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Title : When Things Don't Go Exactly As Planned: Leveraging from Student Teachers' Insights to Adapted Interventions and Professional Practice

1. The Research Problematic

We are all familiar with the difficulties encountered by preservice teachers during their first teaching experiences. They often have difficulty identifying the valuable components of a successful learning situation or evaluating the efficacy of their classroom activities. How could preservice teachers be supported in their transition from university to the classroom? How could we engage in joint reflection on the relationship between student knowledge and preservice teacher knowledge? In that connection, research on the selection and planning of classroom activities has highlighted the importance of conceptions with respect to mathematics (Jaworski, 1994; Ernest, 1989), learning and teaching (Britzman, 1991), initial learning experiences (Jonston, 1990; Civil, 1993), previous instruction concerning the development of pupils' thinking (Fenema & al., 1996). In addition to the new reality of a class, student teachers face several constraints (VaccNesbitt & Bright, 1999; Wideen & al. , 1998).

In the theoretical framework surrounding situated cognition (Brown & al., 1989), the concept of meaning provides a useful basis for devising answers to these questions. It accounts for preservice teachers' experiences when they were pupils, university students, and student teachers in a school. For example, previews studies of the meanings ascribed by primary school preservice teachers to the notion of problem-solving and to the errors produced by pupils have shown how discussions on the use of a teaching material can be quite meaningful, for they appear to prompt preservice teachers from pupil position to student teacher position when they recognize not only the diversity of pupils' representations, but also the necessity of pupil activity (DeBlois & Vézina, 2001). Furthermore, preservice teachers opting for an classroom activities based on an active questioning model and who were asked to plan an intervention based on pupils' errors were shown to focus on the pupil-knowledge relationship, thus a student teacher position (DeBlois & Squalli, 2002).

Our objective is therefore to provide a particular form of support to preservice teachers at the time of their practicum. This research project thus seeks to answer the following questions: What is the role of experience in initial teacher training? How do preservice teachers learn their teaching practices? What practices are crucial to initial teacher training?

2. The Intervention Model Adopted with Student Teachers

In the province of Quebec, preservice training for primary school teachers is spread out over four years of university. In each of these four years, preservice teachers take

university courses and do practicums in schools. Two preservice teachers, one in her junior year, the other in her senior year, agreed to take part in this research project during their practicums. We chose to focus on gaps between the planning and enacting of classroom activities, for a gap can quickly turn into a failed intervention rather than an attempt at adapting teaching to pupil needs. How do preservice teachers explain gaps between the plan and the actual enacted activity? What do they learn from such gaps? We focused on three particular experiences occurring in a mathematics class: a paper-pen situation, a manipulation activities situation, and a situation involving the use of the "Cabri-geometer" educational software.

The project was conducted within the framework of collaborative research. A discussion team was formed around each student teacher, for a total of two teams. Each team consisted of the student teacher, her partner teacher, the school's special education teacher and the researcher. A total of 14 meetings were conducted. For reasons of team member availability, eight meetings were held with the junior-year student teacher and six with the senior-year student teacher. The discussion teams met twice a month for two hours each between November 2003 and March 2004. The meetings occurred prior to and after the student teachers tested out planned activities. It is worth noting that feedback drew on the «Groupe d'Entraînement à l'Analyse des Situations Éducatives» method (Fumat & al. , 2003) and proceeded over three stages: narration, analysis and synthesis. The junior-year student teacher and partner teacher chose to plan paper-pen situations (positional number), manipulations (reflexion and solids in geometry) and use of the "Cabri-Geometer" (construction of geometric figures). The senior-year student teacher and partner teacher opted for manipulation activities on reflexion, probabilities and the Cartesian plane.

Each of the discussions was recorded on audio cassettes for future analysis using verbatim transcripts. When analyzing the transcripts, we sought to bring out the viewpoint of the student teachers when they: compared plans and the activities actually tested in the classroom process; presented the triggers of the transformation of the situation; the pupils' behaviours following the transformation; triggers of learning among the pupils; and their own new insights.

3. The Role of Experience in Initial Teacher Training: The Emergence of 4 Types of Adaptation

By examining the gaps between plans and the actual teaching-learning situation experienced, adaptations could be identified according to four types: projective adaptations, withdrawal adaptations, normative adaptations and avoidance adaptations.

"Projective adaptations" occurred either at the beginning of or midway through experiments, in cases of transformations involving geometry and probabilities. For example, the student teacher walked into the classroom holding a tub. She heard a pupil say: "So we're going to do probabilities!" She grabbed this situation and shot back "And so we are! What makes you say that?" (translation G.4, line 189). This type

adaptation occurs whenever the student teacher banks on pupil attitudes to *question them further*. It also emerges whenever she uses a pupil's *difficulty or explanations* to *foster or pursue a discussion*. For example, when the pupils presented the number of combinations possible using two red tokens and two yellow tokens, she reported:

> […] A team of 2 girls said: "At the beginning, we found more than four, but when we were paired with another team, they told us we had made a mistake." […] Now <u>that</u> I found interesting… It wasn't a mistake because, actually, one team tended to take the order into account, while the other didn't. […] Really, the question had come back to something that should have been made clear to begin with: Is it important to take the order into account? […] They noticed it had changed… (translation G.4, line 362).

A second type of planning-enactment gap has been called "withdrawal adaptations." In this case, the student teacher *deems the pupils capable* of solving certain difficulties. For example, the student teacher did not intervene when the pupils were unsystematic in how they counted the number of possible combinations. This type of adaptation sometimes leads to turning the discussion over to the pupils or to observing that several pupils continually make some serious errors concerning the notion being studied.

A third type of gap has been called "normative adaptations," which occur whenever a student teacher observes a *gap between a pupil's comments and the teacher's expectations*. By pointing out the error, the student teacher wishes to prompt the pupil to adjust or adapt. For example, when discussing the situation bearing on how to use a Cartesian plane to identify a position, the pupils' "failure" to produce the expected answers prompted the student teacher to propose, or refer pupils to, the definitions in the textbook. She reported : « They said questions like if we talk about mesures, how many centimeters from the dege of the page something like that… they didn't think about the graph paper until I proposed it.» (translation G-6, lines 90-93). This type of adaptation also emerges whenever the student teacher forges on with the assignments when pupils are inattentive.

Finally, a fourth type of gap has been called "avoidance adaptations," which arise whenever student teachers simplify the task at hand or lower their expectations. In the situation concerning reflexion, the student teacher acknowledged one such adaptation: "…Then, I explained this, but many felt insecure in this task : and it is not a square but try to do a square as much as possible. Of course, if I hadhad more time, I would have shown the mesure, maybe it would have held… [in Cabri](translation M-8, lines 440-445)." These adaptations also arose whenever the pupils provided solutions without offering any explanation or presented incoherent explanations during one of the positional numbering activities.

4. How Do Preservice Teachers Select Adaptations?

The number and type of adaptations deployed appear to depend on a variety of factors. The first relates to the *specificity of the teaching intention*. This factor possibly

stems from university students position. Thus, a well-defined intention appears to prompt student teachers to adjust to pupil reactions projectively, whereas an unfocused intention appears to prompt them to "stick" more closely to plans or to fail to identify opportunities for "following" the pupils' lead. It should be noted that among student teachers, the *main concern* appears to consist in enacting the situation according to plan. Furthermore, even when the situation unfolds in accordance with team-selected plans, certain "implicit" givens produce a feeling of more or less having been in tune with the actual, lived situation. For example, expectations concerning noise level, pupil participation, time devoted to transitions, etc. are rarely presented as concerns during the plan-devising phase, although they appear to be vital to the student teacher's feeling of "accomplishment" with respect to the situation. Thus, when caught between the conflicting need to achieve a consensus with the other team members and yet successfully orchestrate the classroom situation, student teachers lean on certain plan components that conform more to their particular outlook.

The second factor causing adaptations to emerge is the level of comfort. *Comfort with pupil reactions* is evidenced by a greater or lesser aptitude for interpreting pupil behaviours. This factor stems possibly from student teacher position. The importance of this aptitude becomes clear particularly in terms of refraining from interpreting "troublesome" behaviours as mere deviations and of viewing them as cues provided by pupils (a loss of interest, a difficulty, etc.). So interpreted, these behaviours can trigger projective rather than normative adaptations. Indeed, a projective adaptation can stimulate an active reaction by pupils. It is also worth noting that the withdrawal adaptations also emerge in relation to pupils' *active* reaction toward a situation, whereas normative avoidance adaptations trigger *passive reactions* or *resistance* among them. In addition, *comfort with teaching materials and mathematics concepts* resulted in a greater number of projective adaptations. Conversely, discomfort was evidenced by difficulty in determining how to bank on pupil reactions to the benefit of the learning process. Finally, *comfort with the preferred approaches* is evidenced by a feeling of confidence toward pupil comments, whereas discomfort appears to be associated with a need for control, which tends to inhibit the emergence of projective adaptations.

The third factor concerns *experience*, a notion frequently referred to by both student teachers. This factor possibly stems from a pupil position, in which a given event is posited as resulting from a "best" intervention. Pupils' learning does not *necessarily* result from the able handling of teaching materials, co-operative work, or a structure whose starting point is the activation of the pupils' knowledge and ending point is "reinvestment." The notion of experience thus offers a basis for challenging classroom knowledge overly conceived of in terms of procedures.

5. Conclusion

Several tangible results occur whenever student teachers question or gain insight into their intentions and analyze their practice in order to better understand the underlying

reasons or to justify their choices with respect to interpretations of pupil reactions, the notions being studied, and the preferred teaching materials and approaches. They—and we—are then able to recognize the devolution of the teaching situation (Brousseau, 1983), the "taking charge" of classroom activities, and the student teacher's projection into his/her professional practice. At that point, practice is able to fully play its role.

This model of intervention occasionally prompted student teachers to certain compromises. For example, where student teachers are concerned, the unfolding of the situation, the roles of pupils and teacher, the type of interactions occurring in the pupil-teacher-knowledge triangle may all present considerable differences from these elements as selected by the team. Thus, in the process of adapting a situation to pupil reactions, a difficulty with a given component can represent an opportunity to again review student teachers' "concealed" plans.

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