

Working Group 3: Rich Learning Tasks Summary

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Definition of Rich Learning Tasks

Rich learning tasks are designed to give the student the opportunity to learn, refine, and engage in sense-making processes (that is, inquiry, experimentation, investigation and problem solving) and, in so doing, to learn with understanding, to use their knowledge in an integrated / authentic fashion to make sense (of ideas, situations, ...) and to develop the habits, attitudes, and skills necessary for a life of sense-making.

Focus Questions

Rich learning tasks are designed to support a sense making culture in the classroom and to reach general aims of mathematics education. In mathematics classrooms around the world, such a culture is the exception rather than the rule. Many questions can be asked related to this state of affairs, such as,

Q0. *Why are the general aims of school in a humanistic sight and what is the special points mathematics education can contribute to it?*

Q1. *Why is the sense-making game not the game played in the typical mathematics classroom?*

Q2. *Why are most learning tasks found in contemporary learning resources pseudo-rich at best?*

Q3. [Rich learning tasks give students the opportunity to make sense / construct meaning / learn with understanding.] *Why do so many think 'discovery learning' when they hear 'students constructing meaning'?*

Q4. *What are the forces working against / for the use of rich learning tasks in the classroom?*

Q5. *Is there, as Deborah Ball suggests, a need to convert the teacher's sense of what their work is?*

Q6. [Rich learning tasks ask the student, fellow students and the teacher to play the twin roles of sense maker and facilitator of sense making.] *Which of these pairings are not emphasized in the typical classroom? Why?*

Q7. [Rich learning tasks not only give students the opportunity to learning for understanding, they also act as ‘problem generators’.] *What are the implications of this for the teaching of problem solving?*

Q8. [Many think that teaching for understanding / teaching through the use of rich learning tasks / teaching through inquiry, too costly in terms of time and energy required.] *(In the words of Anna Sierpiska) which costs more, teaching for understanding or non-understanding?*

Q9. *What are good examples of sense-making mathematics teaching which can stimulate teachers to change their culture of mathematics teaching?*

Q10.

Summary of Discussion

Below is a reproduction of the summary of the ideas treated during paper and discussion sessions for the Rich Learning Tasks working group. The ideas are organized according to identified “challenges” with respect to engaging students with rich learning tasks and “fruitful avenues for solutions” to these challenges. The table contains all the ideas in the initial summary created by Dr. Henningsen for the working group wrap up session and incorporates ideas that were subsequently added during discussion by the entire group. Thus the table below represents a joint product of the working group. The group agreed that finding solutions to the challenges is an ongoing process that is never completed. There are no easy answers or quick fixes!

CHALLENGES	FRUITFUL AVENUES FOR SOLUTIONS
Curriculum	
<ul style="list-style-type: none"> • Unimaginative • Centralized/government mandates • Overspecified objectives • Limiting structure of the entire subject in school • Way activities and problems are structured • Organization of content • Too much/irrelevant/redundant • Lack of time 	<ul style="list-style-type: none"> • Develop innovative & creative tasks (also tasks that encourage creativity and original reasoning) • Adapt/extend existing tasks • Authentic tasks—tasks that motivate authentic problem solving activity • Link school math with math history • Reduce the amount of precious class time spent on practice (practice can be done in other ways) • Pursue multiple learning goals simultaneously • Write new materials or influence policy/process of curriculum development
Assessment	
<ul style="list-style-type: none"> • High stakes assessment drives instruction • Lack of alignment between curriculum & instruction • How to incorporate alternative forms • Grading—The Myth of Assessment 	<ul style="list-style-type: none"> • Tests need to change • The way test results are used and valued needs to change • Give adequate weight to ongoing assessment • Change notions of what it means to assess

<p>(we ignore the wealth of information we have about our students and let a handful of numbers determine their future)</p> <ul style="list-style-type: none"> • 	
<p>Lack of Appropriate Classroom Norms</p>	
<ul style="list-style-type: none"> • General behavior norms • Math-specific norms—sociomathematical norms 	<ul style="list-style-type: none"> • Establish norms (both kinds) and consistently follow them (use posters, modeling of desired behaviors and ways of talking about math, etc) • Talk explicitly with students about norms • Involve students in the process of developing and articulating norms (e.g., what constitutes a good math explanation, etc)
<p>Individual Learning Differences</p>	
<ul style="list-style-type: none"> • Typical representations do not reach all students • Differences in quality of previous experiences • Developmental differences & social promotion 	<ul style="list-style-type: none"> • Use multiple representations and connect them • Use multiple-entry point tasks • Encourage students to question one another and work together • Use alternative forms of assessment • Collect informal assessment data and USE IT
<p>Beliefs & Values (about math and nature of mathematical activity)</p>	
<ul style="list-style-type: none"> • Teacher beliefs • Student beliefs • Parent beliefs • Management/Administrator beliefs • Society at-large • Lack of awareness of the social aspect of mathematical activity and that sense-making takes time 	<ul style="list-style-type: none"> • Challenge beliefs with evidence—Face them head on directly • Collect evidence that's out there already and present it to others • If there is none, produce the research needed to support the efficacy of focusing on sense-making • Work on changing the relationships among teachers, students, materials, and ideas in the classroom • Bring parents in as partners in the process—help them understand what the learning goals are (letter explaining content, tips for helping children at home, family math events, etc.)

Teacher Preparation/Professional Development	
<ul style="list-style-type: none"> • Not enough field experience in preservice • Lack of adequate content knowledge • Lack of technology training • Teachers' own educational experiences are not aligned with current reform ideas • Patchwork approach is ineffective • Ongoing work is labor intensive 	<ul style="list-style-type: none"> • Restructure teacher preparation programs • Teach teachers the way you expect them to teach • Blend content and methods • Engage teachers as learners in sense-making activities about BOTH content and pedagogy • Use practice-based professional development (grounded in the actual work of teaching—analysis and reflection on cases, student work, lesson plans, curricular materials, etc.)
Physical Setting and Tools	
<ul style="list-style-type: none"> • Lack of manipulative materials (even minimal materials needed to do mandated curricula) • Lack of appropriate technology • Lack of appropriate physical space, desks, etc. 	<ul style="list-style-type: none"> • Financial resources • Creativity (particularly in home-made materials) • Get new desks!!
Lack of Professional Culture Around Teaching	
<ul style="list-style-type: none"> • No voice in decision-making or policy • Low pay/benefits • Isolation 	<ul style="list-style-type: none"> • Encourage evidence-based decision making • Encourage reflection on practice at all levels (and self-accountability) • Establish forums at department, school, local, regional, and national levels for teachers to exchange ideas and express individual and collective opinions related to policy (conferences, workshops, associations, internet forums, team planning, etc.)

Conclusion

We will (only?) realize a 'Humanistic Renaissance in Mathematics Education' when the 'game' played in the typical classroom shifts to a 'sense-making' game (where students and their teacher play their twin roles of sense makers and facilitators of sense making and where parents, administrators, politicians, and business people support such a shift.) This will be achieved in part by students and teachers, together, focusing on and engaging in rich learning tasks.