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Thematic Working Group 7

Indicators of Quality Technology-Enhanced Learning and Teaching

Summary Report

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Background and context

Technology Enhanced Learning (TEL) has become increasingly important on the agendas of education policy makers, school leaders and teachers around the world. The policy level rationale for emphasizing TEL is not only to improve learning outcomes, but to also transform the learning process to foster new capabilities that are needed for life and work in the 21st century. UNESCO (2008) published a document that puts forward a policy framework that aligns national goals and curriculum in education as well as the role of ICT in teaching and learning with the state of economic development. Technology-enhanced learning and teaching (TEL&T) should help students develop digital literacy and enable them to use technology appropriately for communication, collaboration and problem-solving.

Indicators of quality TEL&T are one of the two new themes proposed by UNESCO (Bangkok) for introduction in EDUsummIT 2015. The context for TWG7's work on indicators is to serve the need for fit-for-purpose indicators as part of the implementation of the Post-2015 Education Agenda. While the details of this Agenda are still to be finalized by the UN summit in September 2015, the theme will be *Towards inclusive and equitable quality lifelong learning for all*, as announced in the Incheon Declaration in May 2015. One of the intended outcomes of the Working Group (TWG7) is to develop a policy brief on this theme and present it to the Asia-Pacific Ministerial Forum on ICT in Education (AMFIE) at its next meeting.

An important goal of TWG7 is to provide advice on and suggestions for indicators of quality TEL&T as an integral part of the set of global indicators that could be used to monitor the implementation of the post-2015 education agenda. These indicators could be expanded and embedded into thematic, regional and national indicators to serve their respective monitoring and evaluation purposes. The primary focus is on learning outcome indicators, but selected input and process indicators will also be included to help us understand and improve the link between policy, policy implementation, outputs and outcomes.

Indicators for quality TEL&T are important not only at the national and global level. Stakeholders at individual, classroom, school and sub-national (e.g. district and project) levels would also need indicators to provide feedback and guide improvement relative to TEL&T implementation and enhancement. As suggested by World Education Forum Technical Advisory Group (2015), these global indicators should guide development of, and be incorporated into, indicators used at national and lower levels of monitoring and evaluation. This practice would promote development of a corpus of indicators that are contextually relevant. It would also allow comparability of indicators across institutions, projects, districts, etc., which will facilitate multiple levels and units of comparison, and potentially provide opportunities for better knowledge building and peer learning about TEL&T.

Issues

The working group started with three basic issues: What is quality TEL&T? Why are indicators for quality TEL&T important? What types of indicators are needed? A summary of the discussions are included below.

What is quality TEL&T?

It was generally agreed that the primary focus should be on preparing learners for life in the 21st century. The term "21st century skills" is considered to be too narrow, as well-being in the 21st century is not simply a matter of skills or competence, and requires well-rounded socio-emotional and metacognitive maturity. It was also agreed that digital literacy, critical thinking, creativity, collaboration and communication are necessary capacities for the 21st century. Further, it was generally agreed that learner-centered approaches to pedagogy would be necessary for students to develop socio-emotional and metacognitive maturity, and the capacities identified for success in the 21st century.

Why are indicators for quality TEL&T important?

It is obvious that we need appropriate indicators for quality TEL&T for us to understand what has been achieved through TEL&T. Outcomes of TEL&T implementation depend on how it is implemented and the associated conditions. An appropriate set of indicators should also help us monitor and understand how the implementation is progressing, and to signal problems before they become serious. Ideally, we would want to be able to make adjustments to the implementation plan and/or make strategic changes to policy and practice based on the feedback we receive from the indicators. We would also want our assessment of implementation, policy and practice to influence the nature and

development of the indicators we use. For this, we need indicators that are coherent and are connected to an appropriate conceptual framework so that these will help us construct better theories for TEL&T. In summary, quality TEL&T should serve to help us achieve four primary purposes:

- Assess what has been achieved through TEL&T implementation;
- Identify what matters most in our planning and implementation of TEL&T;
- Monitor progress and development in the most crucial aspects of TEL&T, and provide feedback on the innovation process for continuous improvement; and
- Support theory building, policy and practice in promoting change & innovation for quality TEL&T.

What types of indicators are needed?

In the discussion, it was agreed that most of the existing indicators related to TEL&T measure conditions for learning, such as the technology infrastructure, teachers' qualifications, etc. The most important type of indicators, which are also seriously lacking, are indicators for measuring learning outcomes that are important for the 21st century. Another important category of indicators is indicators for learning interactions (sometimes referred to as learning processes). People do not learn simply from being exposed to media or technology. Learning results from interactions and engagement. While learning interactions may take place between learners and digital learning resources, deep or complex learning often requires deeply engaging learning interactions among learners and between learners and teachers that cannot be realized through the adoption of digital technologies alone. The quality of students' learning outcomes depends critically upon the classroom environment, pedagogy, lesson and learning activity designs that together constitute the core determinants of TEL&T interactions. We need indicators that can capture and link the variety of learning interactions to the observed learning outcomes if these indicators are to help us improve the design and implementation of TEL&T. In summary, four types of indicators are needed:

- Learning outcomes
- Conditions for learning
- Learning interactions (i.e. learning process indicators)
- TEL&T use (how technology is used to support the totality of learning interactions)

A systemic, multilevel framework to conceptualize quality indicators for TEL&T

There is a rich body of literature that demonstrates the need for pedagogical, curricular and assessment innovations to accompany TEL&T if we are to achieve the desired outcomes (e.g., Voogt & Knezek, 2008). Consequently, TEL&T initiatives need to be supported by strategies and mechanisms for teacher learning, leadership learning and organizational learning. Further, the biggest challenge to the implementation of ICT-enabled learning innovation is scalability (Kampylis, Law, & Punie, 2013; Dede, 2006). Studies on change, innovation and sustainability all point to the need for change to be multilevel (Blamire & Gerhard, 2009; Law, Kampylis, & Punie, 2015). At the lowest level

of the education ecosystem are students learning within classroom contexts, which is hierarchically nested within schools and within systems (Davis, 2015). There is agreement that the changes taking place at each level impacts, and provides feed-forward/feedback on the change processes taking place at the other levels.

While most multilevel models of change only characterize change at the classroom level as learning and changes at the other levels are seen as implementation process or factors, Law (2015) proposed a parsimonious multilevel learning model to underpin the conceptualization of the many indicators involved in TEL&T, as represented in Figure 1. (The list of indicators in the table is only an incomplete, preliminary set for illustrative purposes.) There are four types of indicators at each level: conditions for learning, learning interactions, e-learning use, and learning outcomes. The learning outcomes at each level are strongly influenced by the status of the other three sets of indicators at that level. For example, the red arrows indicate how student learning outcomes are directly influenced by the learning interactions and e-learning use of students, which are in turn influenced by conditions of learning for the student such as school ICT infrastructure, pedagogy and assessment practice.

The working group found this conceptual framework useful for providing a coherent and consistent set of interacting indicators at all four levels, and in delineating the interactions of the indicators at different levels. For example, the blue upward arrows in Figure 1 illustrate some of the support relationships across levels: teachers' learning outcomes (TPACK, learning and assessment design expertise) directly link to the pedagogy and assessment practice as experienced by their students as conditions for learning; national schemes to support joint-school e-learning innovation projects (as system-level learning outcomes) provide opportunities for learning interactions at the teacher level; and staff appraisal criteria (as school-level learning outcomes) is one of the conditions influencing teacher learning. It should be noted that within this framework, the learning outcomes at the school and system levels are outcomes of the decision-making process at the respective levels. By conceptualizing the decision-making processes as learning processes highlights the iterative, continuously improvable nature of these processes. Further, one could also draw downward arrows in Figure 1 to shows how indicators at the hierarchically lower levels (e.g., student and teacher levels) can serve to inform increasingly systemic decision-making for policy and practice at the higher (e.g., school and system) levels.
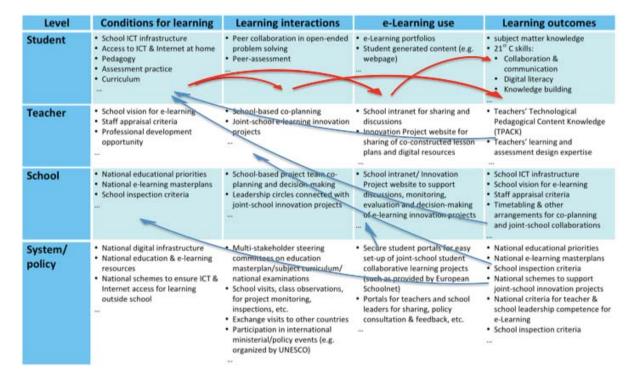
Level	Conditions for learning	Learning interactions	e-Learning use	Learning outcomes

Student	• School ICT infrastructure
	• Access to ICT & Internet at home
	• Pedagogy
	• Assessment practice
	• Curriculum
	...
		• Peer collaboration in open-ended problem solving
		• Peer-assessment
			• e-Learning portfolios
			• Student generated content (e.g. webpage)
				• subject matter knowledge
				• 21st C skills:
				  • Collaboration & communication
				  • Digital literacy
				  • Knowledge building

Teacher	• School vision for e-learning • Staff appraisal criteria • Professional development opportunity ...	• School-based co-planning • Joint-school e-learning innovation projects ...	• School intranet for sharing and discussions • Innovation Project website for sharing of co-constructed lesson plans and digital resources ...	• Teachers' Technological Pedagogical Content Knowledge (TPACK) • Teachers' learning and assessment design expertise
School	• National educational priorities • National e-learning masterplans • School inspection criteria ...	• School-based project team co-planning and decision-making • Leadership circles connected with joint-school innovation projects ...	• School intranet/ Innovation Project website to support discussions, monitoring, evaluation and decision-making of e-learning innovation projects ...	• School ICT infrastructure • School vision for e-learning • Staff appraisal criteria • Timetabling & other arrangements for co-planning and joint-school collaborations
System/ policy	• National digital infrastructure • National education & e-learning resources • National schemes to ensure ICT & Internet access for learning outside school ...	• Multi-stakeholder steering committees on education masterplan/subject curriculum/ national examinations • School visits, class observations, for project monitoring, inspections, etc. • Exchange visits to other countries • Participation in international ministerial/policy events (e.g. organized by UNESCO)	• Secure student portals for easy set-up of joint-school student collaborative learning projects (such as provided by European Schoolnet) • Portals for teachers and school leaders for sharing, policy consultation & feedback, etc. ...	• National educational priorities • National e-learning masterplans • School inspection criteria • National schemes to support joint-school innovation projects • National criteria for teacher & school leadership competence for e-Learning • School inspection criteria ...

Figure 1. A diagrammatic representation of the interrelationship among the different levels of indicators.

Members further pointed out that even in developing countries, a great deal of data collection occurs with a high level of detail, but the purpose for collecting data may not be clear. The proposed conceptual framework for quality TEL&T serves to: (1) focus the purpose of data collection; (2) guide the definitions and criteria for levels of quality for the indicators; (3) delineate how the indicators feed forward and feed back on the different levels of the system; (4) provide a mechanism for indicators to go to the stakeholders at appropriate levels—not just to policy makers; and (5) check and improve alignment across levels in the process of TEL&T implementation.

Challenges

A number of challenges were identified in relation to the theme of the working group. These include:

- Identifying indicators that are meaningful and have clear implications for policy and practice;
- Identifying indicators that provide feedback for refinement and decision making and inform progress;
- Communicating indicators clearly to different audiences and across levels;
- Going beyond the measurement of input;
- Creating operationalizable and valid measures for the indicators; and
- Creating quality indicators that are applicable across contexts.

Further challenges and feedback were collected by the group leaders when they presented the outcomes of the group discussion to the other working groups. These further challenges and critiques include:

- Linking indicators from one level to another and seeing how indicators interact is not simple;
- Developing indicators that are meaningful across country contexts;
- Including indicators at the system level that go beyond educational policy (e.g., partnerships with different stakeholders, the role of communities, etc.);
- Addressing informal learning in the conceptual framework; and
- Developing indicators for cyber-wellness and digital citizenship.

Recommendations to researchers, policy makers, and educational practitioners

- For policy makers and funders, we recommend that measures should be taken to identify indicators that matter (at all levels, and including indicators of processes and learning outcomes as well as inputs) and establish mechanisms for these indicators to influence policy and decision-making.
- For educators, institutional leaders and practitioners, we recommend the use of indicators to provide feedback and ensure alignment across contexts, processes and outcomes within a level; and to provide feedback on alignment across levels.
- For researchers, we recommend (1) development and validation of indicator measures that are valid, reliable and easily implemented, and (2) establishment and curation of a repository of indicator measures.

Action plan

The group agreed to work on the following publications within the time schedule indicated:

1. Complete by 5 October 2015 an extended abstract (~4 pages) for the Working Group discussions in Bangkok, for compilation into a summary EDUsummIT 2015 publication for fast public release.
2. Complete a paper on the indicators framework, rationale, etc. by January 2016.
3. Produce a policy brief (4 pages), which would be an outcome of the EDUsummIT from TWG7, and would possibly also be presented to AMFIE.
4. Different group members may self-organize to develop papers on examples to illustrate how the framework can be used. They can target the various TEL&T related conferences such as SITE http://site.aace.org/conf/, ECER http://www.eera-ecer.de/ecer-2015-budapest/, and CITE Research Symposium http://citers2015.cite.hku.hk/.

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