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Towards an Integrated Model of Teacher Inquiry into Student Learning, Learning Design and Learning Analytics

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This poster introduces the first version of an integrated model of three traditions of research in TEL: Teacher Inquiry into Student Learning (TISL) [1], Learning Design (LD) [2] and Learning Analytics (LA) [3]. The integrated model, is based on four existing models: TISL Heart Model [4], Design Inquiry Model [2], Scenario Design Process Model [5], and the Model for Integrating Design and Analytics in Scripting for CSCL (MIDAS4CSCL) [6]. The result is leading towards a new strand of inquiry, called *teacher-led design inquiry of learning*.

TISL addresses the professional development of teacher practice by investigating student learning through action-oriented, evidence-based teacher-led research, with a particular focus on formative e-assessment. LD is the act of devising new practices, plans of activity, resources and tools aimed at achieving particular educational aims in a given situation, informed by subject knowledge, pedagogical theory, technological know-how, and practical experience. Although LA can be seen as "the measurement, collection, analysis and reporting of data about learners and their contexts" (LAK'11), it aims to extend beyond proposing tools responsible for analysing learning outcomes, providing a holistic, dynamic and formative view of learning processes.

Fig. 1 depicts the proposed model with emphasis on the target audiences its methods and tools specifically designed for practitioners: teachers who wants to inquire into the learning of their students, teachers/practitioners as designers of pedagogical scenarios, and teachers who want to monitor students' activities. We envisage this model to be used for designing better learning analytics tools, specifically tailored for learning scenarios. The model provides a context for these different fields to complement one another and build on each other's strengths.

TISL Heart	Design Inquiry Model	Scenario Design Model	MIDAS4CSCL	Integrated Model
Kick-off	Imagine	Idea of the learning scenario, intentions, and pedagogical approaches		Initiation
Set assumptions	Investigate		Context Analysis. Definition of prerequisites	Context analysis or investigation
Define R&D Question		Design of the scenario for the class/context, successive iterations	Define learning objectives	Formulation of the design objective and the research question
Design method to answer the question	Inspire and ideate		Select the pedagogical pattern. Configure the activity flow, groups, and resources.	Design method to achieve learning objectives and to answer research question(s)
Enact changed teaching and assessment	Prototype	Enactment and successive adjustments	Instantiate the design. Enact the design.	Enactment
Evaluate learning outcomes. Provide summative feedback.	Evaluate	Evaluation of the scenario enactment	Evaluate learning situation and design. Provide feedback.	Evaluation
Refine overall model (formative feedback loop)	Reflect	Reflection on the design, comments and patterns. Re-design and decontextualization	Re-design	Reflection and re-design

Fig. 1. The Integrated Model

The integrated model can be considered a promising direction for future development of educational practices, as well as a rich field for research. LD and LA are currently gaining ground as potent approaches to technology-enhanced educational practice. Yet, to gain validity, LD needs to incorporate data and to gain impact, whereas LA needs to influence design. Thus, both LD and LA can only manifest their full potential if they are integrated in a coherent cycle of inquiry, as through the TISL cycle and through innovation. We see the model proposed here as a first step in this direction.

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