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From zero to hero: learners help technology teachers, and then . . .

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Abstract

This snapshot deals with three critical incidents in three different primary schools involved in a trial implementation, in which the technology teachers were unable to teach the class what they knew, and a learner stepped forward. The three incidents were either directly observed or explained afterward by one of the teachers during the on-going informal interviewing that happens in the programme. In each case, the result was a joyful lesson for the learner and the class, acceptance by the teacher, and resulted in learning about technology skills but also about power, control and knowledge.

Three incidents in technology lessons

The broad research context of these incidents is ethnography. The incidents came to light only because the programme staff spend hours in the classrooms, trying to understand how the training workshops get translated into classroom action.

Ethnography, in its general meaning, attempts to capture the "unsaid" and to construct "implicit meanings" that are present in both the everyday activities of people and in the extraordinary activities involved in ritual, ceremony and public performances of all kinds. The ethnographer does this through participant observation, a method that requires the participation of the ethnographer in the life he/she attempts to describe, and a close reading of the activities, meanings and interpretations of those he/she observes (Thornton, 2010).

The three incidents we captured raise interesting questions about learning by Technology teachers and learners, and Technology as a Learning Area.

The teachers are part of a university-based programme which is testing the implementation of the NCS policy for Technology. None of the teachers have formal qualifications in Technology education; most of what they know they learn in fortnightly workshops where they plan the work for the following two weeks and learn the knowledge and skills that the learners will need.

In School A, the Technology teacher has struggled to learn electric circuits and confesses a mental block about this topic. In workshops she needed continual assistance. In school, she was doing our Grade 6 Systems & Control project involving model cars. The day arrived in which the class had to wire up parallel circuits for the headlights in their model cars. There is of course a great difference between a circuit diagram and real wires that bend and can be connected in many different places (we do not use clip-together electricity kits). The first lesson was fruitless, and afterwards the implementer offered Teacher A more assistance.

In the next lesson a boy called Tshifiwa offered to help. Tshifiwa had been quiet and reserved in all his teachers' classes, and was never taken seriously by other learners. The programme

staffer had never heard him answer a question, in a year and half in the programme. On this day he managed to connect up his parallel circuit and switch, and both bulbs lit up brightly. As that happened, learners around him shouted and called for the teacher to come and see. Tshifiwa then taught the learners in his group how to recognise when the bulbs were connected in parallel. These learners then spread out to teach the others in the class. The teacher was still not sure how the circuit worked but she referred questions to the boy, now known as "Dr. Tshifiwa" by his classmates and as the 'unsung hero' by his teacher.

She later reported that Tshifiwa's confidence and participation in the lessons has grown remarkably. She remains worried by the next Systems & Control project but recently remarked to the programme staffer, *Hake na mathata, ketshepile Tshifiwa!* This translates as "I have no problem, I am counting on Tshifiwa". She says proudly that Tshifiwa is going to help her to teach the Systems & Control project to the class. She goes on to say that she is confident and knows that they will pull through.

In School B, the teacher was also doing the model cars project. We teach learners the technique of enlarging a diagram (of part of the car) using a grid. Teacher B had learned the technique in a personal coaching session with the programme implementer, and had done it successfully. The technique is not difficult, but it can be bewildering until the learner has a moment of insight that any point on the small grid over the diagram can be mapped onto a corresponding point on the large blank grid. However, in the lesson the implementer observed a frustrated teacher who admitted that she could not explain to her learners how they should use the grid to enlarge the diagram onto their squared paper. She said it was too difficult for her to explain, though she could do it for herself.

On the next visit, the implementer found 40 learners who had almost all succeeded in doing the enlargement. The teacher explained that one learner had "clicked" and seen how the method worked; he then showed his teacher how he would explain it, and then she and this learner had gone from group to group explaining the method. Each learner who "clicked" then had to teach another. Teacher B was quite relaxed about the way the problem had been solved and said she would use the same approach the next time a similar problem occurred. (By contrast, in **School D**, the teacher, who had understood the technique immediately in the workshop, did not rely on the insight of any of the learners and that lesson ended in confusion and had to be re-taught.)

In School C, the Grade 7 learners had to learn to sew, for a particular Processing project. Two techniques they need are the running stitch and the backstitch. Teacher C is an expert seamstress and she demonstrated this to us in the preparatory workshop. However, she found great difficulty in explaining to her class how to do backstitch, despite having a drawing in her textbook that they could refer to. Then we observed one boy called Thabo who mastered the stitch, compared it with his teacher's expert stitch and, uninvited, moved on to the other groups in the class to teach them how to do it. Again, his teacher was quite relaxed about this and encouraged him in it. Soon everyone in the class was doing a competent backstitch.

These three incidents raise more questions for an ethnographic researcher, regarding the subject, the teachers and the learners.

- Is this kind of problem-resolution more likely to happen in Technology than in other Learning Areas? Technology offers a greater range of activities than any other Learning Area and this may open opportunities for a wider range of learners to contribute.
- The Technology curriculum is structured as projects with linked stages, and each project has a clear product that must be ready by the end of term. We have a hypothesis that this

goal motivates learners and teachers so that they are willing to push through difficulties that crop up in lessons. In other Learning Areas, teachers are more inclined to simply avoid any difficult area and it remains untaught. (Teachers call these areas the "never-mentioneds").

- None of the teachers in the programme have a formal qualification in Technology; would the possession of a qualification make teachers more likely or less likely to share control of a lesson with their learners?
- The difficulties three teachers encountered, in teaching a skill they personally can do, point to the importance of pedagogical content knowledge (PCK) in Technology. How does this PCK develop and how much of it is found in formal Technology courses?
- Each of these teachers need to move forward in their own learning. Teacher A for example, needs to master electric circuits — will "Dr. Tshifiwa's" resolution of her problem make her less likely to tackle this topic, which is quite hard for her?
- How much conceptual understanding about circuits or graphics did the learners in schools A and B have? Or was this a matter of accidental discovery, then copying the solution repeatedly in front of other learners? What did they communicate to the other learners they helped?
- Each of these learners' self-image and social position in the class was probably different afterwards. Were there longer-term effects in other lessons and other subjects?

Only some of these questions can be answered by participant observation in the programme schools; other questions will, for example, need structured interviews with experienced INSET personnel and testing with learners.

We found few references to situations of students helping teachers – it seems to be an unusual kind of event. One reference (Hawkins, 2002) was to relationships in a focus group of teachers in the Palestine Authority, who were learning to use ICT. The greatest benefit of the use of computers and the training was that it broke down the barriers between teachers and students in the classroom. As one Palestinian teacher stated, "There is now a more collegial environment and less hierarchy — students feel comfortable asking teachers questions and teachers are less intimidated to seek help from students." Many teachers, however, initially feel threatened by the loss of control in the classroom as students, who are usually more adept at using technology, can quickly access information and challenge the teacher's role as the sole font of information. Teachers who receive professional development, however, learn how to more effectively manage their classroom and use the technology to create a more stimulating learning environment. A student in Senegal on a similar programme noted that, "Our teachers, because of our participation in collaborative projects and Internet access, have to do a better job. They carefully prepare their lessons before coming to class."

References

Hawkins, R. (2002) Ten Lessons for ICT and Education in the Developing World in R.Hawkins (Ed.), *The Global Information Technology Report 2001–2002, World Links for Development Program* Washington, DC: The World Bank Institute.

Thornton, R. (2010) Post-graduate seminar, Faculty of Humanities, University of the Witwatersrand, Johannesburg.