parents or teachers in second case but what is going on in the first case. These are our best students yet they cannot score high enough to get into even a Community College. The conclusion is that the test must be wrong. The next school year, their new science teacher must re-teach them everything they should have learned in your class and he/she wonders what you did in class. Apparently you did nothing according to your students. (oh)

J&J have an unfortunate situation. They were born in a time that education is not about the whole child but more about test scores. When Joannie entered school she was a bright, inquisitive, young girl. She was a pleaser and wanted to do her best all the time. She would sit quietly and listen to the teacher. She quickly learned that if she was doing what the teacher wanted her to do, she could please the teacher. It was quite obvious that her work was neither about what she was interested in nor stretching herself to be a problem solver; but if she could “spit out” what the TEACHER wanted her to know she would indeed have success in academia. Johnny also entered school as a bright inquisitive young boy. He was very active and wanted to touch and manipulate things. His teacher wanted him to BEHAVE! He was not allowed to wonder about things or if he did, he had to do it to himself. When he tried to touch things he was told that he was not allowed. He did not want to sit in his desk all day and complete worksheets; he wanted to explore the world around him. It was not long after that the teacher referred him to a team of adults in the building and suggested that maybe he had a learning disability, was ADHD or just a plain old behavior problem. The more Johnnie tried to explore, the more rigid his learning became. Sometimes he would have to sit at a table and face the wall so he would get his “work completed”. The more frustrated he became, the less motivated he appeared to be. The young, bright, eater, inquisitive boy was now turned off to school. After all, if Johnnie did not fit into the school mode could the school actually expect that he would perform well on a test? (jcl)

To learn, one must store a distinct memory that can be retrieved at a later, hopefully appropriate, time in the future. Most kids store and retrieve distinct memories at very high rates. So, the question is: why do J&J not learn the item I am trying to teach? There are several places where this process could break down... 1) J’s mind does not find it important enough to store, 2) J’s mind does not find the item to be distinct from other items, 3) the item is not communicated as intended, 4) the item is not interpreted as intended. (rm)

Assessability – in my days I spent hours in the library researching and reading various sources. Today Google is a student’s best friend. Alone with Wikipedia, Google it, memorize it, Wiki it and you’ve got the definition, not always accurate or even relative. There’s no process except the keyboard. Example, trivia session – a question comes up, someone hits the cell phone and downloads the info. Simplistic? Maybe. Then there’s the educational system. We can all share the blame (teachers, administrators, parents, society). Sign of our times. Things are there at the touch. (cr)

After a century of educational systems that have failed in educating all students en mass, students and their families have become disenchanted with the educational process. Some students, their families and even communities have lost the value of an educated mind. Those communal attitudes shape the views of children in regard to school and by the time students have reached me in high school, they have personally witnessed those failures in their own education. The basis of those failures lies within the foundation of the system itself. A variety of principles account for this such as compartmentalization of knowledge into separate disciplines, curricula and lessons which don’t integrate with the knowledge logically into consilience and instructional methods that don’t meet the cognitive needs of student’s brain physiology. Many of these problems are traditional problems. I’m not referring to the fact that these problems are recurrent – which is true - but instead that they are recurrent because their practices – problematic or not – are a tradition. (er)

J&J did not learn due to not probing their prior knowledge. Both students are able to memorize facts and derive correct answers but could not explain the concepts due to a lack of the fundamental knowledge needed to master the concepts. Also, both students are known to be bright (smart)

students and there is an underlying assumption that they have fundamentals needed. Their misconceptions were not addressed. (gr)

J&J may not be learning a concept for many reasons. Maybe they have misconceptions that have not been cleared up and those misconceptions are blocking the real concept from getting through. Maybe they were not taught in a way that connects to them. Maybe they have a lack of background knowledge and have nothing to connect it to. (cr)

They do not learn because they are not provided with enough challenging opportunities. Also, they do not have teachers that care enough to dig deep and push them to do better! (js)

J&J are both capable of learning but fail to do so for various reasons. Perhaps they lack the motivation to do the hard work involved in learning or are comfortable with failure because it has been their experience. Attitude toward education can also have an effect. Influenced both by upbringing and personal experiences with school. Finally if J&J are in middle school, raging hormones, peer pressure and social interaction impact their learning in the classroom. And, of course, the effectiveness of the teacher! (nvdh)

J&J don't learn because they feel they don't get it. Teachers have one way that instruction is being delivered which does nothing for J&J. It is a lot of work for teachers to differentiate instruction, which a lot of teachers refuse to do. I believe it is just easiest to teach one way and simply allow students to get frustrated and give up all together. (cw)

I believe that there are many reasons that learning may not be taking place. My first thought is environmental issues. Mother and father are busy working or trying to keep up with the Jones until not much attention is given to their children's learning to read. Parents just do not put in the time with their children the way they used to. Education was the topic of conversation in most households. All children do not leave school and go home to a warm cozy bungalow. Some children have to stay outside until Mom or other siblings come home or at a neighbor's house where they may or may not get anything to eat. Then a lot of our children are a product of parents that used drugs while they were pregnant which causes slow thinking and motor skills. All children are not equipped with the same mentality for learning. Not that they can't learn but it may take extra work on the teachers part or that needed encouragement from home. The parents could be illiterate to the point where they cannot help their child with their school work. So no one pushes them to go to school which is cause for absenteeism and truancy. Students are transits - they move from two or three schools in a school year. Besides schools have become money-making businesses and they are no longer concerned about J&J learning but only about them being at school to make the dollars and not about student learning. They are passing students on to the next grade level even if they are failing in all the core areas. School is not what it used to be. (fw)

Weak curriculum foundation (changing curriculum too often or not promoting foundational skills in proper quantity).....Breakdown on parents being the child's first teacher.....Environmental issues such as exposure to brain-altering chemicals (asbestos, drugs, etc.) and lack of proper nutrition.....Student vague or inaccurate retention of presented information so memory is retained inaccurately.....Short attention span or poor attention.....Lack of recognition of developing patterns in stimuli presented.....Non-detected health issues (petite grand-mal seizures or other ailments not easily detected).....Perception of some parts of a stimuli incorrectly or in wrong relationship.....Misperceived behavior disorders (ADHD, autism, bi-polar, etc.).....Administrative policies that shift teachers, indiscriminately, from grade level to grade level and from building to building without allowing for development of expertise (usually taking three years per grade level

taught), or meaningful professional development directly related to best practices in the classroom.....Even with good retention to stimulus pattern, student retains only a small part for a short period of time. (mw)

Breadth vs. depth (at least for science).....large class size (10-15 kids/class).....lack of student accountability.....lack of planning among departments/grade levels (horizontal and vertical alignment of curriculum).....last-minute planning by instructor.....extra-curricular activities. (rw)

Are we teaching to the test? So much education seems to be about mastering a test given at the end of a learning period. There is seldom problem solving involved. They just spit it back out as it was given. Some students become very good at this approach to “doing school”. (cw)

II. What I think could be done to rectify the situation:

Design better inquiry strategies/implement them/professional development.....use problem-based learning/service learning (connected, social, depth-breadth of concepts).....create appropriate assessments.....lower class sizes!!.....rewrite CLE/GLE standards.....use some sort of tracking to build upon prior knowledge appropriately so students have a solid framework on which to grow. (tb)

Lessons need to be interesting and engaging for students. They also need to be relevant- “authentic” to what is going on in their lives. They need learning that they can use. (nd)

Examination, through research, of higher education practices in teacher preparation programs.....Further research in pre-service education, examining constructivist epistemologies in support on inquiry learning.....Research to examine evaluation tools used with student teachers to find evidence, or lack of, inquiry goals and structures.....Further research (qualitative, quantitative, mixed methods) on federal, state, district levels to explore where inquiry learning is practiced to examine what are the specific roadblocks at each level. Roadblocks can include practices, beliefs, attitudes and professional experiences.....Aiding teachers in support of reflective practice through providing training in action research to help them examine current beliefs and instructional behaviors.....Qualitative studies with teachers such as 30-year-veteran Mr. Carter to explore actual practice and to support his efficacy.....Involvement with parents in exploring teaching and learning practices via on-going dialogues and possibly training.....Grant funding for new partnerships (and continued support of current partnerships) between local districts and higher education to examine and support teachers and students together. As Arne Duncan’s button says: “With us, not to us”.....Research to examine educator beliefs (higher education, doctoral students, teachers, district officials) via a critical pedagogy framework addressing the “deficit model” in regards to urban education, exploring ways to begin to see overlooked strengths in underserved districts, schools, classrooms and students.....Additional professional development opportunities in inquiry learning, including how teachers can learn to work toward student-centered learning, gradually giving up more control to the student. Include learning activities that are meaningful and enjoyable, addressed to the adult learner (andragogy) to model best practices, and offer on-going support in a collaborative results-oriented program. (sc)

Improve schools (layout, facilities, activities, opportunities, teachers, community).....get the message out about the value of an education.....make counseling available to all.....teach teachers how to get the kids’ focus: “teach like a rock star!” (rd)

Become an entertainer and offer a three-ring circus. Truthfully it may need to offer multiple levels of instruction to keep and retain. Not sure if we need to really understand our students lack of motivation as much as trying to understand how to keep their attention. (te)

1) Less high stakes testing, 2) higher standards and expectations for teacher, 3) professional development that wows the teachers, 4) more planning time and prep time for teachers, 5) homework specific to each child's needs, 6) appropriate counseling for students vs. in-school or after-school detentions, 7) frequent pedagogy class refreshers (how to keep students engaged), 8) interdepartmental collaboration, 9) supportive administration who model and expect excellence, 10) more speeches like President Obama gave on 9-8-09. (ah)

1) Schools should stop putting up props (new fences, put lesson plans in doorway, board configurations, etc.) and go back to basics, 2) create smaller classes for students who have fallen behind academically. Once they have an opportunity to have more direct attention and help, more than likely they will recover faster, 3) use partnership in the community to help when student's emotional and social development stands in the way of their academic progress. (dh)

I believe that this situation can be rectified by placing inquiry into the scenario. I have found that hands-on, minds-on classrooms are the easiest way to promote true learning for all students regardless of previous knowledge and ability. The goals in this case are three-fold... 1) help students to learn the principles and concepts of science, 2) help students to acquire the reasoning and procedural skills of scientists, 3) help students to understand the nature of science as a particular form of human endeavor.”¹

I will admit that when I first began doing inquiry in the classroom, I made the mistake of assuming that my older students had had experience with many of the items and equipment that we would use in the lab (this could be anything from a beaker to a flashlight). As my methods evolved, I began to include an exploratory session with every inquiry. At first it was very difficult and almost painful to get the students to “play” with the equipment. They had lost their curiosity and begged for me to tell them what it was they were supposed to do. After about the first month, it began to click and my test score showed it. But even more important to me than the test scores were the number of students who came back year after year and told me about their favorite things they learned in my class (Yes! They remembered!).

¹National Research Council. Inquiry and the National Science Education Standards. A Guide for Teaching and Learning. P. XIII (Oh)

Rectifying the situation is no easy task. Our mind set in schools is give more work to get kids to learn. Keep dumping on them; surely they will be successful. In the case of J&J, albeit the profiles are different, they are both part of a school system that is failing. To say **No Child Left Behind** is very powerful. Who does not believe that every child should and even deserves a good education? The problem is that we are creating teachers that teach the way they learned and believing every child should fit into a mold that they have created. Teachers have a lot of ideas. What other occupation do we allow someone the opportunity to control a group of people and pretty much do whatever they wish? One might think they are accountable but accountable to whom and for what? We have failing schools across the nation. Has teacher training changed? Do college students still take notes while listening to a lecture and then take a summative test? When as educators are we going to look closely at J&J? When are we going to realize that confirming and “doing exactly what the teacher says” does not allow for students to reach their full potential? It limits learning. Also, if we do not allow students to be actively engaged and learn by doing...how can we expect success. In order to change schools we need to completely overhaul schools. Younger students need to be able to manipulate materials. Students need to be allowed to formulate, test and answer their own questions. The day of lecturing needs to end. Stand-and-deliver teaching leads to kids like Joannie

being able to perform on a summative test but not be able to use information in a meaningful way. Johnny will not pass in this kind of classroom and although he is very bright, he will have this label of being a “dummy”: because he cannot learn in a traditional, often useless way. (jcl)

- 1) Make it clear how the item is interesting, important, or at least worthy of attention,
- 2) Clearly distinguish items from one another. For example, $v = dx/t$ and $a = dv/t$ are distinctly different despite superficially looking the same,
- 3) Communicate clearly and check how it is interpreted.
- 4) Demonstrate what cues typically indicate it is appropriate to apply what was learned.

For example,

$$\triangle \rightarrow a^2 + b^2 = c^2 \text{ but } \triangle \nrightarrow a^2 + b^2 = c^2 \text{ (rm)}$$

If we can repair the failures at the fundamental level of the educational system then attitudes of students, their families and communities would rapidly change as to the value of education that schools would be providing. To fix these problems we need to engineer a school devoted to the development first and foremost to critical thinking as a central tenet. Therefore, science would be the core field through which all knowledge would be gathered, filtered and integrated. This integration would not only happen with major disciplines of math, English, history, etc. but also within a field of study (i.e. bio, chem. and physics). Development of cognition-friendly curricula and lessons would also improve learning. But one area not yet mentioned would be student choice, allow students to pursue their own interests and follow their strengths. Yes, I am advocating the “T” word – tracking - but with freedom of choice incorporated when students are ready to make these choices. (er)

Ensure probing is used to assess prior knowledge. Time for discussion of misconceptions and asking students “why” do they think this or justify their thoughts to rid misconceptions. Do not feel that students were able to apply the knowledge when doing the activities photosynthesis – gas collection – maybe change the activities that we are using. (gr)

Find out their misconceptions. Provide them with a situation to connect what they are going to learn. Provide them with an inquiry situation to help them learn the connect you desire. (cr)

Hold educators (top to bottom) accountable for the learning process, make it interesting, exciting, and relevant to the students, past events and present, the rational outcomes for their future. Making “Educators as Role Models”. Creating an equal and positive environment for learning for all students. Community involvements (parents, politicians, industry, business). Quality education benefits all of society. Let’s start making it meaningful to all students regardless of their environment. (cr)

Provide them with more opportunities to learn on their level. Teachers need to push students more and expect more from them. (js)

I could allow for small successes, maybe through standards-based assessment and positive feedback. I could improve my teaching by finding effective teaching strategies and reading science education research. I could also differentiate learning and assessment to appeal to different styles of learning. (nvdh)

To rectify this situation is to look at all possible learning styles and offer activities to accommodate their learning styles. Sitting in straight rows working alone is in the past. We need to focus on what

they like to do to keep their interest such as computers/technology. Many students are members of social networking sites. Have them post/blog/twitter assignments considering this is how they communicate with each other. (cw)

For J&J to learn, society has to refocus on what we want out of our students. If we want learning to take place we need paid educators whose goals and assignments are to teach. It's been said that it takes a village to raise a child; every person that comes in contact with a child has a responsibility to help our children to learn. If parents, family aren't there then the church, educator, social worker, truant offers should do their part to help J&J learn. (fw)

1. Ongoing professional development of teachers directly related to ills in teaching, infused with best practices for addressing those ills.
2. Development of tools for ongoing communication with parents in written participation regarding what has been detected as a learning problem and how to address it (teacher to parent, and parent written response about detection), for ongoing dialogue.
3. Teaching of children in small chunks, by helping them to develop organizers that categorize parts of concepts together (helping children to develop recognition of patterns within stimuli presented).
4. Involving and communicating with support staff (community of learners) regarding individual student learning issues, and implementing concerted services early on and regularly. Teams would need to meet weekly.
5. Allowing children to teach a skill to other children (including across grade levels).
6. Bring child's world of learning into concepts being taught and expand learning through technology.
7. Use technology (computers) to assess and teach problem-solving skills in a way that is fun.
8. Start teaching children during the very early years (as young as three years of age) how to think reflectively (through researched questioning methods, safe exploration of their environment, and inquiry-related techniques).
9. Infuse inquiry and reflection into daily student learning without so much attention to technical language (allowing them to express perceptions of activity and exploration), having them to record in illustration and briefly organized language.
10. Consider addressing strengths in learning through movement into another grade level room to accentuate and express talents (non-graded education??). (mw)

More specialized science classes with a narrower scope.....smaller class sizes.....development of efficient intervention programs; mandate parental/guardian involvement.....school/district wide revisions.....no interruption in planning period.....what can we do? (rw)

Something needs to happen. At this point I don't know that I am the best one to provide advice. There are pieces that I think are important parts of the puzzle, however:

1. Students need to not just experience content once; it needs to keep coming back.
2. We need to incorporate what neuroscience brings to the table about how brains learn.
3. Learning via learning-cycle approaches seems to best apply what we currently know about brain learning.
4. Students must somehow apply what they have learned to solve a unique problem.
5. We need to quit teaching everyone the same. (cw)