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**INVITED COMMENTARY FOR STEFFE’S PAPER AND PRESENTATION**

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When we envisioned this conference, with its primary purpose to stimulate and guide the initiation of a new collaborative for research in mathematics education, we immediately knew that we needed Les Steffe to serve in a critical leadership and advisory role!

Today, Les is among the most well recognized and highly regarded senior scholars in our global field, and his seminal research activities and productions span nearly fifty years. Through his interdisciplinary research, his publications and presentations, and his outstanding, productive doctoral students all over the world (several of whom are here as invited participants), he has led in shaping the potentials, the evidential basis, and impacts of radical constructivism in mathematics education. It is exactly his experiences and successes in forging and maintaining interdisciplinary collaborative research, and his wisdom related to such approaches, that we knew that we needed his input for this meeting.

Les’ paper and presentation that we’ve just heard have offered to us his vision and counsel for what collaborative research in mathematics education must involve. His approach is essentially what he deeply understands and advocates—knowledge is always constructed within and from direct, idiosyncratic experiences of the constructive knower. Thus, he has framed his ideas in relation to critical aspects of his own recalled experiential “journey” with collaborative research. Central to his beliefs is that such team research must be interdisciplinary in nature.
I’d briefly offer the following comments related to his ideas, and hope that afterwards we might engage with Les to address further what we want the collaborations within the proposed research teams of WISDOM to be.

In his descriptions of his experiences in initiating and participating in team research work, Les makes it clear that “collaboration” does not always mean “cooperation” or “harmony!” Indeed, it may be inherently necessary that disagreements and struggles among and between participants take place. “Clashes” should be expected if the work is substantive, complex, anchored in issues and differences of opinion, and likely dealing with ill-defined constructs and processes open to differing interpretations. Thus, effective collaborative participation in matters of educational research requires a willingness to accept a social, intellectual context where disagreements occur, where ideas can and may well be challenged, where a shared goal is to strive to “understand the other,” where mutual respect can be maintained while disagreeing and debating of ideas occurs, and where progress is represented in part by consensual agreements. Les cites the description offered by Ernst von Glasersfeld, who noted “…that a common view can be achieved only by a strenuous effort of mutual adaptation” (von Glasersfeld, 2005, p. 10)

As we come here to foster collaborative research, it will be important that we all keep this basic, yet pervasive, starting point in mind—within a research team, expect such clashes, the ensuing struggles, and the shared goal of moving toward such mutual adaptation. Perhaps without this awareness and anticipation, it would become difficult to find the “…glue that holds a research team together in the face of heated arguments.”

Les next offers some important “preconditions for collaborative research.” He emphasizes that an interdisciplinary disposition is a necessity if the scholarship is going to move the field forward. Team members should preferably already have an interdisciplinary disposition prior to collaboration, or engagement in collaborative research should foster and develop such a disposition. Members would best come to a collaborative team with already established problems they want to solve, questions they want to attempt to answer, goals they want to reach—rather than joining a team in order to find these, or in search of “something” to study. As he testifies about his own growth as a researcher, moving toward collaborative, interdisciplinary work can also mirror a scholar’s dissatisfaction with research methods, or with one’s own progress on the problems of interest, or even with the state of the field as a whole. Such discontent, which involves a reflective critical analysis and leads to seeking engagement beyond where one has been working, can serve as powerful motivators for engaging with others.

Again, as we will engage in the next few days and beyond in forging viable teamwork, please keep in mind this advice from Les, and perhaps we will each need to introspect about our own “preconditions.” Soon, as we engage Les in further discussion, some of you may want to ask him to elaborate some of these points.

To help us identify elements of a successful collaborative research program, Les again recounts his notable experiences with Smock and von Glasersfeld that prompted for him a paradigm shift in the ways he was thinking about research problems. In his journey to become a more radical constructivist, Les describes his recognition of a new “reality” of children’s mathematics (as bona fide mathematics to eliminate the duality between children and mathematics), leading to recognition of teaching as a method of scientific investigation. He and his team began to grapple with new approaches, deriving some stimulation and guidance from the then recently translated literature of Soviet-style “teaching experiments.” He discusses the centrality of “conceptual analysis” in the team’s work, where they were eventually led to “analyze conceptual analysis,” giving rise to 1st and 2nd order models of children’s thinking with concepts. Moreover, while efforts to construct living experiential models of each student’s mathematics were critical results, this led to building the epistemic student as a 2nd order model of an “interiorized other.”
For me, Les’ account of the progressions of ideas and approaches within his interdisciplinary team across time characterizes so very well what a program of collaborative research might look like. Of course, he also reveals how his thinking for, and about, research has been transformed, this being deeply based upon the extensive, prolonged individual work he with his doctoral students have conducted with children. I would hope that you will have questions for Les about these experiences, aimed at helping all of us understand even more deeply the potentials in sustained collaborations such as he has experienced.

Les offers some further observations about the “life of a research team.” He notes how difficult it can be to sustain deep, collaborative team efforts, and that even well-functioning teams do disintegrate as time and circumstances pass. A key may be one or two core participants who individually and together share a strongly determined program of substantial research problems and activity. He also notes how rare it is to find “true” (his emphasis) interdisciplinary research on mathematical education problems by mathematicians and mathematics educators. Les emphatically asserts that mathematics education must become an academic discipline, in which we reach beyond the adult “cultural knowledge” of mathematics to a “cultural knowledge of student’s mathematics,” and within which we focus on building models of this knowledge. For him, the most important aspect of collaborative research is the learning from and with others: “…the transformations in the knowledge of the members of the team.” He thinks of the processes as “working together, but alone,” wherein the team interactions support the individual’s efforts while leading to personal accommodations mirroring those “mutual adaptations” identified by von Glasersfeld. Lastly, Les offers a last perspective derived from another of his own transformations—that models derived from research on thinking don’t have to be “true” or valid, but rather the research must strive for viability.

Both Les and I became researchers in Mathematics Education during the Sixties era wherein the “new math” curriculum and teaching reforms were correctly described to be “a revolution in school mathematics.” Les places before us one last challenge: Can the initiatives of WISDOM to stimulate and develop new, broadly-based Research Teams serve as an impetus for starting another revolution in mathematics education?

Now, before Linda leads our discussion, I wish to express my deep appreciation to Les for agreeing to help us in these efforts, and for his thoughtful, indeed challenging, paper and presentation. To each of you, I offer this challenge: during and after this conference, seek out the wisdom and guidance of Les Steffe for our efforts. Thank you.