

Manuscript to a Postmodern Math Education Video

Paul Ernest and Allan Tarp, April 2012, made for Discussion Group 4 at ICME12.

On a YouTube video (youtu.be/bSbOTKeHQRM) on Postmodern Math Education Paul Ernest and Allan Tarp discuss eight questions:

What is meant by postmodern? What is meant by modern? What is the root of postmodern thinking? Who is the most important postmodern thinker? What is mathematics? What is postmodern mathematics? What is postmodern education? What is postmodern research?

Bo: Welcome to this discussion on Postmodern Mathematics education. My name is Bo. And welcome to our two guests. Welcome to Paul.

Paul: Thank you Bo. I am really looking forward to this discussion.

Bo: And welcome to Allan.

Allan: Thank you Bo, so am I.

Bo: I will ask you eight questions. The first question is: what is meant by postmodern?

Paul: As I see it, postmodernism means the rejection of a single all-encompassing metanarrative – whether it be Freudianism, Marxism, Logicism, Radical Constructivism, Enactivism, even Bourbakianism. Instead it means acceptance of multiple perspectives offering new ways of seeing mathematics, teachers and learners. Thus it is important to recognize that all human subjects have multiple selves and that we all (mathematicians, teachers and learners) have access to different selves: authoritative knowers, researchers, learners, appreciators and consumers of popular and other cultures, as well as having non-academic selves.

Allan: It seems to me that we must distinguish between post-modernism and post-modernity. Post-modernity is what we do with our hands, i.e. how we act in the world. And post-modernism is what we do with our head, i.e. how we think about the world. To simplify, post-modernity is the social condition that was created by I,T, information technology. And postmodernism is skepticism toward hidden patronization.

Paul: I would agree that postmodernism is a conceptual position. Rather it is several positions because we should distinguish cultural postmodernism (in art, architecture, music, design and fashion) from philosophical postmodernism. This is more about the rejection of a single all-encompassing theoretical metanarrative. I see post-modernity to be the epoch when postmodern ideas are current. But this is semantic and I accept your distinction between the theory and practice of the postmodern

Bo: The second question is: 'What is meant by modern?'

Paul: To me modern thinking began with Descartes, who puts forward a logical master plan to provide certain and indubitable foundations for all of knowledge. This begins with a small basis of clear and distinct ideas, and then deduces all subsequent truths by the clear rules of logic. This plan was modeled on the axiomatic geometry of Euclid, already two thousand years old, which Hobbes called the only true science bestowed on humankind.

Allan: To me, modernity means the social condition created by the invention of the artificial muscle, the motor; and the combination of the motor and tools to machines. And modernism means the transition from belief to certainty, provided by the natural sciences, producing real world knowledge by inducing categories from observations; and validating theories, by trying to falsify deduced predictions.

Bo: The third question is: What is the root of postmodern thinking?

Paul: As I see it, Lyotard, is one of the first to use of the term 'postmodernism' with reference to philosophical discourse in his book *The Postmodern Condition*. Lyotard considers all of human knowledge to consist of narratives, whether it is in the traditional narrative forms, such as literature, or in the scientific disciplines. Each disciplined narrative has its own legitimation criteria, which are internal, and which develop to overcome or engulf contradictions. However the roots of postmodernism can be traced to Nietzsche too. When he said 'God is dead' he meant that the days of all absolutes were over – and absolutes as what underpins modernism.

Allan: To me, postmodernism means Skepticism toward hidden patronization according to Lyotard's statement: 'Simplifying to the extreme, I define postmodern as, incredulity, toward metanarratives'. Skepticism is as old as the republic, beginning in the ancient Greek republic with the sophists, and continuing in the Enlightenment Century. Today skepticism is expressed in the two Enlightenment republics, in the American with pragmatism and grounded theory; and in the French with the post-structural thinking of Derrida, and Lyotard, and Foucault, and Bourdieu.

Bo: The fourth question is: Who is the most important postmodern thinker?

Paul: To me, the most important theorist is Wittgenstein. Wittgenstein made the transition from modern to postmodern thinking in his two books. First in *Tractatus Logico-Philosophicus* he tries to finish the modern project by showing how the outside world has created our language to represent it. Then in *Philosophical Investigations* he turns around and shows how in return it is language games that construct the outside world. Thus with his own person and his own work Wittgenstein is the first to realize that the world is not creating language, but created by language. But this language use – in what he terms language games – is based in everyday living in what he terms 'forms of life'.

Allan: To me, the most important theorist comes from the threatened republic, the French. Here I will point to Foucault and his statement when discussing human nature with Chomsky coming from the unthreatened republic, the American. Foucault says: "It seems to me, that the real political task in a society, such as ours, is to criticize the working of institutions, which appear to be both neutral and independent; to criticize them in such a manner, that the political violence, which has always exercised itself obscurely through them, will be unmasked, so that one can fight them. "

Bo: Could you please elaborate?

Paul: Wittgenstein says, mathematical foundations are quite irrelevant to the continued healthy practice of mathematics, both pure and applied. Wittgenstein offers a powerful social vision of mathematics. One of his key contributions is to recognize the social basis of certainty, that following a rule in mathematics or logic does not involve

logical compulsion. Instead it is based on the tacit or conscious decision to accept the rules of a 'language game' which are grounded in pre-existing social 'forms of life'. Wittgenstein's importance is to show that the 'certainty' and 'necessity' of mathematics are the result of social processes of development, and that all knowledge including that in education presupposes the acquisition of language in meaningful, already existing, social contexts and interactions.

Allan: To me, Foucault shows how human disciplines discipline themselves and their subject. This forces false identities upon humans, who then seek cure at correcting institutions that copy the pastoral power of the Christian church. Furthermore, the institution called education might instead be a place for symbolic violence, that monopolizes society's knowledge capital for a privileged knowledge nobility. Also, institutions are run by people that follow authorized routines, which can create both gas turbines and gas chambers. Following orders might be OK in industry since it is controlled from below by the natural correctness of the market: sell or die. But it may become problematic in institutions that are controlled from above by a political correctness: conform or die. Thus institutionalized patronization might become totalitarian, reintroducing evil actions, rooted not in a devil, but in the sheer banality of just following orders.

Paul: I agree with Allan that Foucault is a very important thinker. His originality lies in his historical analyses of power, institutions and identity, and his rejection of essences underlying everything – from persons and identities, academic subjects and knowledge to names, concepts and ideas. He is usually called a post-structuralist, but post-structuralists share much with postmodernists – most notably the rejection of single monolithic structural theories to explain anything – from society to language.

Bo: The fifth question is: What is mathematics?

Paul: To me, mathematics is what mathematicians do. Mathematics is a language game, or rather a set of language games and forms of life. Mathematics is taught to allow students to take part in some of these language games; because it can be applied in many real world situations and because it has great social and personal power. To get a deeper understanding, again we should listen to Wittgenstein. Mathematics is a multiplicity of practices – Wittgenstein calls it the 'motley of mathematics'. Mathematics provides the entry ticket to many of these practices.

Allan: To me, mathematics is not an action-word, it is a verdict-word that labels or installs what it names. To see, if it labels or installs something, we must ask, which actions are named mathematics? Many, is a natural fact. To deal with Many, we count and add, in short we reckon. Consequently, there is a need for education in reckoning, also called algebra, which in Arabic means to re-unite.

Bo: The sixth question is: What is postmodern mathematics?

Paul: To me, Postmodernism rejects a single authoritative way of seeing mathematics, teachers and learners, for each can be seen and interpreted in multiple ways. Mathematics can be seen as axiomatic and logical leading to indubitable conclusions, but it can also be seen as intuitive and playful, open-ended, with surprises and humor, as evidenced in popular mathematical images and cartoons. Additionally it can be seen in its applications in science, information and communication technologies, everyday

life and ethnomathematics. All of these dimensions are part of what makes up mathematics and they all co-exist successfully.

Allan: To me, postmodern mathematics raises the question: Is mathematics education what it says, education in mathematics - Or is it something else, like symbolic violence in meta-matism, which is a mixture of meta-matics, that turns mathematics upside down, by defining concepts as examples of abstractions, instead of as abstractions from examples; and of mathe-matism that is true in a library, but not in a laboratory: To exemplify, the statement , 2 times 3 is 6, is matte-matics, since 2 threes can be re-counted as 6 ones. Whereas the statement, 2 plus 3 is 5, is mathe-matism, since it has countless counterexamples as e.g. 2 weeks plus 3 days is 17 days.

Bo: The seventh question is: What is postmodern education?

Paul: To me, postmodern education means accepting the diversity in learners' background and interests, in learning material and situations, and in teacher personalities and ethnic background. Allowing playfulness and surprise to enter into education is also necessary. I think mathematics plays a small but significant part in postmodern education. What I would like to see is a truly responsive education system that has a real personal face. Every student should have a relationship with a teacher or other mentor who finds out what the student loves and can achieve real success at. Whether it be some sport, model making, dance, or academic study and creativity, such as in mathematics, it is the responsibility of education to help the student find their own bliss and success. The area that students experience this success in doesn't really matter. Once they have success, enjoyment and self-confidence unleashed by their manifested talent, I believe students can go on to succeed in many other areas of study and life' including mathematics. So the flexibility and truly individualistic element of education is what would make it postmodern, and a great education.

Allan: To me postmodern education means replacing the forced classes and the forced subject combinations of line-organized education aiming at preparing for public offices, with the self-chosen half-year blocks of block-organized education aiming at uncovering and developing the individual talent of the learners.

Bo: The last question is: What is postmodern research?

Paul: To me, all forms of research can fit under the umbrella of postmodernism since it allows for different methods, meanings and interpretations. As it stands research in the interpretative paradigm, is more open to multiple meanings since it accepts that both the world and its description are social constructions in the end. So postmodern research fits less well with the scientific research paradigm with its assumption of one true reality. However, no methods are ruled out by postmodern research, be they qualitative, quantitative or mixed.

Allan: To me, postmodern research was created by the ancient Greek sophists saying: we must enlighten ourselves to tell nature from choice, to avoid being patronized by choices presented as nature. So postmodern research is a search for hidden alternatives to patronizing choices presented as nature.

Bo: Thank you Paul and Allan. It was a nice debate, wasn't it? I learned that you have more in common than differences, although you do differ on some issues.