RETHINKING LEARNING
IN A DIGITAL AGE

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EDUsummIT 2017 Summary Reports

RETHINKING LEARNING IN A DIGITAL AGE

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EDUsummIT 2017: Continuing the knowledge building journey

Joke Voogt, *Universiteit van Amsterdam, The Netherlands*
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About EDUsummIT

This ebook is a collection of outcome reports by the thematic working groups (TWGs) of EDUsummIT 2017. EDUsummIT (International Summit on ICT in Education) is a global knowledge building community of researchers, educational practitioners, and policy makers committed to supporting the effective integration of research and practice in the field of ICT in education. EDUsummIT was founded in 2009 to extend and further develop the work undertaken by the authors of the *International Handbook of Information Technology in Primary and Secondary Education*, edited by Joke Voogt and Gerald Knezek (2008). Since its inception, EDUsummIT has been held five times, firstly in the Hague (2009), then Paris (2011), Washington D.C. (2013), Bangkok (2015) and most recently in Borovets (2017). Between 70 and 140 participants from six continents have attended each of the EDUsummIT meetings. While EDUsummIT participants meet biennially, thematic groups focusing on pertinent research topics in ICT and education are formed prior to the Summit to prepare discussion papers. These papers are further developed during EDUsummIT. After each EDUsummIT, TWG findings are published in international journals and presented at major conferences.

Previous EDUsummITs have been organised in association with international and national organisations actively supporting the use of information technology in education. These organisations include the Society for Information Technology and Teacher Education (SITE), the International Society for Technology in Education (ISTE), Kennisnet (The Netherlands), the International Federation for Information Processing (IFIP) Working Group 3.3 (Research into Educational Applications of Information Technologies), the Association of Teacher Educators (ATE), the Teacher Development and Higher Education Division at UNESCO and UNESCO Bangkok.

EDUsummIT 2017

EDUsummIT 2017 took place from 18-20 September 2017 in Borovets, Bulgaria and was hosted by the University of Library Studies and Information Technologies, Sofia, Bulgaria and the National Institute for Curriculum Development of The Netherlands. Close to 90 researchers, policy makers, and educational practitioners attended EDUsummIT 2017. These participants came from 31 countries. EDUsummIT 2017 was held under the patronage of UNESCO, Mariya Gabriel, European Union Commissioner for the Digital Economy and Society, and Eva Maydel, member of the European Parliament, of the Committee on the Internal Market and Consumer Protection (IMCO).

The theme of the EDUsummIT 2017 was *Rethinking Learning in a Digital Age*. This theme was inspired by the celebration of the international project *Children in the Information Age* initiated in 1985 in Bulgaria.

Nine TWGs were formed in the beginning of 2017 (refer Appendix 2 for membership of the TWGs). These groups included:

TWG1: Education systems in the digital age: The need for alignment
TWG2: Informal learning with technology
TWG3: Professional development for technology-enhanced learning leaders
TWG4: Digital agency to empower equity in education
TWG5: Formative assessment supported by technology
TWG6: Developing creativity in teachers and learners
TWG7: Learning from national policy experiences
TWG8: Upbringing in a digital world: Opportunities and possibilities
TWG9: Supporting sustainability and scalability in educational technology initiatives: Research informed practice

Focusing on their respective themes, the TWGs started researching and developing their discussion and policy papers from March 2017. The TWGs were guided by the following questions:

- Why is this theme important to education and learning?
- What are the key issues and questions to be addressed?
- What are the research, policy, and practice challenges faced and what are your recommendations to help researchers, practitioners, and policy makers to move forward?

The TWGs were also asked to:

- Conduct a synthesis of relevant research related to the theme's topic.
- Provide examples of innovative practices.

TWGs used a variety of technologies (e.g., Google Docs and Communities) to support pre-Borovets discussions. Drafts of the discussion papers were prepared before the Summit. TWG leaders also prepared questions for discussions, with supporting materials (research articles, reports, website links, etc.). During the two and half day meeting, EDUsummIT participants engaged in intense discussions of key issues and challenges related to TWG themes, and developed recommendations and action plans. There were five group sessions, with each session lasting one and a half hours. An additional session was also held to provide "cross-fertilisation" among TWGs, with TWG leaders visiting other groups to share their findings and elicit feedback. A poster session was held followed by a whole group discussion.

A call to action

EDUsummIT 2017 resulted in a Call to Action that was agreed upon by EDUsummIT participants. The Call to Action and findings of the TWGs were presented at the UNESCO International Workshop *Children in the Digital Era* held in Sofia, Bulgaria, September 20-21, 2017 as the first action of EDUsummIT 2017 to disseminate knowledge to the wider international community.

TWG summary reports

At the conclusion of EDUsummIT 2017, each TWG has summarised the background and context of its theme of study, the issues and challenges, recommendations they proposed to researchers, policy makers and educational practitioners, and the action plan to move forward. These reports are published in this eBook.

Looking ahead

Research papers developed by the TWGs will also be published as a special issue in *Technology, Knowledge and Learning* (edited by Joke Voogt and Gerald Knezek).

The next EDUsummIT will be held in Quebec City, Canada, in September 2019. It will be co-chaired by Thérèse Laferrière, Université Laval, Quebec, Canada and Margaret Cox, King's College London, UK. The planning process will begin in 2018.

The photo album

A selection of photos is included in the following section to document the activities undertaken during EDUsummIT 2017.

The Photo Album

EDUsummIT 2017 participants in Borovets, Bulgaria

Icebreaker excursion to mountain summit for EDUsummIT kick-off

Reception

Opening ceremony

Thematic Working Groups in action

TWG 1. Education systems in the digital age: The need for alignment

TWG 2. Informal learning with technology

TWG 3. Professional development for technology-enhanced learning leaders

TWG 4. Digital agency to empower equity in education

TWG 5. Formative assessment supported by technology

TWG 6. Developing creativity in teachers and learners

TWG7. Learning from nation policy experiences

TWG 8. Upbringing in a digital world: Opportunities and possibilities

TWG 9. Supporting sustainability and scalability in educational technology initiatives: Research informed practice

Posters for sharing with EDUsummIT whole group

Official plenary sessions

Typical informal gathering: Nine participants from seven nations

Formal greeting in informal settings

Reference

Voogt, J., & Knezek, G. (Eds.). (2008). *International handbook of information technology in primary and secondary education.* New York: Springer.

EDUsummIT 2017

International Summit on ICT in Education
Borovets, Bulgaria
September 18-20, 2017

The learning landscape is undergoing fundamental changes, requiring new methods and perspectives to capture the new capabilities and learning processes that have emerged because of the basic technology infrastructure and tools generally available and the augmented capabilities that learners have through the use of such tools.

Approximately 90 leading researchers, policy makers and practitioners spanning all continents, gathered in Borovets, Bulgaria, September 18-20, 2017 to define action items.

A CALL TO ACTION

STUDENTS AND LEARNING WITH ICT

- To recognize that digital agency, as an individual's ability to control and adapt to a digital world, is a critical goal for social, civic and economic well-being.
- To recognize that citizens including young people are able to engage as producers rather than consumers in order to shape the interaction between technology and society.
- To create awareness of family, community and peer challenges for promoting digital citizenship and new opportunities and risks of upbringing in a digital world.
- To rethink inter-generational and intercultural dynamics of family and educational institutes linked to upbringing, in a continuous manner.
- To recognize creativity as an important component of student development.
- To embed creativity throughout the curriculum in both what we teach and assess, and in teacher professional standards.
- To develop a rich array of cases/examples that help exemplify and visualize what creativity looks like across teaching and learning contexts.
- To promote informal learning in education through empowering students, policy makers should facilitate connections between informal and formal learning and enable teachers to recognize and integrate informal learning in their pedagogy.

PROFESSIONAL DEVELOPMENT FOR INTEGRATING TECHNOLOGY

- To encourage professional development that includes the recognition that leaders facilitating technology-enhanced learning are important change agents in the implementation of policies.

- To encourage policy makers to create opportunities for developing teacher capacity to identify, foster development of, and formatively assess 21st century skills (e.g., creativity, problem solving, self regulation, critical thinking, collaboration, communication, digital literacy).
- To establish global and local networks of professional development of leaders who facilitate technology-enhanced learning.

EDUCATIONAL SYSTEM POLICIES FOR INFUSING TECHNOLOGIES

- To develop an actionable vision that has buy-in from all stakeholders to ensure alignment within the system.
- To use frameworks such as the UNESCO Framework (2011) as a tool to guide alignment and implementation within the system.
- To develop productive partnerships among all stakeholders to advance capacity building for ICT use in schools through the co-design of research with real commitment and ownership from all stakeholders at appropriate levels.
- To communicate and connect with policymakers and educators to ground policies in evidence informed knowledge to protect policy and practice from the latest fads of educational technology.
- To be aware of the affordances and challenges when stakeholders use data to make decisions for formative assessment.
- To create opportunities for collaborative work with stakeholders in order to examine the complex connections between data collection, data interpretation and meaningful data use to support teachers and learners.
- To use real time data systems to monitor and evaluate educational processes and outcomes through a balance of valued indicators in dynamic systems models.

AND

- To develop future ready policy visions aligned with global development goals.

Thematic Working Group 1

Education systems in the digital age: The need for alignment

Summary Report

Margaret Leahy & Deirdre Butler, *Dublin City University, Ireland*
Peter Twinning, *The Open University, UK*
Yousra Chtouki, *Al Akhawayn University, Morocco*
Kanda Moore, *Kasetsart University, Thailand*
Roumen Nikolov, *ULSIT, Bulgaria*
Amanda Sherman, *Cambodia Foundation for Higher Education*
Barbara Sherman, *Cambodia Foundation for Higher Education*
Teemu Valtonen, *University of Eastern Finland, Finland*

With

Ben Akoh, *Ulink Insights, Canada*
Carlos Miniano Pascual, *Addis Ababa Science and Technology University, Ethiopia*
Sara Farshadnia, *University of Canterbury, New Zealand*

Background

Around the globe education systems are acknowledging the need to change to meet the challenges of a rapidly evolving complex digital society. The need to have a long-term vision for education that ensures that all students experience success and have the knowledge, skills, abilities and competencies to live and thrive in the 21st century was never more important.

ICT has a key role to play in transforming education systems to meet the needs of the 21st century, not only because it changes many aspects of society which impact directly on the purposes of education, but also because it provides us with additional ways of supporting learners. However, it must be realised that ICT is *only one part* of a complex jigsaw and the use of ICT to support the type of learning fit for purposes in the 21st century is challenging. If change is to occur and ICT successfully used to support learning, there is a need to consider the implications for all aspects of the education system. This includes policy goals and visions of education along with pedagogy, teacher practice, professional learning, curriculum, assessment, as well as school organisation and administration, all of which work together and reinforce each other as part of an interrelated and interdependent learning ecosystem.

Lessons from the past demonstrate that the introduction of ICT into schools does not in and of itself lead to the development of innovative teaching practices or the transformation of education (Butler et al., 2013). If education systems are to support the type of learning required for the 21st century, a 'tinkering at the edges' approach is not sufficient if we are to move towards a real transformation of education. Instead, what is demanded is an understanding of how educational change can be empowered by digital technologies. Consequently, there is a need to move beyond a sole focus on 'ICT based innovations' and reconsider the design of the entire school system so as to maximise the impact educational change will have. This implies the adoption of a more systemic, holistic approach to ensure the alignment of the key components of the system.

The importance of having alignment between education visions, policy and practice is well established (e.g., Butler et al., 2013; Fullan, 2013; Twining et al., 2013). However, what is less clear is what the purposes of education systems should be in a rapidly changing world, and thus what educational visions, policies and practices might be most appropriate. Mindful of Dewey's (1934) advice that "any education is, in its forms and methods, an outgrowth of the needs of the society in which it exists", questions of how best to shape a purpose or vision for education in the 21st century are critical to any conversation around the need for alignment. Key to all such conversations is the understanding that what is defined as the purpose of education will inform alignment and determine if all students experience a quality education (UN Sustainable Development Goal No. 4, http://www.un.org/sustainabledevelopment/education/) whereby they acquire the knowledge, skills, abilities and competencies to be successful in the complex digital world of the 21st century.

Against this backdrop, this report presents the main outcomes of discussions at EDUsummIT 2017 by Thematic Working Group (TWG) 1 on the need for alignment in educational systems in the Digital Age. It begins by outlining the overarching principles of the work and is followed by the key challenges identified, resolutions to these challenges and recommendations. The report concludes by listing the actions to be taken by TWG1 to further develop the discussions going forward.

Nine members of TWG1 representing seven different nationalities attended EDUsummIT 2017 (see Figure 1).

Figure 1. TWG1 comprised 9 members representing 7 different nationalities.

Overarching Principles

The work of TWG1 was grounded in the following overarching principles:

- Alignment matters (Butler et al., 2013; Twining et al., 2013), and it should include alignment of Purposes (Vision), Policy (in particular policy in relation to curriculum, assessment and accountability), and Practice (See Figure 2).
- In determining how to 'fit the education system' with the needs of a digital age society, it is
    - Not enough to buy in to the concept of the need to change; rather, it implies both the need for a vision for education, which is fit for purpose, that is accepted by all stakeholders in the system *and* a need for action.
    - Not about focussing on ICT alone but rather on the ways to harness ICT for ensuring inclusive and quality education for all.

Figure 2. The key elements of alignment in education.

Key Challenges

Based on the analysis of case studies completed by members of TWG1 prior to EDUsummIT 2017 and the group discussions at EDUsummIT, TWG1 identified a number of challenges that were seen to impede alignment in education systems. The current challenge in most countries is a lack of alignment across policy, pedagogy and practice OR alignment to a vision that is 'not fit for purpose' in the digital age. Lack of involvement of all stakeholders in the process of developing policy, pedagogy and practices is also a common issue in most of educational systems (http://unesco.unibit.bg/en/TWG1). TWG1 discussions served to elaborate these challenges as follows:

Challenge 1: Alignment is complex

The concept of alignment within an education system is complex, dynamic and evolving. For example, applying a sociocultural framework (Figure 3) to the idea of alignment shows that it is much more complex than Figure 2 suggests. Each component of the system is just one aspect of an interrelated and interdependent ecosystem which embraces national, school and teacher levels.

Figure 3. A sociocultural analysis of educational alignment (adapted from Twining et al., 2017, p.27).

Challenge 2: Alignment needs to address the system as a whole

TWG1 used the UNESCO framework (2008a, 2008b, 2011) (Figure 4) as a tool to further highlight the complexity of education systems and the need for alignment. Specifically, it clearly illustrates each component of the system as just one aspect of an interrelated and interdependent ecosystem. For example, while it is important to consider infrastructural issues, it is equally important to take into account how digital technologies are to be used in curriculum and assessment. However, while digital technologies can make things possible it is people that make things happen; teachers' pedagogical orientations are pivotal in how the digital technologies are used. How to conceptualise, design and sustain teacher professional learning is therefore a critical component of the system. Despite this, the tendency has been to focus on specific aspects of education, such as the use of ICT in learning and teaching, rather than considering the system as a whole. The lack of impact of work on implementing ICT in

education despite extensive research, investment in infrastructure and equipment, and in teacher professional learning, evidences that this narrow focus is ineffective.

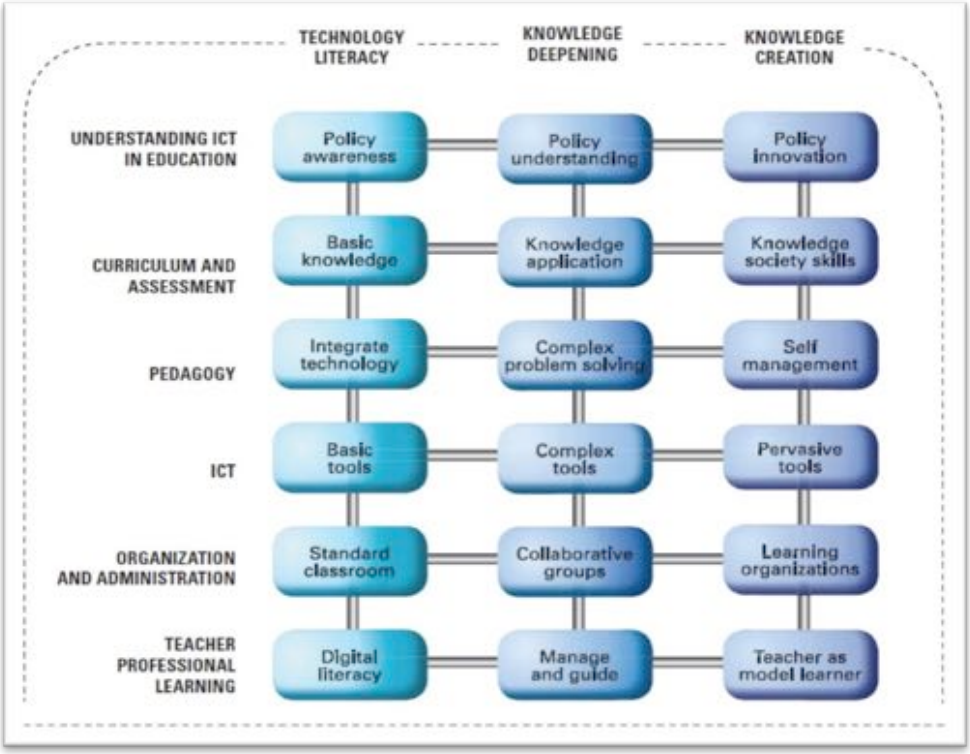

Figure 4. The UNESCO Framework (2011).

Challenge 3: Alignment needs to co-exist with a vision that is appropriate for the digital age

As noted above, alignment needs to be with an appropriate goal (Figure 5). Thus, for example, it could be argued that a vision that focuses on the recall of facts is not fit for purpose in a world in which information is readily available and the challenges are about its application to solve (complex) problems. This needs to be actionable and shared across stakeholders.

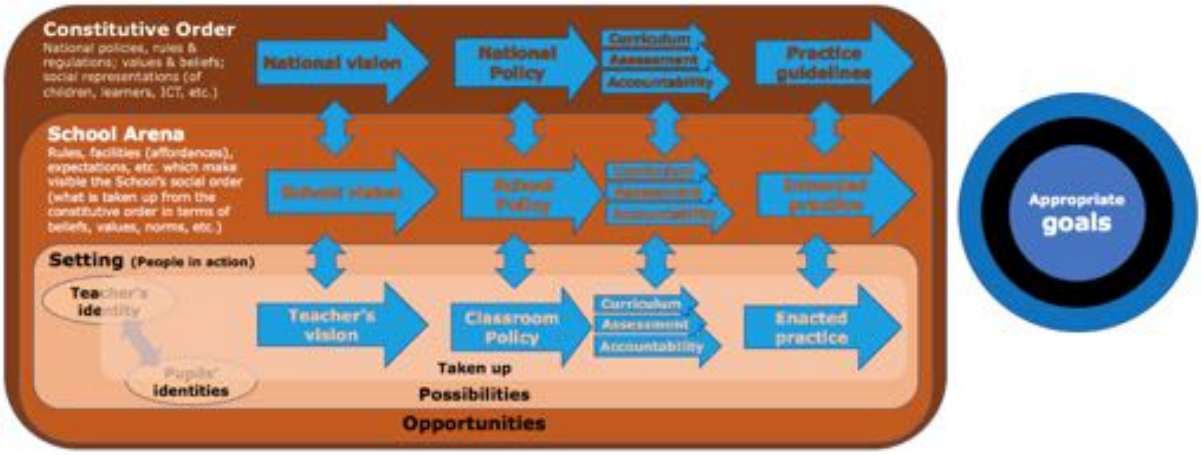

Figure 5. Alignment with an appropriate goal.

These three challenges were further explicated by the group as a set of interrelated questions focusing both on the development of a vision for education and the need for alignment in education systems. They were:

- How to ensure that any stated vision for education is both locally and globally appropriate?
    - How to adopt a global common framework, e.g., the UNESCO 2011 Framework and align it accordingly to the local vision, pedagogy and practices?
    - How to move beyond the belief in 'best practices', i.e., 'best practice' vs context? The tendency to copy is not always appropriate between systems.
    - How to build trust in local expertise?

- How to involve all stakeholders in the process of developing the vision from the outset? Stakeholders include students, parents, teachers, their organisations, policy makers, industry and citizens.

    - How to include the voice (i.e., aspirations, needs, values and interests) of the teachers, students and parents?
    - How to utilise educators' experience and knowledge in developing the vision?
    - How to ensure appropriate supports are put in place to adopt vision?
    - How to stimulate a "prosumer culture" (Toffler, 1980) among the students, teachers and wider community?
    - How to organise Living Labs (ICT based learning environments with involvement of all stakeholders) for exploration of innovative educational systems which demonstrate proper alignment across vision, pedagogy and practices?
    - How to utilise Learner Experience Design (LXE) and learning analytics in order to ensure refinement of the educational systems?

- How to challenge traditional values/resistance to change across and within the system?
    - Policy makers
    - Society at large
    - Learners (including teachers)
    - Parents
    - Researchers

- How to get alignment within and across all levels of system i.e., at the national, district, school and grade levels, including their ICT based infrastructures and learning environments, which entails:

- Understanding the complexity of alignment
    - How to get policymakers to understand the complexity of alignment, and their need for agility and adaptability?
    - How to ensure policy makers rely on the voice of their local teachers, constituents and researchers to avoid the 'flip/flop' nature of policy makers, i.e., when decisions are driven by political experience and third party influence rather than based on validated solid research evidence and data?

- Understanding that alignment is dynamic and evolving at multiple levels.

- How to ensure decision makers engage in an appropriate change management strategy?

How to resolve the challenges

In an effort to address the challenges highlighted in the previous section TWG1 agreed that:

- In developing a purpose/vision for education, there needs to be ownership of an ***appropriate shared*** understanding among all stakeholders. This
    - entails opening up of decision making, involving consultation of all stakeholders including parents, students, researchers, citizens and policy makers;
    - requires active open dialogue and ensures transparency of the educational systems;
    - ensures that policy makers make decisions based on evidence and draw on research from a learner centred design system;
    - embraces local and global needs; local expertise to be recognised/valued in decision making process; and
    - places a focus on pedagogy.

- The vision must be ***actionable*** across and between all levels of system. The 'Individual Fulfilment & Universal Well-being' model (See Figure 6) was accepted by all the members of the group as encapsulating the key elements that needed to be present in their countries' visions.
- Teacher professional learning is key, but we need to acknowledge that their pedagogical orientation is heavily influenced by values and beliefs; so essentially teachers' thinking needs to be challenged in order for them to design challenging learning opportunities for their students.
- The need to gather evidence to demonstrate vision in action is recognised.
    - How to decide what metrics/assessment are needed? There is a need for standard way of collecting data from all stakeholders.

        - User experience evaluation in the context of the evaluation system.
    - Learning analytics
        - Value of the use of big data while being aware of ethical and privacy issues.

Recommendations

The following recommendations were made:

1. Policy makers need to ensure there is alignment within the educational system with an appropriate vision for the digital age.
2. Alignment needs to be grounded within an actionable vision that has buy-in from all stakeholders. Customise the 'Individual Fulfilment & Universal Well-being' model (See Figure 6) as the starting point to develop a contextually relevant vision.

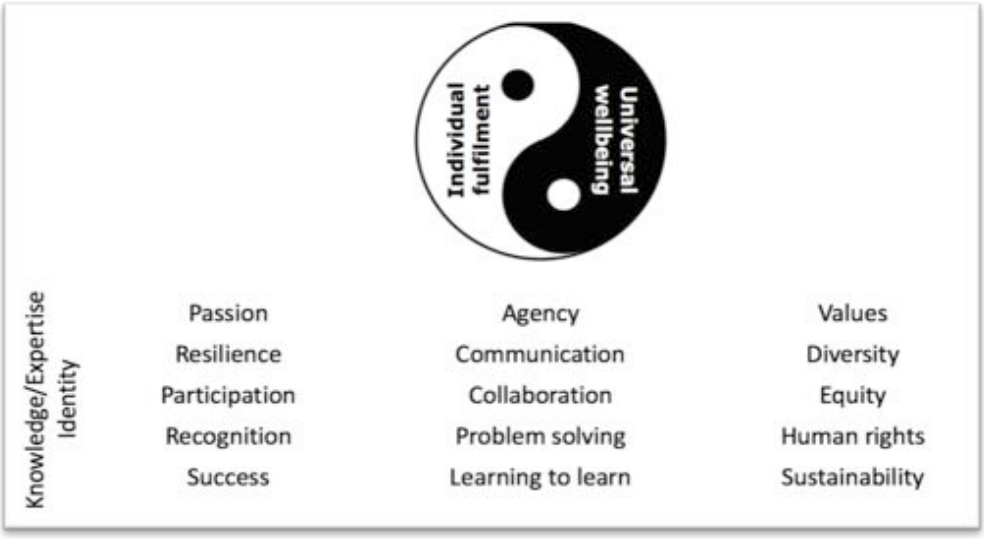

Figure 6. The Yin-Yang Vision.

- Use of frameworks such as the UNESCO Framework (2011) (Figure 4) as a tool to guide alignment and implementation of the vision.
- Use the recommendations from TWG7 with regard to the implementation of the vision development process.
- Effective use of technology to continuously collect data for information based on decision-making.
- Effective use of technology for supporting transparent policymaking.

Actions

Following the meeting in Borovets, the group agreed to the following actions:

- Final EDUsummIT 2017 report.
- Journal article to be developed for Special issue of *Technology, Knowledge and Learning*. All group members to contribute as authors.
- Possibly contribute to following symposia:
    - SITE, Washington DC, USA, March 2018
    - EdMedia, Amsterdam, The Netherlands, June 2018
    - OCCE, Linz, Austria, June 2018
    - ECER, Bolzano, Italy, September 2018

References

Butler, D., Leahy, M., Shiel, G., & Cosgrove, J. (2013). *Building Towards a Learning Society: A National Digital Strategy for Schools*. Dublin: St. Patrick's College of Education, Education Research Centre.

Fullan, M. (2013). *Stratosphere: Integrating technology, pedagogy, and change knowledge*. Canada: Pearson.

Toffler, A. (1980). *The third wave.* New York, NY: William Morrow.

Twining, P., Raffaghelli, J., Albion, P. & Knezek, D. (2013). Moving education into the digital age: the contribution of teachers' professional development. *Journal of Computer Assisted Learning*, , 426-437. doi: 10.1111/jcal.12031

Twining, P., Browne, N., Murphy, P., Hempel-Jorgensen, A., Harrison, S. & Parmar, N. (2017). *NP3 – New Purposes, New Practices, New Pedagogy: Meta-analysis report.* London: Society for Educational Studies. Retrieved from http://edfutures.net/images/e/e7/NP3_Meta-analysis_report.pdf

UNESCO (2008a). *ICT competency standards for teachers: Competency standards modules.* Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0015/001562/156207e.pdf

UNESCO (2008b). *ICT competency standards for teachers: Policy framework.* Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0015/001562/156210E.pdf

UNESCO (2011). *ICT competency standards for teachers: Policy framework.* Paris: UNESCO. Retrieved from http://iite.unesco.org/pics/publications/en/files/3214694.pdf

Thematic Working Group 2

Informal learning with technology

Summary Report

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Background and context

Historically there has been an interest in the relationship between informal and formal learning since a call to action was made at EDUsummIT 2009. In the 2015 EDUsummIT in Bangkok one of the main discussions was the challenge of how to ensure that educational institutions recognize and accredit informal learning. This paper addresses the challenges and potential solutions to better understand student technology experiences in informal learning environments in order to inform learning in formal settings.

Technology, such as social media and mobile devices, offers many benefits for informal learning such as new and more immediate ways of accessing and creating knowledge, greater social interaction, engagement anytime and anywhere, and new modes of representation (Cox, 2013; Davies & Eynon, 2015; Erstad & Sefton-Green, 2013; Erstad, et al., 2016).

There are multiple ways to define the construct of informal learning with no consensus as yet. In this paper, we broadly define informal learning as that which is not organised/teacher-directed, curriculum-driven, assessed and leading to qualifications. However, we recognise that formal and informal learning overlap somewhat, and that attributes of both can be present in a learning activity.

The benefits of connecting to informal learning practices in formal contexts include authenticity, greater engagement, opportunities to develop 21st century skills and the potential to enhance learning (Banks et al., 2007; Fallik, Rosenfeld, & Eylon, 2013; Hung, Lee, & Kim, 2012; Ito et al., 2013; Lemke, Lecusay, Cole, & Michjalchik, 2015). Schools

can draw on everyday knowledge and skills held by young people, their families and the wider community (Banks et al., 2007; Erstad et al., 2013; Kumpulainen & Mikkola, 2016). Policies are also being developed to formally recognise, validate and accredit the in/non-formal learning that occurs in the home, community and workplace (see Werquin, 2010; Yang, 2015). Non-formal learning such as after-school clubs can connect academic and everyday knowledge, enabling students to focus on interest-driven activities with more flexibility and without high-stakes testing but still benefiting academic learning (Deng, Connelly, & Lau, 2016; NRC, 2015). However, non-formal learning opportunities are not commonplace for students although its academic value is recognised by teachers (Birdwell, Scott, & Koninckx, 2015).

Due to the rapid uptake of technology in many societies and the developing digital youth culture, there has been greater interest from policy makers, educators and academics in connecting formal and informal learning (Erstad & Sefton-Green, 2013; Sefton-Green & Erstad, 2016). For example, UNESCO, OECD and many individual countries have developed policies relating to the recognition and validation of informal learning in relation to lifelong learning and adulthood. Many developing countries are exploring ways of reaching rural communities through mobile technologies and outreach work. Non-formal schooling (e.g., afterschool clubs) is a major part of the education ecosystem in many countries. There has been much recent interest in supporting learning across contexts at school level and thus funding has been targeted at educational research to contribute to knowledge in this area (e.g., H2020 at the EU level). As digital technologies become more ubiquitous is it becoming increasing important to investigate how they can be used to bridge formal and informal learning.

Issues and challenges

We now present the key challenges identified through our discussion.

- There is a lack of consensus of definition of informal learning.

Pedagogical challenges

- How can educators encourage students to engage in informal learning and relate it to formal learning?
- When young people use technology for informal learning, how can educators support self-engagement, self-regulation, critical reflection and resilience so that learners continuously develop?
- We still need to understand how to recognise and integrate informal learning with formal learning, and how technology could support this practice.

Policy challenges

- Rigid structural constraints limit opportunities for engaging with informal learning in formal contexts.
- Ethical issues such as formalising the informal, student resistance to the invasion of personal spaces, security and safety concerns need consideration.
- We need to understand how to maintain inclusivity when bridging formal and informal learning.

- There are different cultural expectations and the particularities of specific contexts.
- Many countries/regions do not support the recognition and accreditation of prior learning.

Research challenges

- There are relatively few models of good practice.
- Our understanding of how to bridge the formal and the informal is limited.
- Engaging in such research is challenging because of the diversity of informal learning and the need to address ethical issues.

Technology challenges

- How can technology be used to record informal learning experiences, taking account of ethical issues?
- In what ways can technology provide the structures to support students' self-engagement, self-regulation, critical reflection and resilience in informal learning?
- Investigate whether or not technologies are shifting the paradigm and making learning a social activity.

Recommendations and actionable statements

Lack of consensus of definition:
We should accept that a single definition of informal learning does not exist although many suggestions (discrete, continuum, attributes) have been put forward and some researchers choose not to use the term at all, referring instead to sites of learning, since informal learning is rather context specific. However, we still need a shared understanding. We can more easily agree on a definition of formal learning and consider that informal learning might broadly cover other instances of learning. Formal learning is organised/teacher-directed, curriculum-driven, involves tracking and assessment, and leads to qualifications. However, we recognise that formal and informal learning overlap as noted above.

We now present our recommendations and actionable statements.

For practice:

- Identify how practitioners can share informal learning practices that have an impact on formal learning with their students.
- Identify pedagogical approaches that take account of students' self-directed learning that is relevant to the curriculum and also support students to develop self-regulation skills through informal learning.
- develop teachers' skills and knowledge in order to support the development of their students' digital competence including technical skills, cognitive/metacognitive skills (e.g., critical reflection, making connections

between all learning experiences), and when and how to share learning, as well as their understanding of the ethical issues of using digital technologies.
- Investigate and experiment with new and innovative technologies and applications in educational contexts such as advancements in the xAPI and cmi5 standards. These new technologies can track and report on both formal and informal learning experiences, while most Learning Management Systems do not allow for this.

For policy making:

- Provide teachers with professional learning and development opportunities to develop pedagogical strategies and practices that could benefit learners to engage in informal learning.
- Target parents and students to develop a better understanding of the issues (e.g., ethical issues) relating to the connection between formal and informal learning.
- Develop policy to collect and use information about students' informal learning preferences and activities (e.g., utilising big data).
- Identify and share exemplars of different policy approaches.
- Promote accreditation of prior learning at all levels (e.g., schools, universities).

For research:

- Develop technologies to enable learners to capture and reuse their learning experiences (e.g., the SCROLL system in the context of language learning).
- Develop technologies to support critical thinking.
- Conduct more evidence-based studies to understand the relationship between formal and informal learning.
- Design studies that capture rich data on student use of technology outside formal institutions (e.g., ethnographic, walkthroughs).

Action plan

We intend to submit an article for the special issue arising from EDUsummIT 2017.

Conference targets (subject to proposal acceptance):

- Symposium contribution at SITE 2018, Washington D.C., March 26-30.
- Symposium contribution at EdMedia, Amsterdam, The Netherlands, June 25th-29th 2018.
- Symposium contribution at OCCE 2018, Linz, Austria, June 25th-28th 2018.
- Symposium contribution at ECER, Bolzano, Italy, September, 2018.

References

Banks, J.A., Au, K.H., Ball, A.F., Bell, P., Gordon, E.W., Gutiérrez, K.D., & Zhou, M. (2007). *Learning in and out of school in diverse environments: Life-long, life-wide, life-deep.* Seattle: LIFE Center and Center for Multicultural Education, University of Washington.

Birdwell, J., Scott, R., & Koninckx, D. (2015). *Non-formal learning could help to build character and close attainment gap: Learning by doing*. London: DEMOS.

Cox, M.J. (2013). Formal to informal learning with IT: research challenges and issues for e-learning. *Journal of Computer Assisted Learning, 29*(1), 1-21.

Davies, C., & Eynon, R. (2013). Studies of the Internet in Learning and Education: Broadening the Disciplinary Landscape of Research. In W. H. Dutton (Ed.), *The Oxford Handbook of Internet Studies* (pp. 328-349). Oxford: Oxford University Press.

Deng, L., Connelly, J., & Lau, M. (2016). Interest-driven digital practices of secondary students: Cases of connected learning. *Learning, Culture and Social Interaction, 9*, 45-54. doi:10.1016/j.lcsi.2016.01.004

Erstad, O., Kumpulainen, K., Mäkitalo, Å. , Schrøder, K.C., Pruulmann-Vegerfeldt, P., & Jóhannsdóttir, T. (2016). Tracing learning experiences within and across contexts: A Nordic approach. In O. Erstad, K. Kumpulainen, Å. Mäkitalo, K.C. Schrøder, P. Pruulmann-Vegerfeldt & Jóhannsdóttir, T. (Eds.), *Learning across Contexts in the Knowledge Society* (pp. 1-14). Rotterdam/Boston/Taipei: Sense Publishers.

Erstad, O., Gilje, Ø., & Arnseth, H.C. (2013). Learning lives connected: Digital youth across school and community spaces. *Comunicar, 40*, 89-98. doi: http://dx.doi.org/10.3916/C40-2013-02-09

Erstad, O., & Sefton-Green, J. (2013). "Digital Disconnect? The 'Digital Learner' and the School". In O. Erstad and J. Sefton-Green (Eds.), *Identity, Community, and Learning Lives in the Digital Age* (pp. 87-104.) New York: Cambridge University Press.

Fallik, O., Rosenfeld, S., & Eylon, B. (2013). School and out-of-school science: a model for bridging the gap. *Studies in Science Education, 49*(1), 69–91. doi:10.1080/03057267.2013.822166.

Hung, D., Lee, S. S., & Lim, K. Y. T. (2012). Authenticity in learning for the twenty first century: Bridging the formal and the informal. *Educational Technology Research & Development, 60*(6), 1071–1091.

Ito, M., K. Gutierrez, S. Livingstone, B. Penuel, J. Rhodes, K. Salen, J. Schor, J. Sefton-Green, & S. Watkins. (2013). *Connected Learning: An Agenda for Research and Design.* Irvine, CA: Digital Media and Learning Research Hub.

Kumpulainen, K., & Mikkola, A. (2016). Toward Hybrid Learning: Educational Engagement and Learning in the Digital Age. In E. Elstad (Ed.), *Educational Technology and Polycontextual Bridging* (pp. 15-38). Rotterdam/Boston/Taipei: Sense Publishers.

Lemke, J. L., Lecusay, R., Cole, M., & Michalchik, V. (2015). *Documenting and assessing learning in informal and media-rich environments.* Cambridge, MA: MIT Press.

National Research Council (NRC) (2015). *Identifying and supporting productive STEM programs in out-of-school settings.* Washington, DC: The National Academies Press.

Sefton-Green, J., & Erstad, O. (2016). Researching 'learning lives' – a new agenda for learning, media and technology. *Learning, Media and Technology*. Online first. doi: http://dx.doi.org/10.1080/17439884.2016.1170034

Werquin, P. (2010). *Recognising Non-Formal and Informal Learning: Outcomes, Policies and Practice*s. Paris, France: OECD publishing.

Yang, J. (2015). *Recognition, Validation and Accreditation of Non-formal and Non-formal Learning in UNESCO Member States*. Hamburg: UNESCO Institute for Lifelong Learning.

Thematic Working Group 3

Professional development for technology-enhanced learning leaders

Summary Report

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Background and context

"Leading in a culture of change means creating a culture of change. It does not mean adopting innovations, one after the other, it does mean producing the capacity to seek, critically assess, and selectively incorporate new ideas and practices – all the time, inside the organization as well as outside it" (Fullan, 2001, p. 44).

The focus of Thematic Working Group (TWG) 3 was professional development for learning leaders with an emphasis on how to provide effective technology enhanced instruction from the perspective of a culture of learning. Learning technologies should support curriculum in ways that are not otherwise possible. Rather than focusing on the technology, learning activities should meet instructional goals and involve technology when it enhances learning. Often educators may conceptualize integration as technological rather than primarily as curricular (Hutchison & Reinking, 2011). However, the focus should be on the learning and the curriculum, not the technology. The success or failure of the effective use of technology for learning in schools can be linked to beliefs and ideas of instructional leaders (Chang, 2012; Hughes & Zachariah, 2001). This paper focuses on the role learning leaders have in the effective use of technology in the learning environment and how to provide professional development for these leaders.

Issues and challenges

Based on the pre-summit paper prepared with the input of group members prior to EDUsummIT 2017 and discussions held during the summit, key issues and challenges regarding the professional development of learning leaders for the effective use of technology integration were identified. Group members determined it was important to define the roles, characteristics and practices of these learning leaders as well as how to assess the impact of their leadership. One important issue discussed was determining how these leaders best learn to enhance their leadership abilities. The group first defined the learning leaders as those who were charged with enhancing instruction through the use of technology. Characteristics of learning leaders were described followed by ways to prepare these learning leaders to integrate technology into learning.

Defining Learning Leaders

Learning leaders may include principals, curriculum specialists, technology coordinators, teacher team leaders, instructional technology specialists, teacher leaders or others charged with enhancing instruction. Leadership positions are typically chosen on the basis of prior experiences and activities. In schools, teacher-leaders can be identified in much the same way. No matter who is the designated learning leader in a school, it is important for the learning community to have a shared vision for transforming learning. School culture that emphasizes shared goals and collaboration has been shown to have a positive impact on innovative practices and learner-centered pedagogies by teachers (Jacobson, So, Teo, Lee, Pathak, & Lossman, 2010). An overall approach/mindset for learning leaders is to have a curious, creative, and critical approach to the future of the organization of learning. Creating a vision should support the improvement of pedagogical processes for overall learning goals. A premise for implementing technology for enhanced learning should be that students experience technology as a meaningful learning tool and show improved motivation and academic performance as well as increased technological skills.

Characteristics of learning leaders

There are numerous characteristics that are required to be a successful leader to support a curious, creative, and critical approach to curriculum leadership underpinned by technology infusion. While individuals are unlikely to be proficient in all of these characteristics at the same time, it is beneficial to identify potential leaders that possess many of the following characteristics:

- Focus on learning: The improvement of student learning should be the ultimate goal of learning leaders and not the introduction of technology as a means in its own right.
- Practitioner-research/design-based researcher: The leader should be able to engage in a systematic process of problem solving by employing theoretical models and action-based research methods.
- Current with technology relevant to pedagogy: The leader should be interested in new trends regarding pedagogical use of technology and be up-to-date.

- Ability to suggest suitable technology for specific contents and contexts: The leader should be rooted in local contexts and understand the affordances for teachers and students in different content areas.
- 21st century learning skills: The leader should demonstrate excellent skills with regard to lifelong-learning strategies, technology-related skills, information literacy, computational thinking and other cross-cutting abilities.
- Reflective practitioners: The leader is able to reflect on personal practice in-action and on-action and adapt his/her own practice according to the conclusions.
- Openness and willingness to encourage others: The leader cares for fellow colleagues and wants to serve for others' improvement including within his/her own local community and beyond to other professional groups.
- Broad focus on different technologies: The leader does not focus on one technology alone but is able to provide a broad menu of multiple options that is constantly updated.
- Knowledge about change and management of change: The leader should be aware of theories of educational change and demonstrate different strategies for managing change.
- Empowerment of others: The learning leader should be open to collaboration and a distributed leadership model.

Preparing learning leaders to enhance learning with technology

While there are many leaders in a school system that may impact the integration of technology, this discussion will focus on the school context. This section will include the discussion of ideas related to supporting and preparing learning leaders. The objective is that learning leaders are supported to enable a systemic change process. Learning leaders need to be directed and supported and facilitate the building of a school vision. To enable ownership of this shared vision, the leader needs to take part in establishing a change process that includes the collaborative building of short and long-term goals. It is important to note that learning to lead is a transformational process that does not occur in a one-time course or one-time professional development session.

While there are many formal and informal methods of preparation, the professional development opportunities for learning leaders should focus on the development of leadership capacity through a professional learning community. This leader community can be online and/or face-to-face, inclusive of leaders from a number of schools so that co-support and collaboration amongst the participants occurs. Within the community, participants take on an action research process, contributing ideas, sharing evidence, as well as planning and developing processes and strategies for school reform. Leaders learn from one another, building on ideas and reforming their own approaches. Fundamentally, the learning community is an active organization that informs and supports leaders to lead change. Additionally, leaders need to seek other professional learning opportunities that go beyond their community providing feed back to the leader community.

There are two defining characteristics of the leader community: building leaders to act as community engagers and leaders to act as community enablers. As community engagers, leaders establish who they are as a leader as well as dispositions of leadership

such as how to contribute, share, critique, relationship building in a community. As a community enabler, leaders need to understand and enact school reform including how to: a) build a shared vision (including elements of ownership, using data, gap analysis, strategies), b) focus on pedagogy appropriate for technology, c) support for mentorship/coaches, and d) provide infrastructure (hardware, software, bandwidth, policies).

Assessment and impact

Learning leaders should be able to determine the impact of an effective technology enhanced implementation through an assessment plan. The plan should include a cyclical design that includes vision, implementation and assessment with benchmarks and feedback throughout the cycle.

The impact of learning leaders should be conceptualized holistically, including positive, negative and the unexpected side-effects (consequences) that are generated on the basis of the interventions. The interventions are assumed to be initiated on the basis of a 'program theory' consisting of several presuppositions (or hypotheses) on how the interventions could work in creating change mechanisms in persons (beliefs and pedagogical practices) and in organizations with improved outcomes compared to the previous situation. For learning leaders, interventions (and the theories behind them for change, improvement, innovation and transformation) should have impact (effects, consequences) on student learning, including technology enhanced learning, teaching (including the pedagogical practices), and schools in their transformation towards the future.

This impact is to be assessed with respect to the diverse context-dependent conditions and factors for success and failure. Some interventions to improve learning are effective in certain contexts (classrooms, schools, districts, countries) and not in other contexts. Learning leaders should be concerned with finding answers to the generic question "what does or does not work, for whom, under what conditions and in what circumstances?" This question can be answered by measuring outcomes of the intervention on the one hand and through (qualitative) assessment by actors within the different contexts on the other hand. Learning leaders should be both reflective practitioners and action researchers to find out what works for whom in each situation.

To make an impact on learning, leaders must use a continuous cycle of vision creating, intervention development, implementation, and assessment. To assess these components in this cycle, metrics for assessing the impact are necessary with benchmarks created along the way to provide formative and informative assessment for of the improvement process.

Recommendations

TWG3 completed recommendations for three targeted groups – decision makers, researchers, and practitioners. Three lists of recommendations are provided below.

Recommendations for decision makers

- Value and support research-based, professional development opportunities for learning leaders.
- Give space to support risk-taking by leaders, embrace innovation, be willing to fail and learn.
- Set up positions and recruitment-systems for learning leaders.
- Provide incentives for learning leaders (time, recognition).
- Establish a network of professional development for learning leaders.
- Recognize that learning leaders have an important role in the creation and implementation of policies.

Recommendations for researchers

- Conduct emergent research based on the needs of the practitioner.
- Provide more opportunities for practical/practitioner-based researchers.
- Participate in sharing, dissemination and marketing research outcomes.
- Study learning leaders to measure their characteristics to create a typology that informs professional development.
- Produce a simple, practical measure to identify potential learning leaders.
- Provide a dashboard that produces output for assessing interventions, one that includes backend data.

Recommendations for practitioners

- Keep current on the latest research in the field.
- Take risks, seek opportunities for new the ideas, try something different.
- Use a practical measure to identify potential learning leaders.
- Create and be active in a network of learners.
- Encourage and mentor others to become learning leaders.
- Seek to expand your knowledge of change management and apply this knowledge in your own working environment.

Action plan

The working group developed an action plan to continue the sharing of ideas of learning leaders. There is a plan to develop a scholarly journal article of research-based findings related to developing learning leaders who integrate technology. Some members of the group intend to participate in the development of a symposium for the EdMedia and Innovation conference in Amsterdam in June 2018 and the Society for Information Technology in Teacher Education in March 2018. We will develop presentations related to practitioners at conferences such as the International Society for Technology in Education (ISTE) in June 2018 and presentations related to European Conference on Educational Research Bolzano, Italy, September 2018. We also think it is important to

explore ways to extend the synergy beyond the EDUsummIT event, such as online forums and face-to-face meetings.

References

Chang, I. Hua. (2012). The effect of principals' technological leadership on teachers' technological literacy and teaching effectiveness in Taiwanese elementary schools. *Journal of Educational Technology & Society, 15*(2), 328.

Fullan, M. (2001). *Leading in a culture of change*. San Francisco, CA: Jossey-Bass.

Hughes, M., & Zachariah, S. (2001). An investigation into the relationship between effective administrative leadership styles and the use of technology. *International Electronic Journal for Leadership in Learning (IEJLL), 5*(5).

Hutchison, A., & Reinking, D. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly, 46*(4), 312-333.

Jacobson, M.J., So, H-J., Teo, T., Lee, J., Pathak, S., & Lossman, H. (2010). Epistemology and learning: Impact on pedagogical practices and technology use in Singapore schools. *Computers & Education, 55*(4), 1694-1706.

Thematic Working Group 4

Digital agency to empower equity in education

Summary Report

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Introduction

In EDUsummIT 2017, Thematic Working Group (TWG) 4 researched digital agency empowering equity in education. In a world where digital engagement with learning is increasing, both onsite and online, it is important that concepts and concerns of digital agency are considered appropriately by policymakers and practitioners when they develop and implement provision for learners, locally, regionally, nationally and internationally. The research was undertaken in two stages:

- Prior to the Summit, we undertook a review of an existing literature that related to this topic, asked key informants to complete a short questionnaire, explored how a number of projects had addressed this issue and what their outcomes were, and created a discussion paper for the TWG.

- At the Summit, we discussed the definition of digital agency, the challenges of digital agency empowering equity in education, ways in which we might address these challenges, and recommendations we would offer to key stakeholders (policymakers, practitioners and researchers).

A definition of digital agency

We recognised at the outset the need to consider an appropriate definition of digital agency if we were to consider this topic adequately. Consequently, and early on during the Summit, we developed the following definition, which we used throughout our

subsequent work:

- Digital Agency (DA) - consisting of digital competence, digital confidence and digital accountability - is the individual's ability to control and adapt to a digital world.

The issue

The topic is concerned with a major issue that faces all those concerned with and charged with influencing education. Technology has brought many benefits to the world, but its increasing determinism in all societies across the world today (where technologies are managed by corporations and 'given' to other individuals to be used) raises a critical question about how technology is used and whose interests it serves. When we look at the world in 2017, the picture that emerges can be one of powerful vested interests, using technological progress to further corporate objectives. Indeed, there are several unsettling examples of this around the world today, at national, corporate or individual levels. At this moment in history, when science and technology have brought us much innovation and invention, it is wise to remember that the progress rests on the power of freethinking and the primacy of individual freedom and dignity. To guarantee such power to all citizens equitably, education on and with digital technology should be designed and practiced, fundamentally based on the idea of digital agency. Educators will use more rather than less technology in the future and therefore it is essential that with this increased use of technology comes a clear understanding of the relevance of digital agency and how to achieve it. Digital agency enshrines the principles of access and equity as surely as Article 1 of the United Nations Declaration of Human Rights (1948), ensuring that as we go forward as a global society driven by digital and other technologies, yet to be invented, the individual will always retain his and her ability to control and adapt to accelerating changes in society through the exercise of digital competence, digital confidence, and digital accountability.

Why digital agency is so important?

In an increasingly technological world, there is a need to constantly reconsider and address the question of technological determinism and the interaction between new technologies and society. The age-old question of whether technology controls us (technological determinism) or whether we as individuals shape new technologies as we use and interact with them (social shaping of technology), is central to the notion of digital agency. Currently, given the pace at which technology is advancing, whether it be in science, medicine, business and even civic society through the development of e-Government systems, the individual can become not just overpowered but also disempowered. In the interests of social cohesion and individual well-being, policy makers need to ensure that policies are in place to equip citizens with the tools (cultural capital rather than hardware and access alone) that allow them to interact with confidence and competence with new technological tools and systems. At the same time, understanding the implications for changes that new technologies embody, and impacts those have on how individuals behave, communicate and interact within a changing society, is a clear need for all citizens. In the absence of digital agency, there is a danger that individuals will feel less in control of their own lives and succumb to the belief that they have little or no say in how new technologies shape and control their lives. Therefore, digital agency as we have defined it is a way of empowering people to

deal with new technologies so that they feel they have a role in how they adopt, adapt to and use them wisely and responsibly.

Background

Agency has been a concept explored within the research literature for some time. For example, Martin in 2004 defined learner agency as "the capability of individual human beings to make choices and act on these choices in a way that makes a difference in their lives" (p.135). More recently in the literature, Starkey (2017) stated that digital agency is: "The ability for individuals to control and manage their use of digital technologies and online presence. This includes managing identity, initiating interactions, using technologies for self-identified purposes and modifying or developing digital tools". These requirements for developing digital agency are closely aligned with earlier conceptions of uses of digital technologies that are differentiated into 'consumer' or 'producer' activities and outcomes. Some studies have explored how digital agency might be developed through learner agency (Bjørgen, 2010; Erstad & Silseth, 2008). With computing and computer science education currently being developed and integrated into curricula across increasing numbers of countries, the role of coding is an important concern in this respect also, as discussed by Corneliussen and Prøitz (2015) and de Almeida, Delicado, de Almeida Alves and Carvalho (2015). Other studies have shown how digital agency has arisen from adult-focused projects managed within developing countries (Coelho, Segatto, & Frega, 2015; Vaughan, 2012). Some studies point to the fact that digital activities are offering the potential for more intercultural social interaction (Dezuanni & Monroy-Hernandez, 2012); however, in this context, Gudmundsdottir (2010) and Hatlevik and Christophersen (2013) highlight factors (such as home circumstances, language facility, and cultural capital) that affect digital agency from a digital equity perspective.

It is clear from features in the articles in this section that an important element of agency concerns culture and interculturality (as cultural background may well affect ways that different individuals will engage with student-centeredness or being in control, for example). In our research prior to the Summit, we identified relevant projects from around the world, explored how they had tackled key issues, and what had been achieved (discussed more in the Discussion Paper, http://unesco.unibit.bg/en/EDUsummIT17). These included: the Technology, Education, and Cultural Diversity (TEC) Center in Israel; the Global Classroom in Canada; the Dissolving Boundaries Project in Ireland; clusters of schools in New Zealand that aim to develop agency through the use of digital technologies, including Manaia Kalani; and a scaffolding approach first developed to support indigenous Australian learners, among others.

The challenges

In terms of digital agency empowering equity in education, the challenges we need to consider are identified within a concept map we present (Figure 1). It is clear that there is no one single or simple challenge to consider. The multiplicity of elements to be considered and their inter-relationships are complex, and they often lie at a societal level rather than within a single sector of society – education. The challenges can be considered in three different categories:

- Digital competence, which consists of, for example:
  - Traditional literacy and numeracy as well as digital literacy.
  - Critical thinking.
  - Producer, as well as consumer, skills and abilities.
  - Knowledge of languages that are important in the online world.

- Digital confidence, which consists of, for example:
  - Ease of use of applications and software.
  - Confidence to handle ICT in different contexts – in the family, community and society.
  - Digital autonomy – knowing the informed basis of one's choices and actions.

- Digital accountability, which consists of, for example:
  - Digital responsibility for oneself and for others of one's digital actions.
  - Knowledge of the digital world, and its ethical issues.
  - Understanding concerns with and ensuring security and privacy.
  - Understanding the impact of our digital activities.

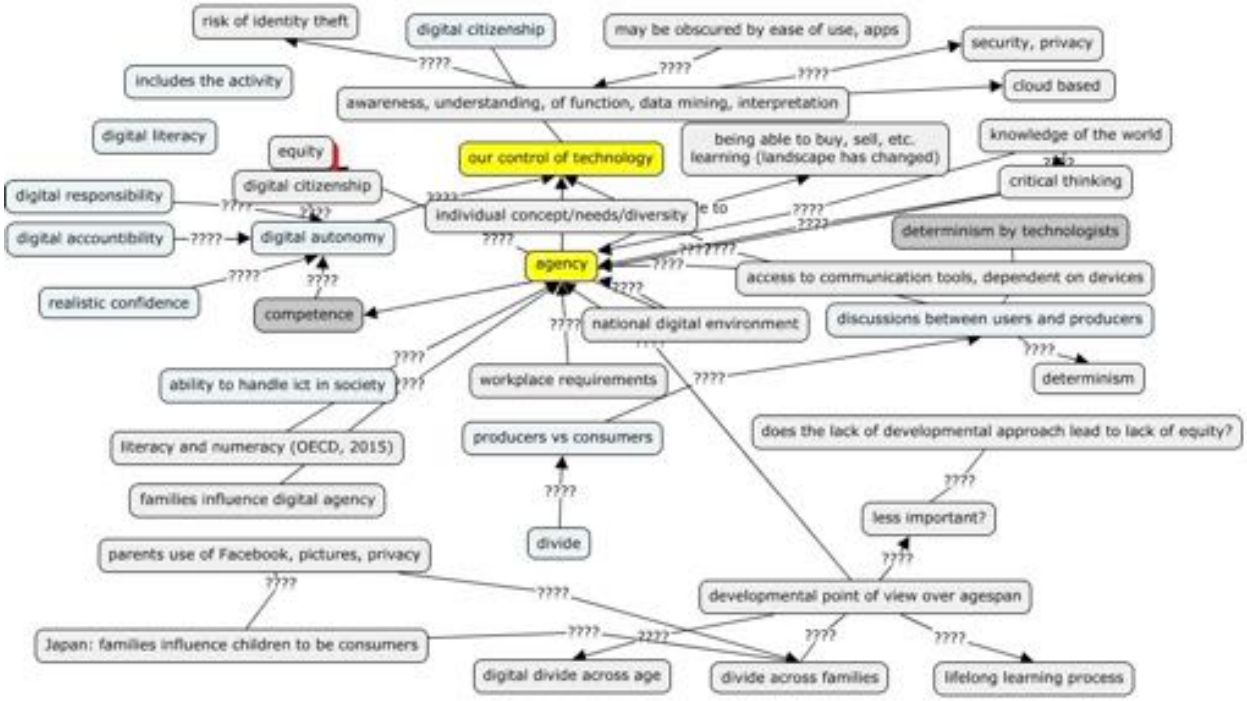

Figure 1. Challenges arising from our conference discussions [Note 1]**.**

How to address them?

While there is no single challenge, there are similarly no simple answers as to how to address the challenges. Appropriate mobilisation of the different sectors of society, as has already been implemented in e-city localities in some countries, is needed to explore ways to do this. Society as a whole has to be involved, with determination to achieve outcomes across periods of time supported with regular monitoring and re-focus, which cannot easily be gained from a simple implementation. A building of understanding and awareness, a movement towards users informing the practices of developers, and a

greater focus on producer activities (activities that produce outcomes from programming, computing and digital creativity) rather than consumer activities (using resources and materials that others provide) must be in place. A concept map (Figure 2) gives ideas of the elements that should be addressed, but ways to do this must be explored in a fully contextualised way.

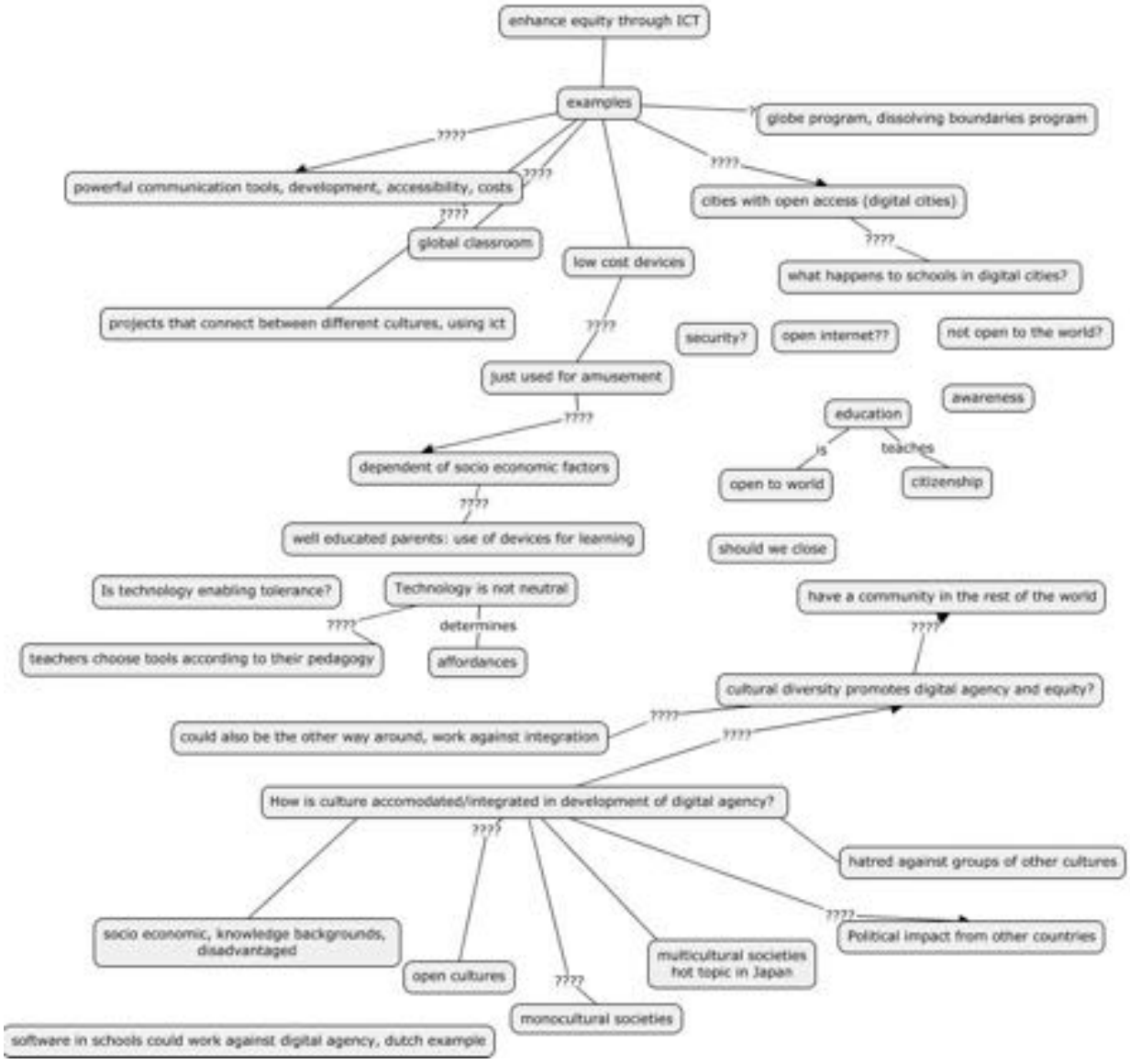

Figure 2. Challenges and elements to be addressed [Note 1].

Recommendations

Our recommendations are:

1. Digital agency must be guaranteed equitably for all citizens.
2. Policymakers and educators must adopt digital agency as a critical goal for social, civic, and economic well-being.
3. Education about and with digital technology should be based on the idea of digital agency, designed, practised and provided equitably for all citizens regardless of age, race, ethnicity, gender or all other human attributes.

4. Curriculum and digital agency development for and involving teachers are urgently needed, and should be introduced into the education of pre-service teachers.
5. Engagement in producing rather than consuming activities must be fostered in schools.
6. Intercultural communication and learning must be fostered.
7. Leaders of society must provide tools and spaces to enable digital equity [Note 2] (technological, social, and cultural access to support individual and group use) for all.
8. Ways to include households in adopting and modelling digital agency must be developed.
9. Research to support digital agency development must be commissioned.

Note

1. The question marks indicate possible, unclear or uncertain links, with the number of question marks indicating degree of uncertainty.

2. It should be noted that some authors argue that digital inclusion rather than digital equity is the concept (with associated practices) that should be the focus of societal concern.

References

Bjørgen, A. M. (2010). Boundary crossing and learning identities – digital storytelling in primary schools. *International Journal of Media, Technology & Lifelong Learning, 6*(2), 161–178.

Coelho, T.R., Segatto, A.P., & Frega, J.R. (2015). Analysing ICT and development from the perspective of the capabilities approach: A study in South Brazil. *The Electronic Journal of Information Systems in Developing Countries, 67*(2), 1–14. Retrieved from www.ejisdc.org.

Corneliussen, H.G., & Prøitz, L. (2015). Kids code in a rural village in Norway: Could code clubs be a new arena for increasing girls' digital interest and competence? *Information, Communication & Society, 19*(1), 95-110. doi: 10.1080/1369118x.2015.1093529.

de Almeida, A.N., Delicado, A., de Almeida Alves, N., & Carvalho, T. (2015). Internet, children and space: Revisiting generational attributes and boundaries. *New Media & Society, 17*(9), 1436-1453. doi: 10.1177/1461444814528293.

Dezuanni, M., & Monroy-Hernandez, A. (2012). Prosuming across cultures: Youth creating and discussing digital media across borders. *Revista Communicar, 38*. http://doi.org/10.3916/C38-2011-02-06.

Erstad, O., & Silseth, K. (2008). Agency in digital storytelling: Challenging the educational context. In Lundby, K. (Ed.), *Digital Storytelling, Mediatized Stories: Self-Presentations in New Media* (Vol. 52, pp. 213-232). New York, NY: Peter Lang.

Gudmundsdottir, G. (2010). From digital divide to digital equity: Learners' ICT

competence in four primary schools in Cape Town, South Africa. *International Journal of Education and Development Using ICT, 6*(2), 84–105. Retrieved from http://www.editlib.org/p/42335/.

Hatlevik, O.E., & Christophersen, K.-A. (2013). Digital competence at the beginning of upper secondary school: Identifying factors explaining digital inclusion. *Computers & Education, 63*, 240-247. doi: 10.1016/j.compedu.2012.11.015.

Martin, J. (2004). Self-regulated learning, social cognitive theory, and agency. *Educational Psychologist, 39*, 135-145.

Starkey, L. (2017). Three dimensions of student-centred education: a framework for policy and practice. *Critical Studies in Education*. Advanced online publication. doi: 10.1080/17508487.2017.1281829.

United Nations (1948). *Universal Declaration of Human Rights*. Retrieved from http://www.ohchr.org/EN/UDHR/Documents/UDHR_Translations/eng.pdf.

Vaughan, D. (2012). Using information and communications technology to build capabilities for well-being in post-conflict communities. *The Capability Approach: Development Practice and Public Policy in the Asia-Pacific Region, 18*, 186.

Thematic Working Group 5

Formative assessment supported by technology

Summary Report

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Introduction

The future of assessment faces major challenges including the use of IT to facilitate formative assessment that is important for improving learners' development, motivation and engagement in learning. In many countries, in recent years, a renewed focus on assessments to support learning has been pushing against the burgeoning of testing for accountability, which in some countries, renders effective formative assessment practices almost impossible. Moreover, a systematic review by Harlen and Deakin Crick (2002) revealed that a strong focus on summative assessment for accountability can reduce motivation and disengage many learners. At the same time use of IT-enabled assessments has been increasing rapidly, as they offer promise of cheaper ways of delivering and marking assessments as well as access to vast amounts of assessment data from which a wide range of judgements might be made about students, teachers, schools and education systems (Gibson & Webb, 2015). These opportunities also extend to assessment of complex collaborative work (Webb & Gibson, 2015). Current opportunities for using IT, including for harnessing the data that is being collected automatically, for formative assessment are underexplored and less well understood than those for summative assessments. Opportunities for learning with IT and perhaps with less teacher input are increasing but this depends on students developing as autonomous or independent learners. Research in formative assessment including effective feedback has emphasised the value of peer assessment practices for developing self-assessment capabilities and hence independent learners (Black, Harrison, Lee, Marshall, & William, 2003). At previous EDUsummITs the possibilities and challenges for IT-enabled assessments to support simultaneously both formative and summative purposes were analysed (Webb, Gibson, & Forkosh-Baruch, 2013). While

these challenges remain, at EDUsummIT 2017 we focused on the opportunities and challenges of IT supporting formative assessment because effective formative assessment is known to be extremely important for learning.

Background and terminology

While a variety of definitions are evident in the literature, we adopted a definition by Black and Wiliam (2009) who characterised formative assessment as the generation and interpretation of evidence about learner performance by teachers, learners or their peers to make decisions about the next steps in instruction. This form of 'assessment *for* learning' allows decisions about future performance to be better founded than decisions made in the absence of formative evidence (Black & Wiliam, 2009).

Evidence from a broad-scale meta-analysis has demonstrated that formative assessment improves learning with strong effect sizes (Hattie, 2009) and has led to a renewed impetus for assessment to support learning in a variety of cultural contexts (e.g., see Carless & Lam, 2014). Formative assessment sits in contrast to summative 'assessments *of* learning', which are used to assess a student's learning at the conclusion to a learning sequence and are typically based on standards or benchmarks to make judgements.

In addition to assessment *for* and assessment *of* learning, assessment *as* learning is a phrase that has crept into common use in education and reflects a renewed focus on the nature of the integration of assessment and learning and highlights the importance of the dialogue between learners and teachers and between peers engaged in formative assessments. We argued at this and previous EDUsummITs that this integration can be supported and promoted by IT (Webb, Gibson, & Forkosh-Baruch, 2013). In addition to increasing opportunities for collecting and processing assessment data, IT has enabled a proliferation of tools including those for classroom use such as student response systems (clickers) and many online systems that provide automatic feedback. These online systems range from simple spellcheckers to sophisticated automatic feedback and 'intelligent tutoring systems'. Furthermore more general IT facilities such as discussion boards, videocasts, videoconferencing and social media environments can support communication and dialogic aspects of formative assessment. At the same time additional sources of feedback have become available to learners. Thus, for example, a learner may choose to discuss their homework in an online forum where they may receive help from experts or peers. In order to deepen their learning experience further a student may take a Massive Open Online Course (MOOC) that supplements their school curriculum and perhaps tackles some of the topics in more depth or from different perspectives. While these opportunities offer many potential benefits they also present additional challenges for all stakeholders beyond those challenges presented by formative assessment per se.

Challenges for formative assessment supported by technology

In Table 1 we summarise the challenges that we identified together with a brief explanation and note of key issues.

Table 1
Summary of Challenges and Issues

Challenge	**Issues and Explanation**
Motivational and affective aspects	How to address and describe motivational and affective issues that may influence the use and validity of assessments?
Datafication	How to decide which data to collect? How to analyze and interpret data and use that meaningful information for formative assessment to support teachers and learners in the process of learning?
Forms of feedback	How to interpret the different forms of feedback and how to provide scaffolds for teachers and learners to make sense of data in order to incorporate data all into feedback processes?
Balance between summative and formative assessment	How to manage the balance and relation between summative and formative assessment especially with respect to validity and transparency? Using data for multiple purposes can present a threat to the validity of an assessment.
Privacy and ethics	How to deal with data privacy and ethical issues? Who has access to data? How is data used?
Teacher education	How to deal with teacher education and lack of assessment literacy and digital literacy?
Horizontal skills	How to assess horizontal, general, complex skills such as 21st century skills? 21st century skills can consist of skills such as creativity, problem solving, self-regulation, critical thinking, collaboration, communication and digital literacy that are difficult to assess because of the lack of descriptions.
Digital Tools	How to evaluate and select tools for different assessment purposes and stakeholders, tools for formative assessment that support the process of learning and gathering data during that process?
Intelligent tutoring systems	Intelligent tutoring systems - What is their place in formative assessment? What form should be the output of formative assessment? Are the outputs recommendations or strict prescriptive statements?

Learning outcomes	How to describe learning outcomes for formative assessment, keeping in mind cultural aspects and validity issues? Learning outcomes can be described as aims, goals, or learning objectives, related to the actual context where formative assessment is used.
Sorts of feedback	There are different sorts and different sources of feedback. Feedback can come from humans or processed from data. Learners, teachers and school leaders have to learn how to manage those sorts and sources. What feedback do teachers want/expect from learners?
Large groups	How to assess large groups of learners and to provide individualised feedback?
Peer assessment	Promoting, managing, timing, designing peer assessments. How to set up a climate in which learners can give feedback online and/or face to face in a safe environment with supportive relationships between students and between students and teacher? In some cultures, e.g. Confucian heritage settings, managing the issue of "saving face". Willingness and motivation to engage in peer feedback and how to establish credibility. Managing learners' expectations. Ages of the learners for engaging in useful feedback, different contexts and groups are relevant. Learners do not always understand the goals, different sources and of sorts feedback. How to promote understanding of quality work and feedback in different contents?
Integrity	Plagiarism and other forms of cheating are critical especially to summative assessments but understanding of expectations for integrity needs to be developed through formative processes.

Recommendations to Stakeholders

Table 2 summarises our recommendations for stakeholders. Our experiences indicate that in many educational establishments teachers are designers of learning and assessment systems but increasingly instructional designers and software designers also have roles in creating IT-enabled assessments.

Table 2

Summary of Recommendations for Policy Makers (P), Teachers (T), Designers (D), Researchers (R) and Industry Partners (I)

Recommendations	**Stakeholders**
Create opportunities to encourage and develop teacher capacity to identify, foster development of, and formatively assess horizontal, general, complex 21st century skills.	P
Realise the potential and be aware of the challenges when using data to make decisions for formative assessment.	P
Create opportunities for collaborative work with stakeholders in order to examine the complex connections between meaningful data collection, data interpretation (learning analytics) and data use to support teachers and learners.	P
Create systems that can be adaptive to contextual sensitivities identified by ongoing dialogue involving teachers, learners, and system designers.	P, T, D, R, I
Give teachers and learners access to the data collection and processing model in addition to the final data state to foster understanding of the formative elements of these tasks.	P, T, D, R, I
Represent new forms of data by new forms of visualisation that are meaningful to stakeholders.	P, T, D, R, I
Provide ongoing data literacy training to enhance effective interpretation.	P, T, R
Increase awareness of the need to design online tasks, where appropriate, that involve and assess horizontal, general, complex 21st century skills.	P, T, D, R, I
Create opportunities to encourage and develop teacher identification, formative assessment and feedback provision associated with horizontal, general, complex 21st Century skills, when online systems are not appropriate for formative assessment of these skills.	P, T, R

Incorporate formative and summative assessment of horizontal, general, complex 21st century skills (which may be highlighted through effective case studies).	P, T, R
Negotiate and ensure shared understanding of criteria or examples to allow for student self-assessment or peer-assessment of skill development.	P, T, R
Regarding learning outcomes, take into account the aims/goals etc. of different stakeholders. For example, mathematics learning has multiple purposes: as a vehicle for personal development, a way to comprehend a beautiful discipline, a tool for solving problems in industry.	P, T, D
Encourage discussions among stakeholders that would clarify matters for a shared understanding and appropriate collaborative implementation regarding how to describe learning outcomes.	P, T, D
Increase awareness among people designing learning systems (including teachers) that assessment design needs to be part of the initial learning design irrespective of other contextual issues (e.g., whether it is a face to face activity or an entire learning module) that encourage metacognition and connections within and between content.	T, D, R
Make learning systems flexible and customizable to allow teachers/learners to modify them for particular cohorts of learners or situations.	T, D
Help students/teachers/school leaders to recognize different sources of feedback and support students/teachers/school leaders in evaluating and using them.	T
Develop students'/teachers'/school leaders' skills of classifying, comparing, evaluating, connecting, and making use of feedback data.	P, T, D, R
Develop learners' capacities for cognitive, metacognitive and affective self-regulated learning in order to enable independent learning from the feedback in various settings. For example, there are a range of systems that give automatic feedback from spell-checkers to CAS (Computer Algebra System). In addition, develop learners' capabilities with co-regulation and socially shared regulated of learning in order to support collaborative group work in both face-to-face and online settings.	T, D

Encourage teachers to recognise that students receive formative feedback from a range of sources both inside and outside school. The two implications that may result are: 1) students may look to teachers to resolve tensions created by inconsistent feedback from differing sources; 2) students work may not accurately reflect their capabilities.	T

Action Plan

The working group will:

1. Elaborate a scholarly article on "Challenges for formative assessment supported by technologies" by building on this short report and on research from past EDUsummITs and the 2nd edition of the International Handbook for Information Technology in Primary and Secondary Schools (Voogt, Knezek, Christensen, & Lai, 2018) and the work of other thematic working groups.
2. Disseminate outcomes at various research conferences including: OCCE, 2018; SITE, 2018; and the next EDUsummit, 2019.
3. Inform national governments and regional authorities of the findings and recommendations translating this report where appropriate.
4. Disseminate outcomes at teacher conferences and through teacher organisations including: National E-learning Center Conference, 2018 and Australian Council for Computers in Education (ACCE), 2018.

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References

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2003). *Assessment for learning: putting it into practice*. Buckingham, UK: Open University.

Black, P. & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability 21*, 5-31.

Carless, D., & Lam, R. (2014). Developing Assessment for Productive Learning in Confucian-Influenced Settings. In C. Wyatt-Smith, V. Klenowski, & P. Colbert (Eds.), *Designing Assessment for Quality Learning* (pp. 167-179). Dordrecht: Springer Netherlands.

Gibson, D. & Webb, M. (2015). Data science in educational assessment. *Education and Information Technologies, 20*(4), 697-713.

Hattie, J. A. C. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. Abingdon: Routledge.

Voogt, J., Knezek, G., Christensen, R., & Lai, K. W. (2018). *International handbook of information technology in primary and secondary education* (2nd edition). Singapore: Springer.

Webb, M. E., & Gibson, D. (2015). Technology enhanced assessment in complex collaborative settings. *Education and Information Technologies, 20*(4), 675-695.

Webb, M. E., Gibson, D., & Forkosh-Baruch, A. (2013). Challenges for information technology supporting educational assessment. *Journal of Computer Assisted Learning 29*(5), 451-462.

Thematic Working Group 6

Developing creativity in teachers and learners

Summary Report

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Introduction

Human creativity has always been, and will increasingly become, one of the most important factors that builds and shape our society, and facilitates approaches and solutions to challenges and issues in our complex world (Freedman, 2007). Creativity has been tightly linked to both sweeping and incremental innovations and discoveries, across many contexts, in the arts, the sciences and all disciplines (Catterall, 2002). It is emphasized more strongly than ever today, both in the workplace and the classroom (Sawyer, 2011), and education is charged with the task of actualizing this importance in teaching and learning practices. Educational institutions and governments globally, are increasingly calling for attention to developing creative thinking, as a 21st century skill in learners. Research has shown that developing creativity in learners is closely related to creative teaching (Amabile, 1989).

Scholars have also noted that in current global contexts, the construct of creativity is ultimately tied to considerations of technology—since new technologies are often a part of the contexts we teach, learn, and work within, and are essential tools for thinking and creating (Zhao, 2012). Contemporary technologies provide new and powerful ways to be creative, which brings implications for teachers and students in classrooms (Mishra, &

The Deep-Play Research Group, 2012). However, technologies can also inhibit or challenge creative endeavours. Because technology-fluency and creative thinking are increasingly touted as core ways of thinking and work for success in the 21st century, it is more important than ever that we develop an understanding of what goes into these constructs for learners and teachers.

EDUsummIT 2017 Outcomes

Creativity is a complex and often ill-defined concept, and this is part of the challenge that educational systems, schools, and policymakers have faced in instantiating it. To begin from a point of common definition, TWG6 determined to adopt the perspective that creative endeavours (processes and products) are characterized as Novel, Effective, and Whole (NEW), as defined by Mishra and Koehler (2008)—and noted by Henriksen, Mishra, and Fisser (2016), stemming from EDUsummIT 2015. We assert creativity involves approaches to thinking rather than a set body of knowledge that can be taught. However, we can reinforce and support sustained creativity by engaging with the idea that it can become a 'habit of the mind'. This also means that the education system/ educators need to be able to recognize and support a sustained facilitation of creativity as a habit of the mind, and agree upon what that is and how to do so—a challenge that can vary greatly across contexts and cultures.

The goal of TWG6 was to explore the complex challenges to developing creativity in teachers and learners. An outcome of EDUsummIT 2017 was the identification of a small selection of what we feel are the most broadly significant or compelling problems faced by educational stakeholders involved in the challenge of enacting creativity in teaching and learning. In response to each of the problems we developed recommendations, where relevant, for several key agents, including: researchers, policy makers, and educational practitioners as well as teacher educators.

Problems and Recommendations

Our recommendations are intended to improve the instantiation of creativity with and through technology, for 21st century learning settings. The following list provides a brief description of key problems and suggested recommendations.

1. **Creativity is hard to define, and therefore difficult to recognize, encourage and evaluate**. It is a complex, multi-faceted concept that resists simple definitions and is used in different ways across systems and contexts. However, because it is ill-defined, it can be difficult to consistently instantiate in teaching and learning. In other words, teachers and learners often struggle to identify when it occurs and understand how it can be facilitated. Stakeholders are in need of a clear vision, specific strategies/principles, and exemplars of creativity in practice to help them better understand how it varies across contexts and may be instantiated in their own.
    - *Recommendation - Researchers*: engage in education/creativity research that both works from common broad scholarly definitions of creativity, and also seeks to provide a working definition for creativity in education contexts. Importantly, this work should offer explicit strategies for recognizing, developing and evaluating creativity with and through digital technologies in educational practice and policy.

- *Recommendation - Teacher educators*: Work with pre-service and in-service teachers to help them take broad/general ideas about creativity in teaching and learning, to imagine and transfer them to their own pedagogical style and context.
- *Recommendation - Policy makers*: Develop a rich array of cases/examples that help exemplify and visualize what creativity looks like across teaching and learning contexts. Engage with creativity/education teachers and researchers to begin to develop a clearer picture of how we define creativity as an approach to teaching and learning.

2. **Creativity is not embedded or valued enough in the culture of education, including what and how we teach, evaluate and assess.** It is not valued across disciplines, as a graduate attribute, or as a teaching and learning method—without legitimate attention and resources across educational settings and contexts, it is often the first thing to fall away in favor of other educational principles or values. Even when policy refers to creativity, this does not guarantee instantiation of creative teaching or learning within curricula, testing policies, and practices. Schools are often structured around traditional ways of teaching, learning, and knowing, and policy/practice and standardized, high-stakes assessment often rewards conventional, one-right-answer approaches, and punishes novel, effective practices or answers.
   - *Recommendation - Policy makers*: Embed creativity within both broad principles and specific outcomes for teaching (how we teach) and learning (what is taught, and how learners engage).
   - *Recommendation - Teacher educators*: Ensure pre-service teachers are involved in creative teaching/learning in which the teacher educators implementing creative methods themselves. Pre-service teachers are given opportunities to practice creative teaching and bring their own ideas.

3. **Digital technologies both support and constrain creativity.** Many stakeholders may lack access to, and knowledge of, digital technologies and how they may support or constrain creativity. Putting digital technologies into schools may resolve issues of physical access, but does not necessarily resolve issues of cultural capital and other significant barriers, and does not guarantee creative practices or outcomes. The design of software/hardware may constrain teacher and learner creativity as well as generate new ways of working and thinking.
   - *Recommendation - Policy makers* need to be cautious when recommending technology 'solutions'.
   - *Recommendation - Teachers*: Recognize that technologies can both constrain and facilitate creativity, and that learners may not have the same access or knowledge of technologies to effectively engage in creative endeavors.

4. **Teachers find it difficult to integrate teaching creatively.** Research supports the notion that creativity in learners is encouraged through creative teaching practices. Therefore, without professional development and clear standards that

value creative practices, teachers will often struggle to engage in or understand how to enact creative activities and practices.

- *Recommendation - Policy makers* (education systems): to develop meaningful professional learning opportunities to support teachers to: (i) recognise environments that can support creative learning; (ii) adopt creative teaching practices; (iii) nurture creativity in students, and (iv) evaluate and assess creativity (including the process, not only the product).
- *Recommendation - Policy makers* (teacher standards): stimulate teachers' capabilities in regards to creativity by identifying and embedding expectations relating to creativity into teacher standards and professional learning requirements.
- *Recommendation - Teacher educators*: Provide future and current teachers with opportunities to learn about how to engage creativity in the classroom. Explicitly discuss the idea that all people are capable of creative thinking, and offer teachers support to consider how this looks for their own professional teaching practice.

5. **Learners often struggle with how to be creative.** Perhaps due to the fact that creativity is not clearly defined and rarely instantiated in schools and education structures, learners are often left unsure of what it means to be creative or how to approach creative work or open-ended projects. They often do not identify as creative, and therefore are limited in their ability to engage in creative thinking, or novel practices in their own thinking and learning.

   - *Recommendation - Researchers*: Study learners' perceptions of their creativity. Study how teachers can support learners' understanding of creativity.
   - *Recommendation - Teachers*: Support learners' creative agency, nurture the idea that everyone can be creative. Develop habits of thinking and working that enhance/expand creativity.
   - *Recommendation - Teacher educators*: Teach pre-service and in-service teachers about creative habits of mind, and offer opportunities for them to practice these.
   - *Recommendation - Policy makers*: Enact policy standards that encourage teachers to value creativity in all learners, and offer clear guidelines for how teachers can support this in students.

6. **School systems and environments can be constraining to creativity.** School structures are often built on traditional (frequently behaviorist) principles of thinking and learning, which limit creativity by rewarding convention and limited approaches/answers, and punish imagination, and novel, effective and whole practices, both for teachers and learners.

- *Recommendation - Teachers*: Look for opportunities in curricula and classroom practices, to engage with and infuse the idea that everybody can be creative in school structures.
- *Recommendation - Policy makers*: Offer clear guidelines for how school systems can systemically value and support creative environments.
- *Recommendation - Researchers*: Study school environments that appear to either constrain or support learners' creativity.

References

Amabile, T.M. (1989). *Growing up creative*. Buffalo, NY: The Creative Education Foundation.

Catterall, J. S. (2002). The arts and the transfer of learning. In R. J. Deasy (Ed.), *Critical Links: Learning in the arts and student academic and social development* (pp. 151-157). Washington, DC: Arts Education Partnership.

Freedman, K. (2007). Artmaking/troublemaking: creativity, policy, and leadership in art education. *Studies in Art Education: A Journal of Issues and Research, 48*(2), 204-217.

Henriksen, D., Mishra, P., & Fisser, P. (2016). Infusing creativity and technology in 21st century education: a systemic view for change. *Journal of Educational Technology & Society, 19*(3), 27.

Mishra, P., & The Deep-Play Research Group (2012). Rethinking technology & creativity in the 21st century: Crayons are the future. *TechTrends, 56*(5), 13-16.

Mishra, P., & Koehler, M. J. (2008, March). *Introducing technological pedagogical content knowledge.* Paper presented at the American Educational Research Association Conference.

Sawyer, R. K. (2011). *Explaining creativity: The science of human innovation.* Oxford, UK: Oxford University Press.

Zhao, Y. (2012). *World class learners: Educating creative and entrepreneurial students*. Thousand Oaks, CA: Corwin Press.

Thematic Working Group 7

Learning from national policy experiences

Summary Report

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Introduction

Prior to the Fifth International Summit on ICT in Education (EDUsummIT, 2017) which was held in Borovets, Bulgaria, members of the Thematic Working Group (TWG) 7 engaged in a series of preparatory activities that included collecting, sharing and analysing a broad range of policy approaches. In a digital age, there is a need to re-think learning and identify successful strategies and framework conditions that help education policies to unfold and help people make use of them in practice. Emergent themes for ICT-related policies were discussed, and the interfaces, boundaries and overlaps of research, policies and educational practices were examined.

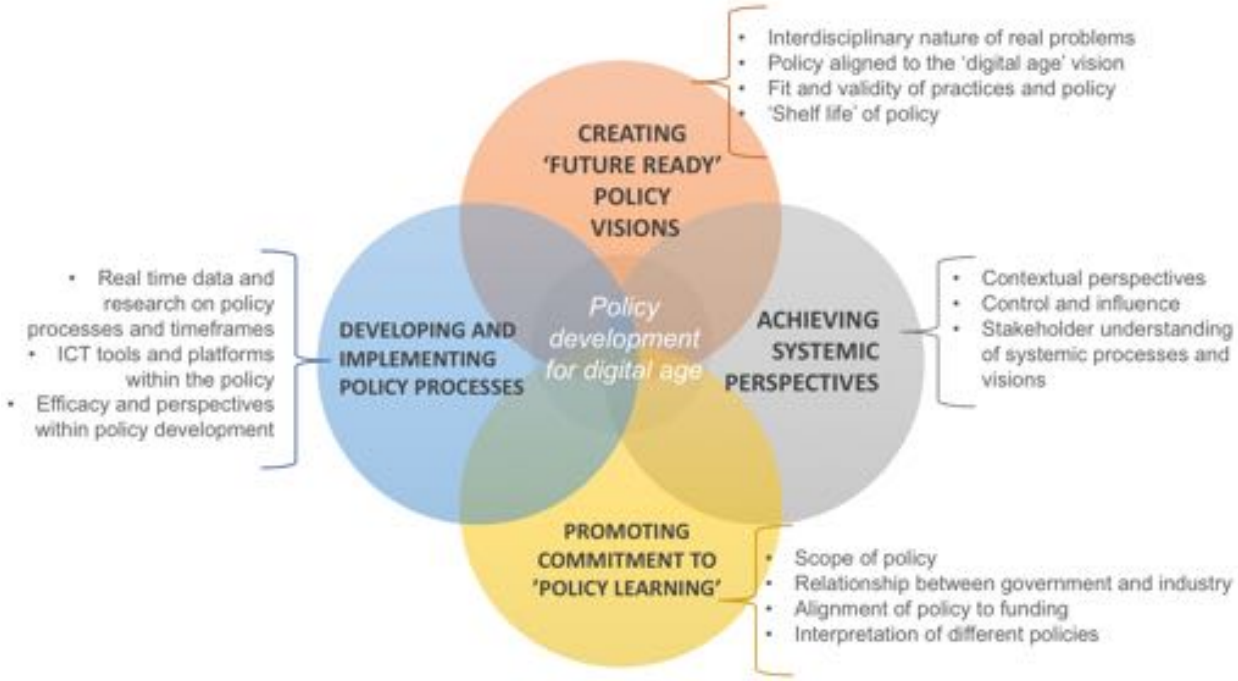
In the context of the increasing relevance of information and communication technologies (ICT) and the global transition towards an information and knowledge society, school systems and higher education have been facing increasing challenges involved in preparing students for successful participation in the digital age. In many countries, this is leading to manifold efforts and changes in national policies towards ICT integration.

During the Summit, TWG7 discussed the issues and challenges in the design, implementation, and evaluation of national policy experiences for the digital age. Key challenges were identified and discussed along with issues that policy makers at all levels commonly face. Based on this discussion a framework was developed that identified barriers and limitations along with criteria for judging successful implementation, at a time of digital disruption. The group briefly summed up major challenges and identified major strategies and solutions/tactics that could be applied to solve these challenges.

The group articulated several assumptions during the discussion, which included for example, the need to involve all stakeholder groups to build awareness of the opportunities for new policy processes that involve technology. We envisioned the use of advanced analytics, alongside research and expert knowledge, as well as historical development garnered from national experiences and literature. Much of our discussion made the assumption that nations have understood the need for equitable access (even if there is still a long way to go to achieve it), that the need for provision and access is fundamental and that education should be available to all, in alignment with UNESCO's SDG 4. The group assumed that the purpose of education technology policy is to help lead nations toward their digital future. We understand that policy may never be ahead of innovation at the grassroots and that both top-down and bottom-up processes have to be engaged and aligned. We acknowledge that there is a developmental path of national policy from simple *use* of technology, to a capacity to *modify* technologies for various purposes, and ultimately to *create* new knowledge, processes and things with advanced technologies to generate impact and outcomes.

The framework classified challenges into four categories: **Creating 'future ready' policy visions, achieving systemic perspectives, promoting commitment to 'policy learning', and developing and implementing policy processes.** Any new policy has systemic implications for educating students; these four factors combined can form a solid infrastructure that may help adopt effective policies and practices that support teaching and learning in the digital age.

Key Challenges for National Policy Development



CHALLENGE A: CREATING FUTURE READY POLICY VISIONS

1. Interdisciplinary nature of real problems; 2. Changing and poorly understood standards for digital literacy and computer science learning; 3. Policy alignment to the 'digital age' vision; 4. Need for ICT policy and national vision for education; 5. Fit and validity of practice and policy; 6. Disruption of educational technologies and acknowledgement of hype cycles; and 7. 'Shelf life' of policy.

CHALLENGE B: ACHIEVING SYSTEMIC PERSPECTIVES

1. Adopt and maintain a systemic perspective; 2. Policy development resourcing; 3. Policy 'fit' with local needs; 4. 'Over control' versus 'under-control' of policy; 5. Short-term political focus for policymakers; 6. Primacy of contextual perspectives in implementation, with a. Stakeholder understanding of systemic processes and visions; and b. Long-term industry focus that is not aligned to the political cycles; and 7. Creativity versus compliance.

CHALLENGE C: PROMOTING COMMITMENT TO 'POLICY LEARNING'

1. Scope of policy – applies to different levels of the ecosystem, from policy-maker to practitioner; 2. Relationship between government and industry, communication with stakeholders, connects to systems and renewal not aligned; 3. Alignment of policy to funding is challenging resulting in 'so what', implementation; 4. Qualifications and professional development of teachers need to be considered; 5. Disconnect between the policy-writer and implementation by the policy-maker; and 6. Interpretation of different policies – 'what do we mean by policy'.

CHALLENGE D: DEVELOPING AND IMPLEMENTING POLICY PROCESSES

1. Policy developed in isolation of other sectors, need to be more strategic – education, economic development, politics; 2. Measurement of indicators of success are often not agreed to or understood at every level; 3. Using big data to gather evidence is relatively new and underdeveloped; 4. Showing the efficacy of policies needs improving; often policies are made and then not examined, critiqued, or reviewed; 5. Research that informs policy is important. There is a need for efficacy of research, in relation to the context; 6. Lack of research evidence on ICT and computer science of higher order skills progression, 21st century skills progression, 'policy on intuition'; 7. Lag time in policy process is evident, which leads to brittleness of the policy development process; 8. There is an opportunity to use data and ICT tools to drive policy; 9. There is also opportunity to strategically use of social media in influencing developing policy.

Recommendations and Strategies for Addressing Challenges

A. STRATEGIES FOR CREATING FUTURE READY POLICY VISIONS

Develop future ready policy visions aligned with global development goals and contextualized within communities using technology to facilitate and democratise the process.

1. Ensure policy is contextualised within community by the people with knowledge of the capabilities of the people, the resources and context impacted by the policy; 2. Situate visions within Sustainable Development Goals by understanding the future of the economic, political, environmental and social potential; 3. Incorporate the future of

technologies, such as artificial intelligence (AI), and the potential impact on lifelong learning and working/not working; 4. Utilise computational power as a partner in learning; 5. Recognize that the policy development process itself will be impacted by technology; and 6. Democratise policy development facilitated by technology.

B. STRATEGIES FOR ACHIEVING SYSTEMIC PERSPECTIVES

Use real-time data systems to monitor and evaluate educational processes and outcomes through a balance of valued indicators in dynamic systems models.

1. Develop dynamic systems models (macro, meso, micro) that express a comprehensive framework of resources, relationships, stakeholders, contexts and interaction with other systems; 2. Develop a balance of agreed targeted indicators, through an open-ended process, to invite creative implementation and evaluative processes; 3. Track the flow of information and resources (relationships) within actors and systems over time, and to monitor and evaluate; and 4. Implement a continuous improvement process using near real-time data that monitors the effectiveness of the indicators and provides information about the impact on the system.

C. STRATEGIES FOR PROMOTING COMMITMENT TO POLICY LEARNING

Develop individual and organizational capacity to develop, contextualize, implement and learn from policy experiences and action plans based on transparent data sharing.

1. Promote awareness of the policy system in the digital age and development of knowledge and skills needed to participate; 2. Embed the continuous learning and development of all stakeholders in daily practices; 3. Develop the individual and organisational capacity to contextualise policy to create local meaning and sensitivities; 4. Support individual and organisational action plans based on transparent data sharing; and 5. Develop policy that engages with those responsible for policy implementation (student, teacher, parent, school).

D. STRATEGIES FOR DEVELOPING AND IMPLEMENTING POLICY PROCESSES

Strategically use new technologies and new ways of working that engage stakeholders including computational support systems to create insights for action and address inequalities.

1. Strategically use new technologies and ways of working that engage stakeholders in the development, implementation and evaluation of policy processes; 2. Critique the processes involved in the development of policy and the inequalities in the power relationships amongst stakeholders in the education system; 3. Use analytics to create insights for action to inform policy development; 4. Ensure transparent, public and defensible policies; and 5. Accept that computational decision support systems may need to be included as stakeholders in the process, as the complexity and opaqueness of these systems increases.

Action Plan

The group plans to continue working together to develop a white paper and publications. The dissemination plan includes seeking critique through academic and policy networks such as AMFIE, Education World Forum, conference presentations and UNESCO National Commissions.

Conclusion

National education policy planning is an important tool for realising the potential of digital technologies for achieving sustainable development goals by promoting learning in a digital age of all contributors to education systems - students, and their parents, teachers, teacher educators, educational managers and policy makers at all levels. Existing processes face a range of challenges in a world of digital disruption and dynamic technology and educational environments. The model of national policy planning articulated by TWG 7 harnesses digital technologies to enhance the policy planning process, and is offered as a starting point for validation, refinement and development of such processes for unique national, regional, educational contexts.

Thematic Working Group 8

Upbringing in a digital world: Opportunities and possibilities

Summary Report

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Background

Upbringing is a term which has evolved tremendously in the last few decades. The traditional definition is quite narrow, including mostly the family perspective, e.g., "the way in which you are treated and educated when young, especially by your parents, especially in relation to the effect that this has on how you behave and make moral decisions" (Cambridge dictionary), or "the treatment and instruction received by a child from its parents throughout its childhood" (Encyclopedia.com). A wider definition can be found as well, e.g., "the care and training of young children or a particular type of such care and training" (Dictionary.com). When discussing the term upbringing, the concepts that come to mind range from bringing up, rearing, raising and breeding, to caring, fostering and tending. Additional concepts may include facilitating tolerance (Grigorev, Grinshkun, & Lvova, 2014) and involve developing media literacy skills and competencies (Livingstone, 2004) or digital literacies in general (Sefton-Green, Marsh, Erstad, & Flewitt, 2016).

Challenges of upbringing in a digital world are influenced by social and cultural changes worldwide that require us to rethink intergenerational and intercultural issues linked to upbringing. International processes of globalization in several domains, accompanied by technological advancements, transform our lives and demeanor in all aspects, whether at home or in educational institutions. Technological developments inflict new challenges, necessitating changes in the ways in which we transfer our cultural heritage to future generations. This has special impact on the lives of future generations, in some ways we cannot even imagine, as portrayed in a paper summarizing discussions on this topic (Voogt, Erstad, Dede, & Mishra, 2013).

These developments raise yet another issue, namely, what is the purpose of schooling (e.g., better grades, to educate the young generation, to prepare youngsters for their

future), particularly with the growing role of serendipitous and ubiquitous learning beyond school (Kaufman, 2013). There is also a growing need of creativity and innovativeness in preparation of future working force for jobs that did not exist prior to the ICT era. Digital technology is transforming education rapidly, towards e-learning and mobile learning in ways that question traditional schooling, as opposed to a lifelong learning paradigm, which requires viewing education as a continuous and broad process. Digital literacy, collaboration, communication, problem solving, critical thinking and digital citizenship are examples of essential components in the upbringing of future generations in the digital era (Voogt et al., 2013). Yet the purpose of many schools may not truly reflect best learning practices for these generations; hence the concept of 21st century skills, aiming better and relevant education (Kaufman, 2013).

Hence, the key challenges for this theme, based on the literature review and the group discussion, are the following:

1. Ecological challenge: awareness of family, community and peers of new opportunities and risks of upbringing in a digital world.
2. Rethinking intergenerational and intercultural dynamics of family and educational institutes linked to upbringing.
3. Upbringing in a technological world as a continuum: developing norms and conventions, and implications for education.
4. Upbringing digital citizens as informed adults, experiencing well-being and security.

Challenges of upbringing in a digital world

Challenge 1: Ecological challenge: awareness of family, community and peers of new opportunities and risks of upbringing in a digital world

The digital world defines a new model of interaction between a child, his/her family and relatives, friends, schools and teachers, and the environment. Each of these relationships must be examined and studied, thereby identifying the essential features relevant to upbringing in the digital era. Of particular importance is the curation of these interactions in order to regulate the information flow.

The impact of the digital world is defined by new possibilities, hardware (e.g., computers, robots, sensors and actuators, smart environment components, and smart technical devices) and software. Software products are classified according to the functional principle: social networking, communication, interaction with the environment, big data, etc.

The main task for this challenge is to ensure the advantages of opportunities in the digital era, e.g. connectivity, awareness, and to be able to control the negative impact of the digital environment through joint endeavors that include all stakeholders, e.g., parents, schools and the community as a whole. Furthermore, children should be taught to formulate criteria for determining the usefulness of a given technology independently. The learning process in the digital era should include cultural traditions and diversity, thereby acknowledging the influence and traditions of the community, alongside global trends, involving the community at large. For this, it is recommended to create an online environment for involvement of parents and families. Formation of alternative communities for parents and children may establish collaboration between

all involved in upbringing, e.g., facilitation and implementation of joint educational projects.

Challenge 2: Rethinking intergenerational and intercultural dynamics of family and educational institutes linked to upbringing

In today's world, in addition to interpersonal differences in communication, behaviour and interaction of members of different generations and cultures, there are also commonalities as a result of digital media penetrating our lives. New points of intersection between the elderly and young people, as well as people with different cultural traditions, are related to digital technologies.

People nowadays have the opportunity to access general information, communicate between continents, work using common technologies, exchange negative and positive life situations or carry out global joint activities. Electronic translators allow people to overcome language barriers. This new digital world poses new norms of behaviour and communication, a new language and new modes of interaction, as well as new security threats. Modern upbringing processes still do not fully consider the practical, social and psychological implications of all these for upbringing in the digital age.

This challenge addresses the need to better understand intergenerational and intercultural gaps, via extensive research and visibility on the ways in which the required competencies are achieved. Hence, the global society should encourage ICT usage in a ubiquitous and extensive manner, thereby moving towards stability and competency, i.e., technology as an integral component in everyday life and an extension of human capabilities. In order to achieve this, there is a need to construct resources for different cultures and generations, with special attention to language and behaviors in social media. Electronic intercultural communication and translation systems should be developed, broadening the possibilities to connect worldwide. This may be supported by common intercultural and generational activities via common projects, developed either by government agencies or NGOs, or by the private sector. This will allow the collection of data worldwide, supplying international global open databases with examples of positive and negative human behavior – as means of best practices for upbringing and education (formal and informal).

Challenge 3: Upbringing in a technological world as a continuum: developing norms and conventions, and implications for education

The technological era allows continuous lifelong learning, beyond formal mandatory education; this is especially relevant in today's era of constant change and growth of information exponentially. Hence, upbringing in this context requires consideration of "the big picture", which means: creating a continuous manner in which upbringing is not defined by certain ages or groups within the population, but rather a comprehensive endeavour, encompassing all ages and sub-populations. Also, upbringing in this sense is not necessarily a pedagogical issue - it is an ongoing social, emotional, moral, cultural, vocational and behavioural undertaking.

However, in spite of this comprehensive challenge, there is a lack of research on the development of digital culture as a continuum, globally and locally; therefore, sporadic attempts to construct continuous initiatives of development of norms across ages, e.g., senior citizens telling their life stories to youngsters, while these attempt to teach the former ICT skills, are usually not evidence based. Possible initiatives for tackling this

challenge, which should also be further researched, may include development of educational projects without borders or boundaries using ICT - for all ages. This may be achieved by continuity in development of guidelines for digital competencies and culture throughout a lifespan. It may serve another target, of preserving connections between generations.

Connection between generations in a continuous manner may allow observation of behaviours throughout different stages in life, from different points of view, thereby facilitating desired content and behaviour and reducing undesirable content and behaviour. By this, as well as by promoting visibility of communication via advanced digital technology, rules of communication in the digital sphere may be established. In an era of growing personalization, the awareness of the individual to different contexts in cyber-space is vital to his or her well-being; therefore, assistance throughout one's lifespan in continuous utilization of digital technologies that connect and even create enmeshment between the digital and the virtual is imperative.

The SELFIE (self-assessment tool for digitally capable school) EU project is an example of implication of these when referring to the education system. This is a reliable and validated self-assessment tool developed to assist schools in their utilization of digital technologies in learning and in their strive for developing digital competence. This is achieved by an annual reflection of each school on its current uptake of digital technologies for innovative and effective learning and on desired improvement for the upcoming year. This self-assessment process is fully owned by the school, which may decide if and with whom to share its results. This is in line with the recommendation for individual children to independently formulate criteria to determine the usefulness of a given technology - only here we refer to the institutional level, as a means to ensure continuity.

Challenge 4: Upbringing digital citizens as informed adults, experiencing well-being and security

The term digital citizenship encompasses a broad range of activities and goals, including the ability to navigate within continuously expanding networks of information, to connect with communities, to engage in online and physical civic activities, to explore new possibilities for shared local and global initiatives, and to examine new ideas beyond traditional boundaries. The continuously expanding infospace offers a new mode of citizenship, with additional and possibly novel perspectives and responsibilities that go beyond the local and national and require more global awareness, critical thinking and behaviour, and even willingness to challenge ideas and values.

The main focus of this challenge is twofold: to promote respectful behaviour online and to encourage online civic engagement. This requires several initiatives within the community at large, not only in schools, as a means for ensuring best upbringing of future citizens that exhibit greater compassion and awareness. Of course, the first necessary step would be to educate the entire community about best uses of technology for the benefit of society, and strategies to identify malicious activities online. Appropriate technology usage and awareness of instances such as plagiarism, digital marketing and proper communication require digital competencies as well as moral and ethical values, and may require signing a pledge for better behaviour online. Notwithstanding, communities should promote critical thinking, which in turn requires understanding the digital culture, e.g., fake news.

Parents should undergo programs themselves that raise awareness to issues such as addiction, exploitation online etc., and should explore techniques that focus on their families' well-being. One way of doing so is to create a bank of best practices for digital citizenship, as a means of educating young generations for enhanced awareness to online behaviors, e.g., distribution of private information, identifying opportunities via digital media. Parents themselves need to gain better insights on the implications of their own behavior online, e.g., online documentation of lives of their children from birth; this requires educating families altogether. Ethical issues – privacy, normative expressions (e.g., language, visual), documentation issues – all these should not be overlooked, and should be better defined. Communities altogether should attain enhanced control of content, as a means to promote informed decision-making of individuals.

Recommendations to policy makers, researchers and practitioners

The recommendations herewith apply to each of the challenges separately, but they are intertwined and interrelated. Hence, we recommend joint top-down and bottom-up initiatives, as reflected in our proposed solutions.

1. Ecological challenge: awareness of family, community and peers of new opportunities and risks of upbringing in a digital world

Policy makers

- Regulations (recommendations) for families.
- Promote policies for involvement within families and within the community.
- Allocation of funding for research.
- Holistic, interconnectedness policy, based on findings from studies.
- Constructing alternative (physical and virtual) environments for community, interconnectedness and for interacting with technology.

Researchers

- Effectiveness of diverse technologies in alternative community structures.
- Developing – based on research – of guidelines for ecological awareness to digital challenges.
- Research on the benefits of interconnectedness and holistic approaches.

Practitioners

- Raising awareness of opportunities and risks of upbringing in the digital age.
- Promoting self-assessment tools.
- Facilitating community events.
- Implementing behavioural norms and conventions with technology (e.g. robots, AI entities).
- Collaboration between parents, teachers and community members at large.

2. Rethinking intergenerational and intercultural dynamics of family and educational institutes linked to upbringing

Policy makers

- Constructing environments for collaboration on inter-generational and inter-cultural projects.
- Regulations for allowing utilization of technologies to support intergenerational and intercultural initiatives (e.g., pedagogical, social).
- Giving a voice regarding inter-generational issues to the young generation.
- Giving a voice regarding inter-cultural issues to diverse groups within society (e.g., minorities).
- Define wise usage of technology for intergenerational and intercultural issues, based on research.

Researchers

- Multi-disciplinary research on inter-generational and inter-cultural differences and commonalities – make findings public.
- Construct assessment tools and assess criteria and usage of ICT for inter-generational and inter-cultural issues related to upbringing in the digital age.

Practitioners

- Construct and use international global open databases with examples of positive and negative human behaviour – as means of education (e.g., best practice scenarios).
- Initiate common inter-cultural/generational activities – common projects (e.g., collecting data worldwide).

3. Upbringing in a technological world as a continuum: developing norms and conventions, and implications for education

Policy makers

- Development of guidelines for digital competencies in cultural and intercultural contexts.
- Allocate funding for initiatives that promote policies from K to 12 and for higher education.
- Strengthen connections and partnerships with the industry (e.g., implement robots in education, in community centers).

Researchers

- Research on development of digital culture as a continuum.
- Research on psychological aspects of upbringing in a technological world across ages and educational levels.

Practitioners

- Initiatives for parents and educators that promote requirements and conventions across ages – lifelong learning progressive approach.
- Courses and workshops (physical and online) for parents, teachers, and community members on using ICT continuously throughout the upbringing process.

- Special attention in developing and implementing requirements and conventions for children and young adults with special needs.

4. Upbringing digital citizens as informed adults, experiencing well-being and security

Policy makers

- Research-based recommendations on ICT utilization for informed decision-making
- Initiate and fund digital citizenship programs and projects, e.g., digital marketing, proper online communication.

Researchers

- Research on critical thinking as a means for informed decision making.
- Develop research-based methods on utilization of digital tools.

Practitioners

- Raise awareness for media consumption within the community: from young age till age of retirement.
- Educating Parents about preserving their well-being and their families' well-being in an ICT saturated environment.

Conclusions

To sum up, there is a need for promoting awareness of family, community and peer challenges in a holistic-integrative manner (as a whole ecological system), for promoting digital citizenship and new opportunities and risks of upbringing in a digital world. As a means of doing so, we need to rethink intergenerational and intercultural dynamics of family and educational institutes linked to upbringing, in a continuous manner.

References

Grigorev, S.G., Grinshkun, V.V., & Lvova, O.V. (2014). Some aspects of education informatization in Russia concerning training future teachers. *Bulletin of Peoples' Friendship University of Russia, 3,* 14-18.

Kaufman, K. J. (2013). 21 ways to 21st century skills: why students need them and ideas for practical implementation. *Kappa Delta Pi Record, 49*(2), 78-83.

Livingstone, S. (2004). Media literacy and the challenge of new information and communication technologies. *The Communication Review, 7*(1), 3-14.

Sefton-Green, J., Marsh, J., Erstad, O., & Flewitt, R. (2016). *Establishing a research agenda for the digital literacy practices of young children*. A White Paper for COST Action IS1410. Retrieved from http://digilitey.eu

Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning, 29*(5), 403-413.

Thematic Working Group 9

Supporting sustainability and scalability in educational technology initiatives: Research informed practice

Summary Report

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Purpose

Aims of the Thematic Working group (TWG) 9 on *Supporting Sustainability and Scalability in Educational Technology Initiatives: Research Informed Practice* were to (a) develop a better understanding of what we mean by sustainability and scalability in the context of educational technology initiatives; (b) establish a foundation for research approaches that would apply in these contexts; (c) identify challenges faced in this work; and, finally (d) provide key recommendations to researchers and policy makers for future work in this area.

The purpose of this document is to inform policymakers of the challenges related to sustaining and scaling technology innovation in education. Since digital technologies change very quickly, it is incumbent on researchers to provide insights and strategies to enable rapid and nimble scaling of effective technology use in instructional settings, and to identify key factors that support sustaining these effective practices over time. We take as given that technology plays (and will continue to play) an important role in education. Thus, it is imperative that we better understand how technological innovations in schooling can be implemented in ways that are sustainable and scalable.

In the sections below we better define the idea of sustainability and scalability, provide three key foundational guidelines and end with a set of short term and long term challenges and recommendations.

Sustainability

Sustainability relates to the degree to which an innovation implementation can be maintained over time.

Sustainability requires project design that incorporates co-design, partnerships, iterative intervention—research cycles, and attention to complex relationships among opportunities and constraints in the intended context(s). The goal of this work is to ensure that educational innovations with technology endure within these constantly evolving context(s); and draw on active stakeholder ownership by students, parents, teachers, administrators, researchers and policy makers.

Scalability

Scalability addresses application of innovation implementations to new contexts and different levels in educational systems. Scalability of technology innovation can be defined by two dimensions: horizontal (across contexts) and vertical (moving between levels of an educational system). Designing for scalability needs to consider implications of implementing innovations that afford vertical and/or horizontal adaptation, adoption, replication and reinvention of digital technology use in teaching and learning across educational systems. Designing for scalability requires consideration of, and work in, the cultural context to legitimize both horizontal and vertical scaling of technology integration.

Note: See Appendix A for a visual representation of our framework for thinking about sustainability and scalability of innovative practices.

Three key guidelines

Technological innovation implementation is deeply contextual; with implementation of a given innovation playing out differently in different contexts and across multiple iterations within the context. This implies that innovation implementation changes when extended across and/or within contexts. Therefore, top-down approaches that seek fidelity of innovation implementation across situations are not consistent with what we know about innovation diffusion. What is needed is a perspective that identifies the core elements of an innovation while respecting the adaptation inherent in implementation over time and across contexts. Thus:

1. There is a clear tension between adapting and promoting fidelity of innovation implementation across contexts.

The reason for strong influence of context is the high level of variability between educational systems and structures. Further, it is clear that the deepest understanding of a given educational context is held by key stakeholders who are operating at a local level. At the school level this would be school leaders, principals, teachers and students; at the district by administrators like superintendents and curriculum directors; and at the government level by policymakers like legislators and their education advisors. We also need to attend to and include industry partners. Each of these stakeholders may have different, but legitimate, perspectives on issues relating to technology innovation. This local, situated knowledge must be honoured and represented when moving forward with designing, implementing and researching technology integration efforts. Thus:

2. We need strong stakeholder and researcher partnerships.

When we develop such partnerships, which bring stakeholders and researchers together to collectively study and understand educational innovations and their impact, we will be able to:

3. Develop evidence-driven approaches to scalable and sustainable innovation design.

Challenges and Recommendations

Given this broader context and guidelines, TWG9 members worked together to identify a series of challenges and provide short- and long-term recommendations.

Challenge 1: Establish productive partnerships among all stakeholders to advance capacity building for ICT use in schools.

Short Term Recommendations

- Co-design research with real commitment and ownership from stakeholders at all levels.
- Develop and model strategies and procedures for developing productive partnerships.

Long Term Recommendations

- Develop feedback loops to inform the process and maintain innovations.
- Help stakeholders at all levels better understand the value of research (this requires building active communication strategies into the process).
- Develop iterative cycles of research that include multiple stakeholders and attention to context.

Challenge 2: Identify research approaches that are sustainable and scalable and/or that support sustainability and scalability.

Short Term Recommendations

- Provide opportunities and support for scholars to synthesize research that address technology integration efforts that have been successfully scaled and sustained.
- Provide opportunities and support for scholars to develop literature review across multiple studies that have been successfully scaled and sustained to identify patterns and principles.

Long Term Recommendation

- Build a comprehensive body of knowledge scalable and sustainable research designs and findings to inform decision-making and policy.

- Build on and adapt technology integration and research designs that have successfully scaled and sustained.

Challenge 3: Scale technology integration based on impact found in research literature rather than isolated politically-driven policy initiatives.

Short Term Recommendations

- Use research to deconstruct fads and communicate appropriate research findings to stakeholders.
- Develop a team that can respond quickly to policy initiatives on the basis of accumulated research results.

Long Term Recommendation

- Actively involve policymakers and industry partners early and throughout the process.

Appendix A

Seeing Innovation, Scalability and Sustainability

Innovations get richer, more nuanced, complex as they become embedded in contexts over time. At the same time, as innovations spread into other contexts, mutate and they change to meet new needs and contextual demands. How do we think about scalability and sustainability of educational innovations, in particular with respect to fidelity and variability?

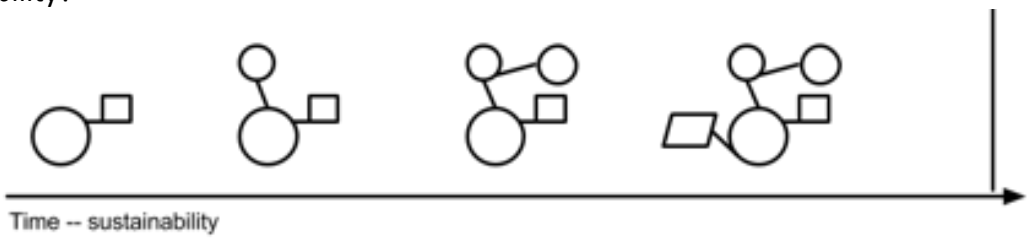

Figure 1. Sustainability of an innovation showing how it gets richer and nuanced over time

These shifts and changes are illustrated above (see Figure 1). On the horizontal, we have time (left to right) where the innovation becomes richer and more embedded in a specific context. This represents sustainability, indicating greater embeddedness of an innovation in a context that continues to grow and sustain over time.

The vertical axis appears when we look to the idea of scalability, namely when the innovation spreads into other contexts.

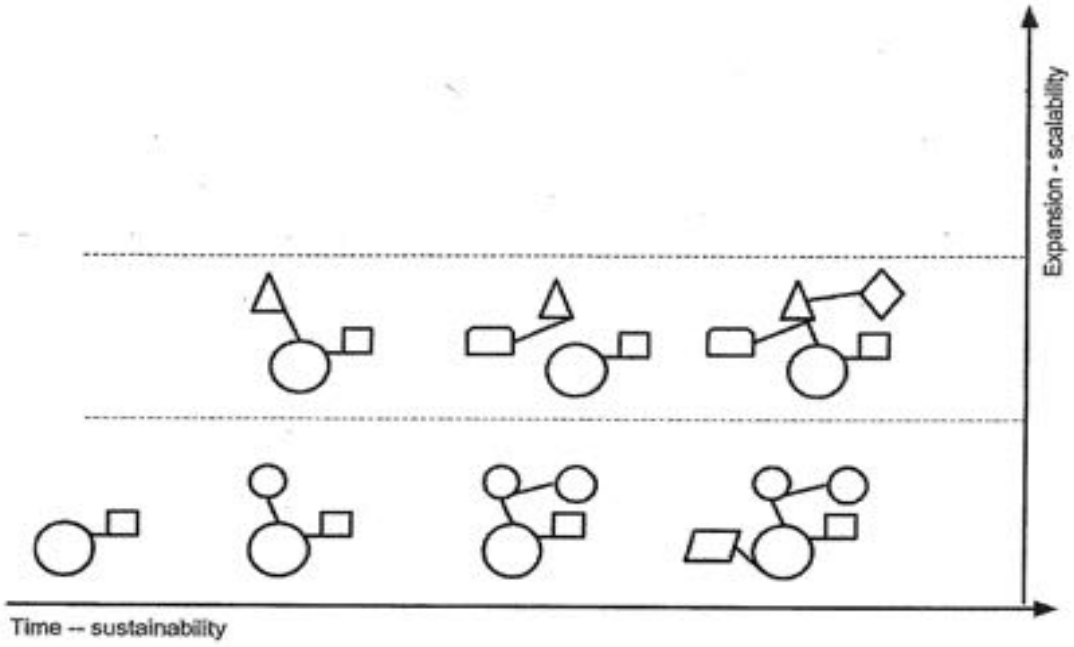

Figure 2. The innovation spreads into a new context – and grows and mutates over time.

Scalability is represented in Figure 2, in a vertical shift. We can see the original innovation on the far left, in the bottom row. The second row illustrates its application in a new context. Changes, shown in changes in the shape of the innovation, result from new issues and possibilities of the new context. The innovation in the second context, as it also becomes sustainable over time, becomes more embedded and rich.

Each time the innovation is applied in a new context, the process repeats, as represented in Figure 3. An important consideration of scaling and sustaining

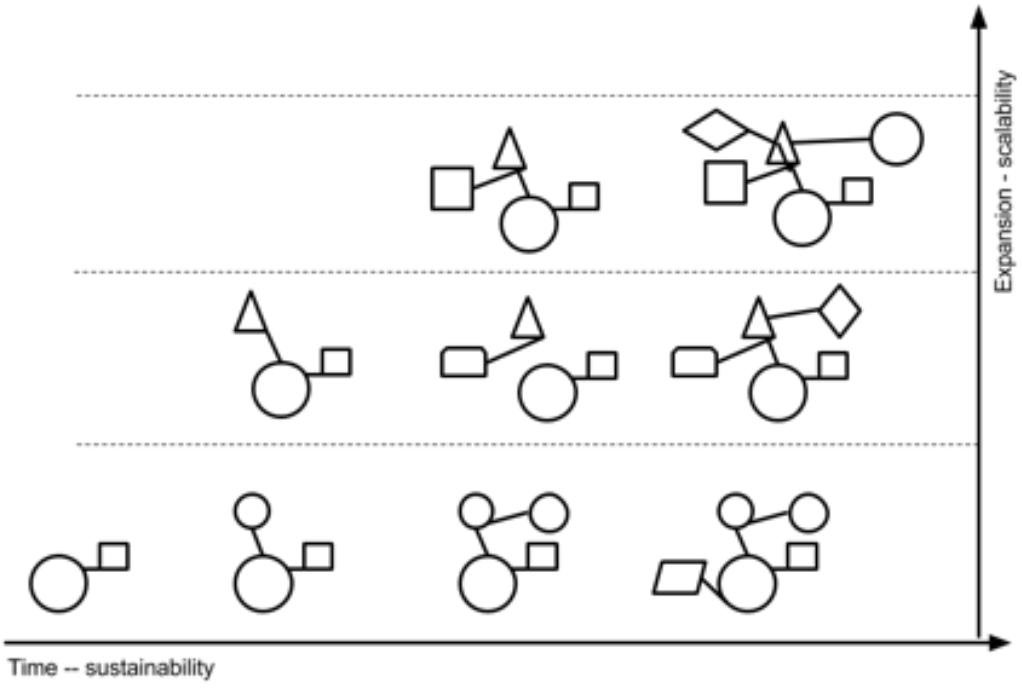

Figure 3. A complete image of the process of sustainability and scalability.

innovations over time is the tension between fidelity to the innovation and adaptation in new contexts – how does the innovation need to change and how do we make those decisions? Research shows that innovations cannot be simply transferred and translated and imposed onto new contexts. Thus, replicability of an innovation becomes harder to achieve and fidelity needs to go to more abstract elements that determine the essential elements of the innovation.

Figure 3 demonstrates this process of growth and change – and provides a way to think about sustainability and scalability together. However, to do this, it is necessary to consider how programs and initiatives are able to change and innovate. We recommend thinking about these as responsive to new contexts and innovating in response to needs of new environments.

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Alona Forkosh-Baruch, *Tel Aviv University, Israel* (Leader)
Vadim Grinshkun, *Moscow City University, Russian Federation*
Sergey Grigoryev, *Moscow City University, Russian Federation*
Alexander Khoroshilov, *Russian Federation*
Eugenia Kovatcheva, *ULSIT, Bulgaria*

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Members attending EDUsummIT
Douglas Agyei, *University of Cape Coast, Ghana*
Margaret Cox, *King's College London, UK*
Sarah Howard, *University of Wollongong, Australia*
Djordje M. Kadijevich, *Institute for Educational Research, Serbia*
Therese Laferriere, *Université Laval, Canada*
Punya Mishra, *Arizona State University, USA* (Leader)
Dale Niederhauser, *West Virginia University, USA* (Leader)
Lynne Schrum, *Nova Southeastern University, USA*
Jo Tondeur, *Vrije Universiteit Brussel, Belgium*
Joke Voogt, *Universiteit van Amsterdam, The Netherlands*

Appendix 3: EDUsummIT 2017 Programme

Sunday, 17 September

6.30 pm Reception

Monday, 18 September

8.30 – 9.00 am Registration

9.00 – 9.30 am **Welcome by our hosts**

9.30 – 10.00 am **The EDUsummIT Vision: Background and Future,** *Joke Voogt & Gerald Knezek*

10.00 – 10.30 am Morning Tea Break

10.30 – 12.00 pm **TWG Breakout Session 1 – What are the key challenges?**

12.00 – 1.00 pm Lunch

1.00 – 2.30 pm **TWG Breakout Session 2 – How to resolve the challenges?**

2.30 – 3.00 pm Afternoon Tea Break

3.00 – 4.30 pm **TWG Breakout Session 3 – How to resolve the challenges?**

4.30 – 5.30 pm **EDUsummIT 2019**

Tuesday, 19 September

9.00 – 10.30 am **TWG Breakout Session 4 – Recommendations to policy makers, researchers and practitioners**

10.30 – 11.00 am Morning Tea Break

11.00 – 12.30 pm **Cross-fertilisation, TWG Leaders rotate**

12.30 – 1.30 pm Lunch

1.30 – 3.00 pm **TWG Breakout Session 5 – Preparation for Action Plan and Policy Recommendations** *(posters)*

3:00 – 3:30 pm Afternoon Tea Break

3.30 – 4.30 pm **Posters Session – Action Plans and Policy Recommendations presented by TWGs**

4.30 – 5.15 pm **Plenary Discussion**

Wednesday, 20 September

8.30 – 10.30 am **Writing up TWG report**

10:30 am **Closing ceremony**

11:00 am – 6:00 pm Monastery visit (optional)

RETHINKING LEARNING
IN A DIGITAL AGE

18-20 SEPTEMBER 2017, BULGARIA