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ORIGINAL RESEARCH

Creativity and Technology in Education: An International Perspective

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Abstract
In this article, we consider the benefits and challenges of enacting creativity in the K-12 context and examine educational policy with regard to twenty-first century learning and technology. Creativity is widely considered to be a key construct for twenty-first century education. In this article, we review the literature on creativity relevant to education and technology to reveal some of the complex considerations that need to be addressed within educational policy. We then review how creativity emerges, or fails to emerge, in six national education policy contexts: Australia, Bulgaria, the Czech Republic, Finland, Slovakia, and the U.S. We also locate the connections, or lack of, between creativity and technology within those contexts. While the discussion is limited to these nations, the implications strongly point to the need for a coherent and coordinated approach to creating greater clarity with regards to the rhetoric and reality of how creativity and technology are currently enacted in educational policy.

Keywords Creativity · Educational technology · Twenty-first century learning · International education policy · Teaching and learning · Review · National policy contexts · Creative teaching · Creative learners

1 Introduction

Creativity is commonly viewed as critical for twenty-first century learning and teaching (Craft 2010). Both scholarly and popular discourse point to the importance of creative thinking skills for learners, and much rhetoric focuses on the need to infuse it into education systems (Harris 2016; Runco 2014). Similar to the positioning of creativity, the ability to use digital technologies is also commonly seen as a core skill in twenty-first century. Indeed, it is often argued that the connection between technology and creativity is a key issue for twenty-first century education (for example see Page and Thorsteinsson 2017). On the surface, one might assume that education systems emphasize and support creativity

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in schools, or that teachers and learners are afforded opportunities in policy and practice to engage in creative work and thinking. However, the reality beyond the surface is not so simple, and the challenges of enacting creativity in education are substantial (Feldman and Benjamin 2006). It is not uncommon for creativity to be talked about as being enabled by and through technologies. It is no surprise that enacting creativity with and through digital technology is equally unclear and in need of greater clarity (Mishra and Henriksen 2018).

In this article, we the authors use our shared international context of EDUsummIT 2017 to review how creativity emerges in education systems across several national education policies—considering if, where and how this intersects with issues of educational technology. We begin by discussing and defining creativity in the literature. We then consider how creativity intersects with issues of educational technology, followed by consideration of the benefits and challenges to instantiating creativity in education. Drawing on our shared international context of EDUsummIT, the article explores what basic policy content around creativity looks like across several educational contexts. Following this, we consider how several national education policies enact (or fail to enact) creativity for teachers and/or learners. We end by identifying some broad themes and recommendations for policy makers.

2 Defining Creativity

The multifaceted and complex nature of creativity presents a challenge for many educational systems, which are often bound to standards or norms that seek clear, fixed or internally and externally consistent framing (Csikszentmihalyi and Wolfe 2014). School cultures can vary dramatically even within a single district, town, or region, let alone at national or international levels—and culture informs the distinctive ways that policy emerges into real-world practices (Jurasaite-Harbison and Rex 2010). There are a multitude of ways in which systems and cultures might enact (or fail to enact) creativity, and this is a concern for schools and systems that require clear guidance in policy and practice (Caena 2014).

Most definitions of creativity identify *novelty* and *effectiveness* as being two key characteristics of creative ideas or solutions (Plucker et al. 2004). Creativity, thus, can be described as the production of useful solutions to problems, or novel and interesting ideas and artifacts across domains (Amabile 1996; Oldham and Cummings 1996; Zhou and George 2001, 2003). Beyond these common themes of newness or effectiveness, there are variations in definitions. The broadness, or lack of specificity, in how creativity is defined makes it difficult for practitioners to identify and facilitate it, in situ. Henriksen et al. (2016) explored where and how creativity is located as an interaction within a system of actors in education. They suggested that to infuse creativity into education systems, the field must attend to it at multiple systemic levels, including teaching, assessment, and notably, policy. This systemic view provides a foundation for the idea that it is valuable to consider systems of policy contexts for creativity in education.

The definitional challenge of creativity speaks to its ill-structured, multi-faceted nature, which is emergent, contextual, and complex in expression. This complexity and diversity of emergence within systems makes it challenging to instantiate creativity within the concrete realities of schooling. Creativity is clearly important for twenty-first century education, yet it is also open-ended and contested ground (Runco 2014). The problematic nature of and inconsistent understandings about creativity may make it difficult for teachers to know how

to enact—particularly in the absence of policy guidance or exemplars. Likewise, policymakers often do not have an understanding of what creativity means in education (Craft 2003; Beghetto and Kaufman 2013); thus there are few clear parameters which educators can use to recognize and thus enhance creativity.

Perhaps it is only by recognizing the complexity and definitional challenges, and looking across policy contexts, that we can approach policy discourse in meaningful ways. Taking into account the complexity of creativity may help educators, researchers and policy makers understand the challenges of instantiating the concept into the bounded space of schooling.

3 Creativity and Technology in Twenty-First Century Education

Given the digital world in which education is increasingly situated, there has been much consideration of what teachers need to know to use technology effectively in the classroom, and the competencies needed to develop digitally-fluent, creative students (Mishra and Mehta 2017). This is partly due to what scholars refer to as an important emergent relationship between creativity and technology, and the apparent connection between innovation and digital technologies (Mishra and Deep-Play Research Group 2012). Unquestionably, the effects of globalization and digital technology advancement in our world have an impact on how humans now live, work, think, communicate and create (Zhao 2012). Digital tools, digital devices and applications are affording a new world of opportunities in which people can imagine, make and share in creative ways (Zhao 2012). As knowledge bases expand and our world becomes more complex, we need creative thinking to address twenty-first century problems (Florida 2014). Amid the shifting context of globalization and rapid digital change, creativity becomes that much more necessary in contemporary society. It also becomes increasingly vital in discussions of learning, particularly in technology-rich contexts (as described by Henriksen et al. 2016).

Yet before the field of education can address the complex relationship between creativity and technology, it must consider how creativity can be enacted in classroom settings and student learning experiences.

This is because, despite the rhetoric about the importance of supporting creativity in education (Runco 2014) scholars have noted that school systems still function in traditional ways, with rigid boundary lines between subjects, linear single-answer assessments, and restrictive practices for students and teachers (Collins and Halverson 2018). These constraints emerge largely due to broader policy goals that define what ought to be in the curriculum, and how this curriculum is to be instantiated. In this context that it becomes imperative to consider educational policies across the globe. Before delving into national educational policies, we examine some of the benefits and challenges of infusing creativity in education.

4 The Value of Creativity: In Education and Beyond

Creativity is closely connected not only with the artistic world and the creation of products, but also with science, engineering, innovative thinking and problem-solving. Creative people are increasingly demanded in the labor market (Ambrose 2017). Companies

and entrepreneurs are cognizant that the key to success is an ability to create new knowledge (Žahour 2016).

Education has a pivotal role in fostering creativity and creative practices, and thus the skills needed to create new knowledge. Indeed, "schools and initial education play a key role in fostering and developing people's creative and innovative capacities for further learning and their working lives" (Cachia et al. 2010, p. 5). Creativity is central to societal progress and the formation of new knowledge—thus it is necessary for schools to pay attention to the construct. According to Loveless:

> Education systems in the twenty-first century are having to adapt to the changes, aspirations and anxieties about the role of creativity in our wider society, not only in realising personal learning potential in an enriching curriculum, but also in raising achievement, skill and talent for economic innovation and wealth creation" (Loveless 2007, p. 5).

Since the 1950s, psychologists have empirically examined the concept of human creativity (Plucker et al. 2004). Research has demonstrated substantial and lifelong intellectual, educational and developmental advantages associated with creative thinking (Torrance 1995; Blicblau and Steiner 1998). Educational psychologists and researchers have noted strong positive correlations between creativity and life outcomes, including life success (Torrance 1995), leadership in the workplace (Williams 2002), healthy psychological functioning, and strong intellectual/emotional growth (Runco 1997). Maslow (1962) and Rogers (1976) noted the overall beneficial impact that creativity has upon human development, mental health and self-actualization. In any of these studies done through the latter part of the twentieth century, creativity was viewed as a kind of thinking skill or habit of mind—whereas in earlier history it had often been thought of as an inherent talentor trait for special and gifted people. In viewing it as a thinking skill, it becomes more accessible through learning, growth and change.

Creativity is recognized as one of the most coveted psychological qualities; yet it is often misperceived as an inherent trait limited to unique individuals (Sternberg and Lubart 1991). This view has created a tension: educators recognize the importance of creativity but are unclear if or how it could be facilitated in classrooms. The problem of concrete implementation of creativity is at odds with the conviction across educational discourse that creative thinking is important (Sawyer 2015).

The international implementation of technologies in educational settings may be a way of grounding creativity in practice or could provide a tangible mechanism for fostering its development. However, there is comparatively little scholarship that has explored the complex relationship between technology and creativity, though some work has recently begun to emphasize the connection (Henriksen et al. 2016). This connection between creativity and technology may have stemmed in part from changes in the economy and workforce, which has shifted dramatically in the last 50 years, due to accelerating shifts in digitization and mechanization. Specifically, more of the workforce has shifted from lower-skilled labor or manual jobs, to what Davenport (2005) referred to as knowledge work. Florida (2014) has spoken of this shift, warning the education and management sectors to avoid class divides between creative and non-creative knowledge workers. Given these new trends in the labor force, he notes that, "the only way forward is to make all jobs creative jobs, infusing…every form of human endeavour with creativity and human potential" (Florida 2014, xiv). In other words, workers must not only develop knowledge-based skills, but also embody creative practices in work

situations. However, it is not clear that there is any consensus on what these changes mean in the realities of policy and practice in work places, industry and in education.

5 National Policy Contexts

National education policies are more than mere documents. They foreground what is deemed important, and ignore or under-emphasize what is not deemed so. They provide a vision, lay out goals and procedures for achieving it, and act as an incentive structure for educators. Within the context of this paper, to engage a global view, we review how several national policies examine creativity and locate it in school curriculum or teacher skills. We report on this issue of creativity integration in policy, with an eye toward if or how this intersects with technology in education. We conclude on common goals, synthesizing themes, and broad recommendations for the future. For pragmatic reasons we focus on a convenient sample of six countries: Australia, Bulgaria, the Czech Republic, Finland, and Slovakia, and the U.S. That said, we believe that this range of countries would provide us a space for examining the challenges and realities of creativity and technology in education mandates.

5.1 Australia

In Australia, the states and territories develop individual variations of curriculum guided by the federal government policy frameworks. The Australian Curriculum (ACARA, n.d.) is the most important set of policy frameworks, and stipulates the minimum curriculum for F-10 students in learning areas (subject disciplines), cross-curriculum priorities, and general capabilities. Importantly, one of the seven General Capabilities for F-10 is Critical and Creative Thinking. Here, the General Capabilities curriculum defines creative thinking as:

> students learning to generate and apply new ideas in specific contexts, seeing existing situations in a new way, identifying alternative explanations, and seeing or making new links that generate a positive outcome. This includes combining parts to form something original, sifting and refining ideas to discover possibilities, constructing theories and objects, and acting on intuition. (ACARA, n.d.)

It also connects creative thinking with problem solving and other broad dispositions for learning:

> Students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking involves students thinking broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school… Dispositions such as inquisitiveness, reasonableness, intellectual flexibility, open-and fair-mindedness, a readiness to try new ways of doing things and consider alternatives, and persistence promote and are enhanced by critical and creative thinking (ACARA, n.d.)

Because creativity is a general capability it is also identified to varying degrees in the seven Learning Areas. Of particular relevance to this paper is the Digital Technologies Learning

Area, in which digital technologies are strongly positioned as a context for the development of creativity:

> Digital Technologies provides students with authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. These are all necessary when using and developing information systems to make sense of complex ideas and relationships in all areas of learning. (ACARA, n.d.)

Overall, creativity has a high degree of visibility within the F-10 curriculum. It is reasonable to conclude that all children in Australian schools are expected to be creative. However, the definition or criteria for creativity within the curriculum is discursively challenged within the Australian Curriculum itself, thereby making it difficult for teachers to enact in practice. This discursive challenge is especially evident in the fact that, despite the strident definition offered within the Critical and Creative Thinking General Capability, the rest of the Australian Curriculum commonly describes it in terms of a way of working and a functional extension of achieving disciplinary goals, such as solving problems. Most worrying is that creativity is rarely mentioned by itself, it is only framed in reference to other complex constructs. For instance, in the Digital Technologies learning area, creativity is referred to as only one of several characteristics that can be fostered by, and is a requisite for the effective use of, digital technologies.

In conclusion, the high visibility of creativity is promising, but the way the curriculum constantly conflates it with other equally complex and aspirational skills, behaviors and dispositions only further diffuses the concept and makes it more difficult to implement. For instance, how can it be taught if it cannot be distinguished from the other complex and aspirational learning outcomes?

In relation to teaching standards, in Australia, the standards of professional practice for teachers is set by the Australian Institute for Teaching and School Leadership (AITSL, n.d.). While creativity is not a core standard for teachers or leaders, it is indicated in the standards, as one of the goals of effective teaching strategies, that "proficient" teachers "select and use relevant teaching strategies to develop knowledge, skills, problem solving and critical and creative thinking" (APST 3.3). In addition, school leaders are expected to "promote creative, innovative thinking among colleagues." However, in AITSL, creativity (or creative thinking) is not defined. It is embedded as one of several goals for one particular standard, amongst 36 other standards competing for attention. Moreover, there is no indication of how it can be identified, measured, or developed, which undermines the point of any system of standards and makes it difficult to enact in practice.

5.2 Bulgaria

The term *creativity* did not appear officially within educational law until 2016, when the New Pre-School and School Education Law came into action. There term *creativity* (творчество in Bulgarian) appears in article 77 (1) dealing with the key competences expected by Bulgarian students, such as competence #8: cultural awareness and competence for expression via creativity. Indirect references to creativity are found also in article 219 (1) dealing with the rights of the educational experts to determine methods and means for carrying out the educational process in harmony with the broader principles and goals of the law and to be autonomous in implementing educational policies, self-control and decentralization.

As for the referenced innovative school elements of creativity, these are found also indirectly in article 38 (7), which offers some guidance for how schools might be run: developing and implementing innovative elements with regard to the organization and/or the content of the education; organizing in a novel manner the educational process and the learning environment; using new teaching methods, and developing new curriculum and syllabus. However, despite this incorporation of innovation or creativity, the text of the New Educational Law does not contain any explicit guidelines for the teaching of creativity in teacher education and does not provide descriptions of ways to assess the creativity competences for students.

While the notion of creativity is not as visible as in some of the other nations' educational policy documents, it is noteworthy that there have been significant efforts to raise its profile over the years. For instance, over four decades ago the Research Group on Education (RGE) at the Bulgarian Academy of Sciences at the Ministry of Education, launched a 12-year experiment, that among other goals, sought to facilitate creativity (Nikolov and Sendova 1989). A key finding was that learners' and teachers' creativity potential can be stimulated by developing specific ICT-enhanced methodologies and educational resources in support of inquiry-based learning and creativity. This project then led to further national and European projects, particularly focusing on innovation, which is linked with creativity—e.g. I*Teach—*Innovative Teacher*, IDWBL—*Innovative Didactics for Web-Based Learning,* InnoMathEd—*Innovations in Mathematics Education on European Level,* and others (Sendova et al. 2009; Zehetmeier et al. 2015).

Nevertheless, despite projects such as these, and as seen in other national contexts, there continues to be a lack of clarity in policy regarding creativity, let alone its connection to technology. This then reinforces the difficulty for teachers and education leaders to form a coherent or coordinated approach.

5.3 Czech Republic

In the Czech national curricular advisory document, the RVP (rámcové vzdělávací programy (National Institute for Education, Educational Counseling and Educational Training Facilities, n.d.) framework for education programs (which includes nine years of study in elementary school and four years in the gymnasium), we only occasionally find requirements to develop students' creativity and thinking. Creativity (tvořivost in the Czech language) and creative activities in the RVP ZV curriculum (2013) for elementary schools (pupils aged 6–15) are associated primarily with artistic performance (Art Education, Music Education, Dancing Education, etc.). Creativity is implemented in the supplementary domains of Ethical Education, Film and Audio-visual Education, Dancing, and, in a cross-curricular theme, Personal and Social Education. In students' creative activities, the emphasis is put on artistic production in educational domains.

In the curricular document (RVP) for the gymnasium (schools for students aged 15–19 years) the position of creativity is similar to the curriculum for elementary schools. The cross-curricular theme, Personal and Social Education, emphasizes the development of creativity and emotional intelligence (RVP G 2007, p. 61). The educational domain, Art and Culture is expected to contribute to the development of creative activities in Art Education subjects and the like. In contrast to elementary school curriculum, the gymnasium curriculum requires that the educational domain, Informatics and ICT, deepens pupils' ability to use ICT, information resources and software in creative ways (RVP G 2007, p. 62) and to exploit theoretical and practical knowledge about hardware and software applications

creatively. Yet the governmental strategy for education in the Czech Republic does not significantly deal with creativity and creative thinking development within schools. In terms of assessment, creativity is not assessed explicitly in students, but is accounted for in terms of being considered a competence of teachers.

A space for creativity and creative thinking for learning in Czech school education has not been discussed or fully appreciated in policy. Creative skills and activities of children in the Czech Republic may be developed in after-school activities at Basic Artistic Schools which have a long tradition in the Czech society. Some experienced teachers in Czech schools understand very well the importance of the development of creativity for learning and cognition. Consequently, they have established a network of public and private Czech schools named Creative Schools (Tvořivá škola) that apply aspects of creativity in learning and everyday teaching. However, this is separate from common curricula in most conventional schools.

5.4 Finland

In Finland, the National Core Curriculum (NCC) guides the Finnish compulsory basic education for students' age 7–15 (FNBE 2016). It provides a uniform foundation for education providers to create local school-level curricula, thus enhancing educational equality. The NCC recognizes creativity (luovuus in Finnish) as one element of learning, which receives 80 mentions in 473 pages. However, the document itself does not define creativity. As the idea behind NCC is to provide the foundation for planning the local curricula, the educational providers have autonomy to define their approach for creativity. The goals of the NCC are to secure the necessary knowledge and skills for all learners, to encourage learning in collaborative and student-centered ways, to use technology for supporting learning, and to support the use and design of different learning environments (also outside of classrooms).

Additionally, the NCC encourages teachers to break down the traditional subject structures to create more comprehensive areas of learning by using phenomenon-based learning (FNBE 2016). High emphasis is placed upon seven transversal competences that Voogt and Roblin (2012) argued are important for twenty-first century skills and learning in general. Creativity in the curriculum is typically related to these transversal competencies, but also to various subjects (e.g., languages, mathematics, music). In the NCC, information and communication technology (ICT) skills are considered important for citizenship and multi-literacy. Students are expected to develop ICT competences in four main areas: (1) understanding ICT key concepts, operating and using principles, (2) how to use ICT responsibly, safely and ergonomically, (3) how to use ICT for inquiry, data management, and creative work, and (4) using ICT in collaboration and for networking. In all four areas, there is emphasis on creative potential and active learning. In total, creativity is tied to ICT five times in the NCC.

Creativity and ICT also pose expectations for teacher education. The teaching profession is highly valued in Finland; around 10% of applicants are accepted to teacher education programs, and qualified teachers require a master's degree. Teacher development in Finland aims to provide skills for future teachers to work as educational experts linking learning processes, subject content and didactic processes from a multidisciplinary perspective. This opens up possibilities and creative approaches to teaching with ICT.

In terms of assessment, teachers in Finland have significant autonomy (no inspection systems or standardized tests). So the assessment of creativity in students depends

on the teacher. Creativity is often tied to subjects and transversal skills, so assessment is also tied to them. In teacher education, there is increasing interest around including creativity more deeply in the curriculum. For example, one of the Finnish Ministry of Education and Culture (2018) key development projects, the national "Teacher Education Forum" aims to strategically develop creativity of teachers. In addition, large-scale research of pre-service teacher education places emphasis in twenty-first century skills e.g. research from a creative thinking and ICT tools perspective (Valtonen et al. 2017).

5.5 Slovakia

The State Education Program (SEP) is the key national curriculum document and its updated, innovated version, has been implemented in schools since 2015. The National Institute for Education in Slovak Republic (National Institute for Education in Slovak Republic 2017a, b) is responsible for implementation of the SEP into school practice, and provides teachers methodological guidance. The SEP states the aims or expected outcomes of school education, lists the compulsory topics for school subjects, and defines required competencies of students. Creativity (tvorivosť or kreativita in Slovak) is present in this document, and the principles of active and creative education are characterized in the SEP; for instance in the introduction of the document (pg. 3): "This means that we can effectively acquire only the knowledge we create in a particular activity. So, we are also teaching the active construction of knowledge in particular subjects."

School subjects Mathematics and Computer Science are regarded together as the educational domain: *Mathematics and Information Treating* in the SEP. These subjects support the ability to use information and communication technologies, information resources and software applications in an "efficient and creative way."

All of this implies a certain focus around creativity in official school policy. However, long-term observations of lessons at schools and assessment of students and of school practice, still show a dominantly transmissive style of teaching in Slovakian schools (Duchovicova and Tomsik, 2017). Several strong aspects of school culture in Slovakia still influence traditional education in every type and level of school. These aspects include: time-tight and rigorous curriculum (part of the SEP), a focus on content subject knowledge instead of process knowledge and interdisciplinary skills, national standardized testing (provided by National Institute of Certified Educational Measurement 2010), dominantly traditional initial teacher education ITE), and summative assessment system. Thus, while there is some consistent evidence of attention to creativity in educational policy, school and teaching practices often remain rooted in conventional traditions (Duchovicova and Tomsik 2017). In terms of assessment, there is no official system for creativity assessment in Slovakia. Assessment of creativity is based on the individual teacher approach and attitude and on the style of her/his teaching as well as on the particular school culture.

Universities provide initial teacher education (ITE), and such programs must be accredited by the Ministry. Expanding attributes of creativity and critical thinking are key challenges in ITE, which is undergoing a period of slow reform in the Slovakian school system: the Ministry supports a project (APVV 15-0368) that aims to introduce methods and strengthen skills of future teachers in promoting creativity and critical thinking, in methodological subjects and pedagogical practices at schools (Constantine the Philosopher University, Nitra, n.d.).

5.6 The US

Describing U.S. education policy is challenging, because the U.S. is a decentralized system of 50 states with individual priorities. The United States Department of Education makes policy mandates, which may be interpreted differently at the state and local level. Examining teacher certification and accreditation requirements is one way to consider U.S. education priorities and the role of creativity in those priorities.

The Common Core State Standards are a set of curriculum standards (student learning expectations) for Grades K-12 in mathematics and language arts. These standards are the closest thing to a U.S. national curriculum. These standards do not require much in the way of creative thinking for K-12 students. Most standards focus on declarative and procedural knowledge, directing students toward a predetermined answer. A series of studies conducted since 2015 sought to determine the amount of creative, extended, and strategic thinking required by the Common Core. The results suggest a lack of creative thinking and a preponderance of declarative and procedural thinking; in fact, the term creativity does not appear in the Common Core State Standards (Florida State University 2012; Niebling 2012; Sforza et al. 2016). The lack of creative thinking required by the Common Core seems to be endemic of a larger national education policy environment focused on standardization of knowledge rather than creativity. For example, the two national testing consortia, the Smarter Balanced Assessment Consortium (SBAC) and the Partnership for Readiness for College and Careers (2015) do not include any items within their released testing items or their testing frameworks that require students to use creative thinking, other than the occasional writing prompt.

Each U.S. state administers federally mandated standardized tests in mathematics and language arts in grades 3–8 and at least once in high school. These tests are aimed to align with the Common Core. Therefore, a fair conclusion is that the mandated tests lack the assessment of creative thinking. For instance, the Common Core makes a superficial reference to use of technology on page 4 of the standards documents, yet no anchor standards in reading mention technology or creative use of technology as a K-12 priority. A mention of technology shows up one time in the Writing Anchor standards: "Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others." The majority of that statement revolves around automation, not creativity. The only point that could support creativity is the "collaboration" aspect, yet collaboration is not prioritized throughout the remainder of the standards.

The Council for the Accreditation of Educator Preparation (CAEP) controls teacher education certification in 28 of the 50 states. Creativity does not appear in the CAEP Standards for teacher education accreditation, nor does any reference to twenty-first century Skills or related terms. The five CAEP (2016) standards have 23 indicators, only one of which sets out requirements for teaching candidate performance: *1.1 Candidates demonstrate an understanding…in the following categories: the learner and learning; content; instructional practice; and professional responsibility.* However, specific examples for understanding are not provided. References to technology appear five times in the standards, but with no reference to using technology in creative or innovative ways—thus the concepts are never tied together in policy.

The mandated testing, along with the mandated curriculum standards, is how the U.S. communicates curriculum and assessment expectations in policy. All of this points to an overall lack of focus on creativity and twenty-first century skills in U.S. education, regardless of frequent rhetoric and discussion on these topics.

6 Looking Across Policy Contexts

National educational policy documents are visions more than mandates. That said, it would be negligent to underestimate how these policies influence and structure the broader conversation around education—emphasizing certain ideas and perspectives and de-emphasizing others. The policy environments described here reveal both convergence and divergence in how they reference creativity and technologies. We acknowledge that this discussion is limited in scope and scale, based on our range of contexts, but believe it offers certain insights around global educational policy.

6.1 The Struggle to Enact Creativity in Policy and Practice

First, the definitional challenges of defining creativity appear to be reflected here as well. The difficulty of arriving at a specific vision of what creativity is presents a challenge to policy, which often demands detail, clarity and structure for enactment (Perry 2017). When the nature of a construct like creativity (subjective, complex, ill-structured) sits at odds with the demands of policy (clarity, agreed-upon guidelines, specifics in structure), it follows that challenges arise (Craft 2010).

These challenges played out in several ways across the six national contexts we reviewed. It is evident through looking at the absences and gaps in these documents, that all six of these nations do not define what creativity means—either in the context of teaching practices or assessment. As in Australia, the curriculum in Finland, Slovakia and Bulgaria also identify creativity as a competency that works across subject areas. However, while Slovakia and Australia largely associate it with problem solving, Bulgaria frames it in terms of a mode of expression. In the Czech Republic it appears and receives mentions, yet is not clearly and consistently infused across curriculum, but is tied to learning in the arts or through functional application and instrumental needs, rather than focusing on it across subjects or developing creativity more broadly as an approach to thinking or expression.

One notable point is that in terms of assessment, none of the nations considered here offered any clarity. This critical point of assessment was generally either ignored, or left to the discretion of individual teachers. It is difficult to say (and this may vary in context) whether this stems from policy makers not valuing creativity, not knowing how to define or measure it, or simply being cautious not to mandate something they see as subjective. There may be a tension in avoiding a hardline directive or overly structured assessment around something as complex and emergent as creativity. Yet we must note that it is difficult to truly integrate a concept into policy if it is not assessed with any guidance.

Across five of the six national contexts (i.e. with the exception of the U.S.) there appears to be an understanding that creativity should feature in the curriculum. However, there are varied ways it has been instantiated in the curriculum frameworks. One such variation is perhaps related to the confusion about defining creativity we discussed earlier in this article: is it a way of thinking, such as a problem-solving technique, a disposition, habit of mind or something else? This confusion appears to be reflected in the silences in some policy documents, which may be the result of systems that avoid attempting to operationalize or define messy or subjective concepts; or in the limiting ways that creativity is thought of, as merely a facet of the arts or as a means to an end for a functional need.

6.2 The Rhetoric Versus the Reality

Our review of the policy documents also reveals some disparity between how creativity is valued rhetorically, yet it is ignored or limited by policy documents. For example, there is no shortage of both popular and scholarly discourse focused on the importance and the value of creative thinking—both in society and in classrooms (Zhao 2012). This, however, is not reflected in the realities of much education policy. This disparity is seen in the absences of creativity, and where the term appears without any definition or clarity. In some instances it appears in policy yet still fails to provide specific guidance on how it would be instantiated in practice. Again, this distance between perceived rhetoric and actual policy or practices appears relevant to the ill-structured nature of the construct.

Such disparities are also seen around educational technology implementation in schools (Mishra et al. 2011). Despite the fact that technology is sometimes positioned as a panacea, it is inherently a tool that is contingent on how it is used. It can be used to maximize affordances for creative output or deep learning, or it can simply be a replacement device with shallow uses for learning. Complex constructs require complex treatment in how they are approached and applied, and this presents policy challenges across the board. It is clear that the policy documents reviewed above vary on how creativity is to be understood, evaluated and instantiated in real classrooms.

7 Conclusion

While creativity has become a core issue for twenty-first century teaching and learning, it is still not clear what this means for the field of education—in policy, and therefore in practice. Our review of the literature has highlighted both the essential nature of creative thinking across contexts (Runco 2014), as well as the ill-defined and ill-structured nature of creativity (Runco and Jaeger 2012). The tension faced by the field of education lies in how to navigate this conflict between the needs of policy and the nature of creativity.

In our review of six national contexts, this broader tension also becomes clear, though it shows up differently in different spaces. We have noted how in some cases, curricula or policy meet this ill-structured dilemma with silences—by not defining it or sometimes not even mentioning it. This may lead to problems for practitioners, who seek to be guided by policy or who might benefit from clarity in order to instantiate a complex construct such as creativity in classrooms. Another challenge may be to overcome pre-existing traditions and cultures, which sometimes involve practices that are antithetical to creativity, yet are endemic in many schools. Thus, even for nations that manage to describe creativity within policy, such as in the case of Australia, there may be problems in practice, if it goes against traditional, ingrained structures. The implication is worse, of course, for nations such as the US, which fails to position creativity within the curriculum –an issue further reinforced by testing regimes that exclude, ignore or devalue it (Au 2011).

Across the six contexts represented here, there is also not a great deal of clarity around how creativity can be a part of teacher capabilities—partly because of a lack of consistency across national contexts in how it is approached, and perhaps partly because of the complex nature of creativity and the definitional openness inherent in the construct. Teaching in and of itself happens in a complex space, where they need a blend of both flexibility and support for creative practice. Without a clear idea of the goal of creativity in policy, it is

difficult to cultivate it in teachers, yet teachers are essential to infusing it into practice (Hall and Thomson 2005).

Moreover, while much educational scholarship and rhetoric has discussed and described the relationship between creativity and technologies in learning (Malhotra et al. 2015), there is still little direct connection between these in policy. They are sometimes mentioned or noted together, but not often—and while there is a sense of the possibilities in these spaces, this is often not articulated in policy.

While this challenge of integrating creativity in policy and curriculum is inherent to this line of work, based on the complexity and subjectivity of the construct, it is not insurmountable. In fact, many of the major thinking, teaching and learning constructs that most education policy deals with—from literacy to scientific thinking and more—are concepts that have been (and in some cases, still are) contested, subjective and changeable. Yet over time they have still become part of curricula and policy in clear and practicable ways, which has often happened via much debate, discussion, and examination (Bowe et al. 2017). Even with respect to the current limits of creativity in education, some nations have taken some key initial steps to integrate it. We suggest that through affording creativity the time and space for extensive and serious policy discussions, creative twenty-first century education may become as much as part of policy as it already is in the rhetoric.

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