

Thematic Working Group 8

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Pedagogical Reasoning and Reflective Practice: A Framework for Teaching in a Digital Age

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Background

Pedagogical reasoning and reflective practice are important means for teachers to continually professionalize and improve their teaching. These concepts also help us to understand why, how and with what results practicing and prospective teachers use technology in their teaching. This emancipative form of professional development taps into teacher agency for digital technologies and resources (Albion & Tondeur, 2018). It is also critical for bringing new teachers into the practice, and enhancing the techno-pedagogical skills, knowledge and action through the joint lens' of TPACK (Technological Pedagogical Content Knowledge) and PR&A (Technological Pedagogical Reasoning and Action). This is particularly important when considering the transition from novice to expert educator using technologies, and for understanding the possibilities of transforming teaching and learning through teacher education (Forkosh-Baruch, 2018).

Teachers' professional knowledge has been researched and discussed at length by educators, researchers and policy makers for many decades. The extensive body of literature reporting findings from research describes differing forms of teacher knowledge as either theoretical knowledge or practical knowledge, or in Fenstermacher's (1994) terms Formal Knowledge – "one's knowledge claims must be justified in such a manner that they range beyond the immediate context, situation, or slice of time" (p. 28) - and Practical Knowledge – "to claim to know something practically is to claim to know something about an action, event, or situation in this particular instance" (p.28).

To better understand the 'what' and 'how' of teachers' work, many have argued that exploring why teachers make certain decisions is important (for example see: Niess, 2019; Forkosh-Baruch & Avidov Ungar, 2019). Making sense of the 'why', however, comes with its own

challenges because much of that thinking – the pedagogical reasoning – underpinning practice has long been recognized as tacit in nature (Polanyi, 1966).

The connection between teachers' knowledge and their actions is evidenced in Shulman's (1987) work outlining a knowledge base for teaching and a model of Pedagogical Reasoning and Action (PR&A). This resulted in six non-linear decision-making steps which help identify the unseen aspects of practice (Loughran, Keast, & Cooper, 2016, p. 388) and allows teachers to demonstrate their capacities as an expert pedagogue (Berliner, 1986). However, we fine-tuned the PR&A definition, redefining it as an ongoing process by which a teacher develops and articulates theoretical and/or practical understandings to describe why, what & how their practices lead to sustainable learning.

Hence, the objectives of our TWG were to:

1. Exchange ideas regarding recent research, policy developments and teacher practices highlighting the role of knowledge and PR&A related to technology integration education. The outcome was the identification of key issues and trends in research, policy and practice.
2. Identify and pinpoint the role of technology in PR&A, in teaching, learning and decision-making.
3. Examine possible actions to promote teachers' knowledge and PR&A to enhance wise utilization of technology in education and reflective practices.
4. Discuss implications and make recommendations for policy, practice and research.

As a result of TWG discussions, we identified three themes relevant to PR&A in relation to new alignments for learners and their learning contexts, namely:

1. How might we better connect understandings of teachers' knowledge to their classroom practices in technological-rich contexts? (Harris and Phillips, 2018; Heinonen et al., 2019; Heitink, et al., 2016; Holmberg, Fransson, & Fors, 2018; Tondeur, Van Braak, Ertmer, & Ottenbreit-Leftwich, 2017)
2. What new ethical challenges are presented to teachers' decision-making when educational technologies are used in classrooms? (Burbules & Callister, 2018; de Zwart, Henderson, Lindsay, & Phillips, 2011; Selwyn Nemorin & Johnson, 2017)
3. How does the PR&A of pre- and in-service teachers differ? How might we better develop the decisions of all teachers? (Lloyd, 2019; Loughran, Keast and Cooper, 2016; Niess & Gillow-Wiles, 2017; Smits, Voogt, & van Velze, 2018)

Alignment issues and challenges

Next, we identified current misalignments referring to the identified themes. These may be considered as challenges for pedagogical reasoning and reflective practice for teaching in a digital age, as follows:

Connecting knowledge and action in technological-rich contexts

- We currently have models of teacher knowledge and of teacher decision-making; however, these models are separate from one another. Separation of knowledge and decision-making is a misalignment.

- We do not have an integrated model that considers teachers' attitudes, beliefs and dispositions together with teachers' knowledge to better understand their decision-making processes. Lack of a more comprehensive model is a misalignment.

Ethical decision-making based on PR&A

- Teachers are increasingly required to make classroom decisions based on the data provided by software developed by third party commercial companies. The algorithms that generate these data are not transparent creating challenges for teachers to make effective decisions. Lack of transparency in third party software as a misalignment.
- The increased prevalence of learning analytics software, often imposed upon teachers by system or school leaders, threatens to automate many classroom decisions and reduce teachers to managers rather than active, professional decision-makers. PR&A as a hallmark of professional teachers and the automation of their decisions is a misalignment.

PR&A of pre- and in-service teachers

- Preservice teachers lack practical-authentic experience –this results in limited opportunities for decision-making and self-reflection opportunities. Lack of guided professional experience for pre-service teachers is a misalignment.
- In-service teachers are often isolated in terms of exposure to different practices, which can limit their decision-making repertoire. Lack of ongoing, shared classroom experiences is a misalignment.

Possible actions to overcome misalignment

In an attempt to propose actions that overcome misalignments, we identified emerging new alignments that may promote pedagogical reasoning, action and reflective practice. The main ideas are presented according to the TWG themes:

Connecting knowledge and action in technological-rich contexts: we propose representations of teachers' epistemic frames that will provide new opportunities to connect teachers' knowledge, attitudes, beliefs and dispositions with their decision-making processes. This may provide additional reflective opportunities and a more comprehensive PR&A model that may in turn create a better link between practice and the underlying dispositions held by educators.

Ethical decision-making based on PR&A: we propose that policymakers develop a code of conduct that requires software developers to make decision-making algorithms more transparent for educators, for example, by using plain language and detailing the rationale for interpreting data. This would allow teachers to understand the basis for software recommendations and to be able to make autonomous decisions regarding the appropriateness of software recommendations for their classroom practice. This will allow fruitful partnership between developers, policymakers and educators, thereby involving educators in software development processes, in a quality assurance iterative procedure – for the students' benefit.

PR&A of pre- and in-service teachers: in-service and pre-service teachers should be provided with opportunities to enhance their repertoire of available decisions in order to empower their PR&A. This may be achieved by sharing classroom experiences collaboratively, utilizing digital simulations or text-based scenarios involving teams of educators, either focused on subject matters or generic pedagogical reasoning. This approach can also lead to development of evidence that may be accumulated in an online depository – for the benefit of preservice or in-service teachers (possibly the freshness and innovativeness of the former and the experience of the latter will allow all educators to benefit from this initiative). Making decision-making processes and reflective practices explicit will create new authentic learning opportunities for preservice teachers.

Key insights from other TWGs

We were visited by two TWG representatives: TWG2: learners as learning leaders: how does leadership for learning emerge beyond the traditional teaching models? And TWG6: putting learning back into learning analytics: optimizing learning through analyzing the data. Following these interactions, as well as casual conversations with, and plenary exposure to other TWGs, some insights followed:

- a. A need for clarification of what is included in pedagogical reasoning and action – definition of this concept required re-thinking. Hence, an updated definition was formed.
- b. In addition to the teacher, we further broadened the role of the learner as practicing pedagogical reasoning and action. We think learners should also be reflective in their utilization of ICT – by this, we allow them the autonomy and authenticity that we found so important for the teacher. Furthermore, this may enhance their future e-citizenship.
- c. Learning analytics is an issue that needs further examination, since this field is “under construction”. Therefore, we emphasized the importance of taking into account a) teachers’ experience (perhaps involve teachers in developing this field) and b) ethical issues involved in this, e.g., tagging students based on ill-interpreted performance.

Strategies and actions

EDUsummIT findings focused on three inter-related levels of strategies and actions, detailed herewith.

Strategies and actions for policy makers

Policy recommendations include, first and foremost, the notion that PR&A must be an individual consideration, rather than a systemic endeavor. In fact, much of the high-level reasoning is performed in a top-down manner, usually by policymakers and inaccessible to practitioners or to students. Hence, it does not impact users’ practice and does not develop their own PR&A. The empowerment of teachers’ utilization of educational technologies must be addressed through policy initiatives. These should focus on ways to improve teachers’ PR&A via TPACK-related professional development initiatives. Special attention should be allocated to teachers’ pedagogical beliefs, thereby connecting between them and PR&A. Therefore:

- Individual teacher PR&A is an essential aspect of effective, sustainable educational technology integration and enhanced learning outcomes;
- PR&A must be an individual consideration rather than a systemic endeavor. Teachers should be able to develop their personal reflective and decision-making processes for their particular context. Time needs to be allocated to allow for teacher professional development to engage in these progressions;
- A code of conduct should be developed that requires software developers to detail decision-making algorithms in plain language allowing teachers to make autonomous decisions about the appropriateness of their use in classrooms.

Strategies and actions for practitioners

Practice recommendations should be divided into four major layers: teacher educators, in-service professional development, pre-service teacher education, and students. The major focus should be on pre-service education. Preservice teachers need assistance in pedagogical reasoning regarding technology-supported teaching and learning in the subject matter they specialize in their training. Consequently, they can lead PR&A processes within innovative practices in their schools, and become educational leaders. In-service teachers should participate in professional development training to empower their PR&A, in face-to-face meetings, but also online, utilizing video-recording of lessons, which may serve as learning materials. These lessons can be analyzed by groups of teachers from the same subject matter or of different specialization areas. Learning from best practices as well as from failures within school staff and possibly also across schools – by homogeneous subject matter groups of teachers – will raise teachers’ awareness regarding educational technology implementation considerations. Students should also be encouraged to make informed decisions regarding their technology utilization, since the choice of technological interfaces, applications or platforms should be at times their choice; this is relevant for content-based as well as for generic software. Students, sometimes being more technology-proficient than their teachers, must be taken one step further, thereby connecting between their technology skills and learning processes. As for teacher educators, they need to experience the same PR&A processes regarding digital technology implementation; however, they can accompany their practice with research. To conclude:

- Broaden professional development opportunities (including digital simulations and augmentations). PR&A about technology integration could be undertaken collaboratively or individually;
- Teacher educators should explicitly develop, model and discuss PR&A in relation to educational technology integration with their students;
- Encourage leadership within the teaching community to develop a culture of PR&A, that will in turn impact learning and learning outcomes.

Strategies and actions for researchers

Research recommendations focus on the need to further examine factors involved in educators’ PR&A, in order to fully understand educational decision-making with regards to ICT implementation. Factors should include contextual components, e.g., the TPACK model, as well as variables such as teachers’ beliefs and digital technology proficiency, as well as students’ age, interests, talents etc. Ethical aspects need to also be addressed to a greater extent, as technology is developing rapidly and penetrating our lives altogether, and our

professional lives in particular. This may cause restrictions regarding technology utilization, therefore requires examination of its consequences. Actions include:

- Extant literature in related fields provides opportunities to connect aspects of epistemic frames to conceptualizations of teacher knowledge and their connection to action;
- Broaden the use of developing software to examine the correlations between elements of teachers' epistemic frames;
- Co-explore the current reasoning with practitioners to develop a nuanced understanding of the aspects of knowledge, beliefs and attitudes that underpin practice in different contexts.

Actions from the TWG

While digital technologies are becoming more common in schools and in teacher education, PR&A regarding educational technology utilization is becoming more complicated and requires training of teachers, teacher educators and even students. Our TWG was composed mostly of researchers, but some members are connected directly to teacher training programs; hence, they work with preservice as well as in-service teachers. The advantage of combining research and practice is well within the scope of action for our TWG members. As for policy, this may be achieved by publishing our recommendations, thereby allowing public debate on this issue. Since TWG members are from diverse countries and cultures, this may influence the implementation of our recommendation; while we are aware of this, we strongly emphasize the role and necessary autonomy of the teacher in pedagogical reasoning and action.



Figure 1 Members of TWG8 at EDUsumMIT 2019

References

- Albion, P., & Tondeur, J. (2018). Information and Communication Technology and Education: Meaningful Change Through Teacher Agency. In, J. Voogt, G. Knezek, R. Christensen, & K.W., Lai (Eds), *Handbook of Information Technology in Primary and Secondary Education (2nd Edition)* (pp. 381-396). Switzerland: Springer Cham.
- Berliner, D. C. (1986). In pursuit of the expert pedagogue. *Educational Researcher*, 15(7), 5–13.

- Burbules, N. C., & Callister, T. A. (2018). Dilemmas of Access and Credibility: Access for Whom? Access to What? In, N. C., Burbules (Ed.), *Watch IT: The risks and promises of information technologies for education* (pp. 19-40). New York: Routledge.
- de Zwart, M., Henderson, M., Lindsay, D.F, & Phillips, M. (2011). *Teenagers, Legal Risks and Social Networking Sites*. Monash University, Melbourne.
- Fenstermacher, G. D. (1994). The knower and the known: The nature of knowledge in research on teaching. In L. Darling-Hammond (Ed.), *Review of research in education* (Vol. 20, pp. 3–56). Washington D.C.: American Educational Research Association.
- Forkosh-Baruch, A. (2018). Preparing pre-service teachers to transform education with Information and Communication Technologies (ICT). In, J. Voogt, G. Knezek, R. Christensen, & K.W., Lai (Eds), *Handbook of Information Technology in Primary and Secondary Education (2nd Edition)* (pp. 415-432). Switzerland: Springer Cham.
- Forkosh-Baruch, A., & Avidov-Ungar, O. (2019). ICT Implementation in Colleges of Education: A Framework for Teacher Educators. *Journal of Information Technology Education, 18*, 207-229.
- Harris, J., & Phillips, M. (2018, March). If There's TPACK, is There Technological Pedagogical Reasoning and Action? In, *Society for Information Technology & Teacher Education International Conference* (pp. 2051-2061). Association for the Advancement of Computing in Education (AACE).
- Heinonen, K., Jääskelä, P., Häkkinen, P., Isomäki, H., & Hämäläinen, R. (2019). University Teachers as Developers of Technology-Enhanced Teaching—Do Beliefs Matter? *Journal of Research on Technology in Education, 51*(2), 135-151
- Heitink, M., Voogt, J., Verplanken, L., Van Braak, J., & Fisser, P. (2016). Teachers' professional reasoning about their pedagogical use of technology. *Computers and Education, 101*, 70–83.
- Holmberg, J., Fransson, G., & Fors, U. (2018). Teachers' pedagogical reasoning and reframing of practice in digital contexts. *The international journal of information and learning technology, 35*(2), 130-142.
- Lloyd, C. A. (2019). Exploring the real-world decision-making of novice and experienced teachers. *Journal of Further and Higher Education, 43*(2), 166-182.
- Loughran, J., Keast, S., & Cooper, R. (2016). Pedagogical reasoning in teacher education. In, J. Loughran, & M. L. Hamilton (Eds.), *International handbook of teacher education* (pp. 387-421). Springer, Singapore.
- Niess, M. (2019). Supporting Instructors in Redesigning Online Instruction Toward Student-Centered, Problem Based Learning. In, *Society for Information Technology & Teacher Education International Conference* (pp. 250-254). Association for the Advancement of Computing in Education (AACE).
- Niess, M. L., & Gillow-Wiles, H. (2017). Expanding teachers' technological pedagogical reasoning with a systems pedagogical approach. *Australasian Journal of Educational Technology, 33*(3), 77-95.
- Polanyi, M. (1966). *The tacit dimension*. Garden City N.Y: Doubleday.

- Selwyn, N., Nemorin, S., & Johnson, N. (2017). High-tech, hard work: An investigation of teachers' work in the digital age. *Learning, Media and Technology*, 42(4), 390-405.
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1-22.
- Smits, A., Voogt, J.M., & van Velze, E.M. (2018). The development of technology integration in a graduate course for practicing teachers. In M.L. Nies, C. Angeli and H. Gillow-Wiles (Eds.), *Developing Teachers' Technological Pedagogical Content Knowledge (TPACK) in the Digital Age*. Hershey, PA: IGI Global.
- Tondeur, J., Van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. *Educational Technology Research and Development*, 65(3), 555-575.