9. Creative Production With Tablet Applications for Learning Digital, Social, and Interpersonal Skills in the Primary-Level Classroom

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Abstract: This paper looks at a primary school curriculum for information and communication technologies (ICT) and the digital skills taught and practiced by students during these lessons in comparison to their practices and experiences outside school. Discrepancies between what children make with digital tools outside school and during ICT lessons are identified and used to design and test a model that enables digital, social, and interpersonal skills learning and practice. The paper presents the tested model as a proposal to transform the primary school ICT curriculum and pave the way for contextual digital, social, and interpersonal skills learning and practice.The skills children need to acquire today to ensure future job security are evolving from "perennial" skills to "contextual" (Dede, 2009). The ability to collaborate with people from various backgrounds is of growing importance in information-based economies where work is no longer a solitary experience as in the past (Karoly & Panis, 2004). Classrooms should provide opportunities for group collaboration and contextual digital skills learning and practice. This research demonstrates the objective to use primary-level ICT lessons as a platform where children can learn such skills.

From Technical to Contextual Digital, Social, and Interpersonal Skills

This paper addresses the question of creative production as a means to acquiring contextual digital skills and fostering social and interpersonal learning as part of the information and communication technologies (ICT) curriculum in the primary education in one European country, Malta. It explores how, through digital applications (apps), children can self-organize to create projects, stories, or games as a means to acquiring such skills.

Making things can be seen as a way for one to express personal ideas and views (Gauntlett, 2007) or as a process of learning (Papert, 1980; Resnick, 2017). When children engage in making projects, stories, or games using digital media they can learn in an interdisciplinary and self-driven way (Guay, Ratelle, & Chanal, 2008; Kafai, 2006). Cebeci and Tekdal (2006) emphasize the learning opportunities that stem from producing podcasts. Ejsing-Duun and Skovbjerg (2016) analyze how Danish children tap into existing knowledge to develop further when they engage creatively with digital reproduction during mathematics and Danish. These are some examples of the benefits when engaging in creative production with digital media. Yet there is little research to demonstrate that such methods work in the primary-level classroom.

With the growing use of data-driven automation and decision making it no longer suffices for ICT lessons in primary schools to equip children with solely technical skills (i.e., knowing how to use Excel, a software program), but lessons should also provide contextual skills that enable group collaboration and self-organization and enable connected learning across disciplines and systems. Thus, a model is proposed (see Figure 1) to replace the ICT curriculum whereby children engage in creative production with the available digital tools as a means to foster self-organized and interdisciplinary learning and practice of digital, social, and interpersonal skills.

Context

In 2014 the government of Malta launched a national one-tablet-per-child policy (Ministry for Education and Employment, 2014). It aimed to introduce digital tablets—LearnPads—to Year 4 and Year 5 students, aged 7 to 10, to modernize the curriculum, to encourage digital media literacy, and to support learning (Department of eLearning, 2015). While there is a global call to bring up digitally literate and critical young thinkers, the reality is that classroom initiatives to attain such goals vary and so do the outcomes. Although research was conducted in a European setting, the proposed model (see Figure 1) can have a wider application across primary schools with digital literacy initiatives.

The current ICT curriculum in Malta for Grades 3 to 5 (7–10-year-olds) has limited learning objectives in comparison to what children this age group typically do with digital devices outside school, as preliminary research for this paper has identified. The discrepancy between in- and outside-school activities presents a drawback to pursuing children's greater potentials (Vygotstky, 1978), since use in class is bound by the curriculum and not flexible to accommodate children's perspectives, skills, and motivations. As the ICT lessons do not provide opportunities that students find outside school, their perspective on what interests them or what they might want to explore further is left out. This can lead to children's disengagement in class while they can also miss out on other learning opportunities.

Research Questions and Methodology

This paper focuses primarily on the skills that children aged 7–10 practice and acquire when they engage in organized creative production using digital applications. The identified skills become the learning objectives that can serve to improve the ICT curriculum at the primary-school level. The guiding research questions were:

1. What do children make in and outside of school with digital tools from children's, parents', and teachers' perspectives?
2. What are the ICT lessons' learning objectives and practices and how do those compare to what children do outside school?
3. What happens when children create things using digital technologies? What are the skills they practice, the topics they explore, the challenges they tackle, and the social relationships they engage in as they delve into the creative process?
4. How can we build better ICT lessons in the primary school knowing what children are capable of creatively making with digital technologies outside it?

Personal interviews were carried out with 342 children aged 7–10 across the Maltese islands; 309 parents were surveyed to gauge their knowledge of their children's digital use, and 48 of them were further interviewed to understand their view on children's creative production with digital tools. Interviews were conducted with eight ICT teachers and eight school principals to grasp their views on children's digital use. The ICT teachers were further interviewed to assess their perspective on the curriculum and the opportunities—or lack thereof—for their pupils to engage in creative production. Last, seven experimental workshops were conducted with 21 children, grouped into three and four, that aimed to engage them in creative production with digital tablet apps. The subjects were randomly selected from a pool of private, state, and church schools with equal representation from both genders and various socioeconomic backgrounds.

The workshop structure (see Figure 1) was drawn from an extensive literature review on creativity and learning. Yet each workshop followed a typical school lesson length of 45 minutes with three sessions spread over three nonconsecutive days. Four parameters guided the choice of apps the participants could use: (a) apps that allowed unstructured idea

creation (Gauntlett, 2011); (b) apps that could cover one of three fields: writing, audiovisual, and artistic, but also a combination of those three, all of which enable visualization as an aid to learning and creativity (Kervin, 2016); (c) apps that can address the participants' interests, values, or emotions (Anderson & Krathwohl, 2001); and (d) apps that are age-appropriate (Common Sense Media, 2012).

Direct observation and chronicling children's behavior and attitudes were recorded to assess the effectiveness of the workshops and to identify the type of learning that took place. Behavioral and attitudinal indicators were marked (Ott & Pozzi, 2010) when present using the following indicators: (a) personally able and motivated to propose a solution; (b) able to respond with solutions at researcher's prompts; and (c) unable to respond with solutions. The direct observations were not limited to this methodology. Children's personal verbal and nonverbal communication was also observed, recorded, and considered in the analysis of the workshops' outcomes. The observations were recorded on monitoring sheets. Personal interviews before and after the workshops were conducted and audio-recorded. Freestyle notes during the workshops were also taken. The final data include interviews, class observations, survey data, and artifacts created from the workshops.

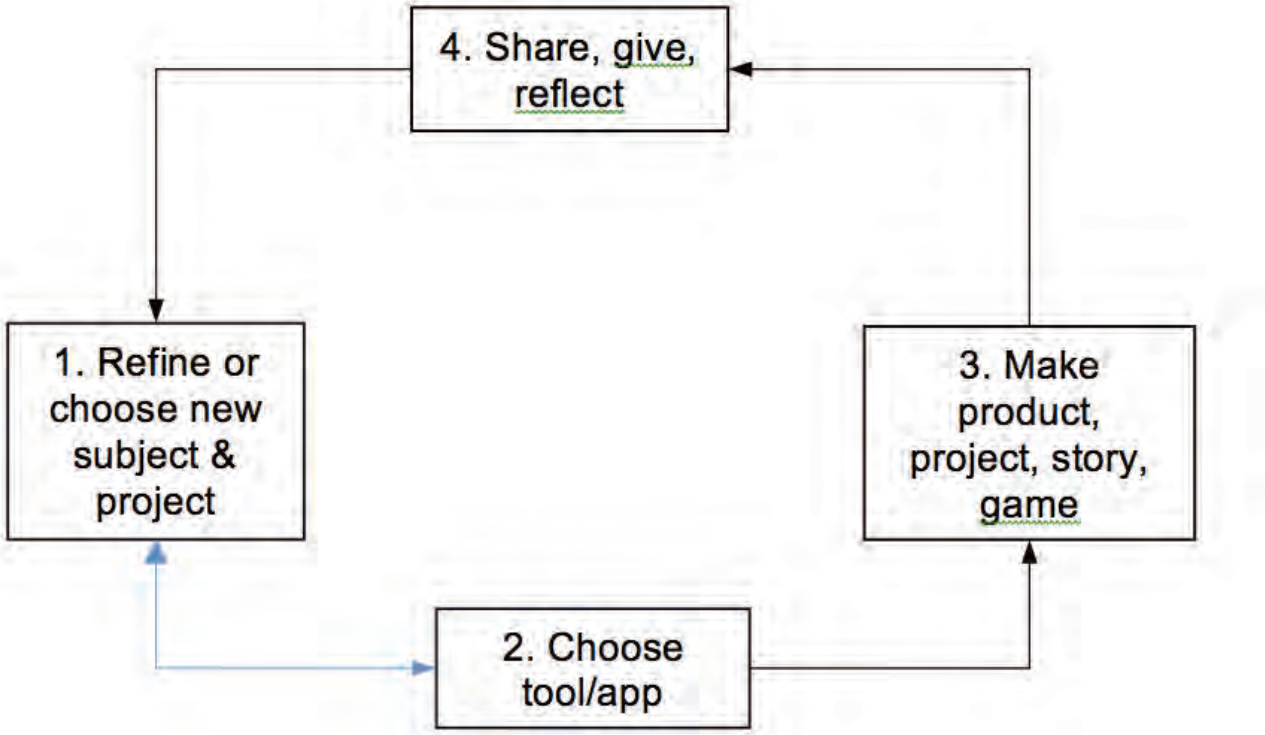

Figure 1. Model for creative production to teach ICT lessons: Learner (1) delves into a subject (e.g., environment); (2) selects the digital tool—an app that allows for the creation of an audio-, video-, or text-based narrative; or, in reverse, (2) selects tool and then (1) thinks of project; (3) creates it; (4) shares and reflects.

Findings

Technical Curriculum Versus Connected Learning

An analysis of the ICT curriculum (see Table 1) for Grade 3 to 5 students shows that the ICT lessons provide rather limited digital education in light of the pressing necessity for children to grow up digitally literate, especially as they become regular users of digital tools outside school and at a much younger age (Rideout, 2017).

	Learning objectives of primary level ICT curriculum (Ministry for Education and Employment)				
Year	Communicate information	Handle information	ICT management	ICT evaluation	Control
3	Write, enhanced by pictures; format text	Using pictures to present information	Using software and more items from pull-down menus; managing computer files	Describe interactions with the software; explain how to use PC; talk about activities on PC	-
4	Create audio-visual text; access web content; use email	Log data; use CD-ROMs	Manipulate text; export/import and manipulate graphics; access stored files; learn printing options	Talk about ICTs social impact; learn to search information; online behavior related to emails	-
5	Audio-visual and text manipulation; share content; bookmarking; attaching files	Search CD-ROMs; excel basic operations; tables & graphics creation; printing	Manipulate text; print preview;	Distinguish values between ICT and non-ICT tools as "means of communication"; appreciate ICT effects on society (e.g. how scanners or cameras change society); evaluate web content; web safety.	Recognize control mechanisms (remote controls); operate with them e.g. rewind a tape

Table 1. Learning objectives for ICT syllabus for primary education (children aged 7–10).

The learning objectives focus on technical practices and as preliminary research confirmed, such practices in the classroom were predominantly teacher-led with prescribed decontextualized activities that all children had to follow. The interviewed ICT teachers and principals acknowledged the importance of creativity and the need to foster creative production in general and specifically when children used the technologies available to them. Yet some teachers insisted on giving pupils ready examples to practice digital skills without making room for self-expression. To teachers, assigning such ready tasks was a way of controlling students, while allowing them to self-organize in creative production could compromise this control.

Table 2 summarizes the learning objectives drawn from two of the seven workshops carried out for this research. These learning objectives provide evidence of the skills children engaged in practicing while self-directing in creative production. These learning objectives help to further develop strategies for learning assessment. They can also guide teachers in their pedagogical efforts and lesson structuring.

WORKSHOP	PRACTICED SKILLS
Workshop 1 Three children, aged nine, designed a food menu using *Foldify*, an app for creating 3D printable objects.	Technical skills • Formatting text and images: e.g. copying/pasting images and text • Researching content using Google Chrome/ Explorer • Conceptualizing, designing and creating 3D figures; learning to print • Saving/deleting/retrieving files • Navigating through the app's menu Social skills • Working with others; assigning and practicing different roles • Solving personal conflicts • Moving on from unsolved issues or conflicts • Managing work with others (within the designated 3 days for the workshop) • Practicing communication skills • Bonding and camaraderie; using humor to steer work • Exchanging knowledge and seeking support from one another Academic exploration • Researching on the subject of culinary
Workshop 2 The children teamed to develop a fictional story, "The Story of Aidawrabel" – the name comprises parts of the participants' names. They designed 3D characters using *Foldify*, printed them, photographed them and inserted them into a digital presentation. They wrote a story line and audio-recorded it as a voice-over	Technical skills • Audio and visual recording; working with sequence and montage • Conceptualizing, designing and creating 3D figures; learning to print • Operating with photography and photo editing • Researching information online • Developing a storyboard and script writing • Copying/pasting and editing text and images • Saving, editing, deleting and retrieving files - text, images, and audio Social skills • Distributing roles, assigning tasks and setting deadlines • Managing frustrations and conflict resolution • Learning to share • Practicing communication skills • Bonding and camaraderie; using humor to steer project Knowledge • Exploring the topics of astronomy and physics • Learning about photography and video production • Learning how to create a storyboard and film montage

Table 2. Summary of the learning objectives being introduced and practiced by the children during the workshops carried out during this study. Only two of the seven workshops are given as examples here.

Fostering Creative Production as a Preamble to Teaching Social, Digital, and Media Skills in Primary-Level ICT Lessons

Table 1 presented the current ICT objectives for primary schoolchildren. ICT teachers adhered to these but as they reported, they often redrafted their lessons in search of more engaging activities. The proposed model aimed to overcome the limiting objectives of the current curriculum by seeking to (a) foster creativity, (b) engage children in meaningful project making for practicing digital, social, and interpersonal skills and (c) enable self-organized and interdisciplinary learning.

An improved ICT curriculum can have two overarching goals (see Table 3). The first encompasses teaching, learning, and practicing digital and technical skills. The second enables social and interpersonal skills and other key subjects that aim to enable critical understanding and interpreting of media and technologies as students delve into creative

production. Students will be steered to make creative things on subjects they care about or are interested in. Moreover, this curriculum allows for subject crossover—connected learning; students can develop projects related to topics from their other lessons, say, history, biology, or ethics. Students can use the tools available at the moment and as these change so will learners' technical skills. Students will not aim to explain how to use the computer to present ideas; they will demonstrate creative expression on subjects they care about, discover, and learn.

	Learning by making: ICT curriculum objectives					
Year	Communicate information	Technical skills	Creative skills	Interpersonal skills	Old vs. new media education	Social media skills: children as recipients, participants, and actors
3	Make projects, products, ideas, games, etc. based on a selected subject: e.g. environment, family, culture, music, physics and so on	Manipulate content; use Internet; use apps to build projects, products, or games; save, retrieve files	Demonstrate creativity by making a product, a project or a game. Reflect on the accomplished work	Work and manage groups and projects; self-organize; practice communication skills; adapt to changing environments (re-group when initiating new projects)	Create projects, products, ideas, games, etc. using 'old' and 'new' media tools; introduction to storyboards; montage; promotional vs. factual content	Contact risks and opportunities; Content risks and opportunities Commercial risks and opportunities
4	Include new subjects: e.g. physics, astronomy, biology, music, sport	As above. Make apps; basic coding, e.g. design on Scratch	As above. Reflection can include making digital journals using Scratch	As above. Share reflections and projects	As above; using a wider spectrum of tools	As above; include understanding civic engagement; digital citizenship
5	Focus projects on subjects in-depth	Include computer science	As above	As above	As above	As above

Table 3. Proposed learning objectives for the ICT curriculum in primary schools, Grades 3 to 5.

Conclusion

This paper draws attention to several points of discussion. First, the workshops presented an opportunity to examine children's perspectives on creative production with digital devices in and outside school. From a constructionist perspective (Papert, 1993), the workshops designed for this research aimed to foster 7–10-year-old children's creative production as a way to allow them to practice a variety of skills and expose them to new subjects. While self-directed learning can be fruitful (Mitra, 2000), this research also highlighted the importance of the facilitator—the teacher. Children can get bored or lose focus when simply left to experiment (Clements & Sarama, 2002). Teachers are important to steer the learning process and to enable children's greater potentials.

The participants' feedback was acknowledged and collected as it evidenced their personal feelings about the given experience. This feedback clearly contrasted with the participants' views on their ICT lessons. When asked to describe how devices were used in the classroom, most participants discussed software programs and apps, not specific themes or subjects. They talked about using PowerPoint and Excel without referring to a topic except for general titles such

as “maths,” “English,” or “science.” Respondents mainly focused on describing the format and the tools with which they were taught and not the subject or the issues that they were being taught. This resonates with the research conducted by Livingstone and Sefton-Green (2016); the researched children’s school had imprinted their structure of leveling learning and comparing levels in such a way that students—and their parents—“were directed to a standardized level of attainment … [where] levels [are] divorced from their original meaning in relation to the subject matter” (Livingstone & Sefton-Green, 2016, p. 133). Because of leveling learning in such a “ritualized and procedural” manner, the “content and meaning has become subordinated to the process of simply moving through” these levels (p. 132).

In contrast, the workshop participants’ reflections on their experience veered around the content. They researched information, which gave them further topics for discussion. For example, Workshop 2 researched Mars and life on other planets. This research became a stepping-stone for the participants to delve into various subtopics (e.g., Earth’s system components in comparison with those of other planets) in a seamless way. This process led the children to a form of learning—and discovery—without the typical school structures (separating knowledge into subjects and time slots). The workshop participants seemed to experience a sort of “flow” (Csikszentmihalyi, 1998) of learning from one topic to another as they searched for the pieces that would make their project. This flow happened in an organic way, without the children realizing what they were learning or *that* they were learning. These observations were evident across different socioeconomic backgrounds, gender, and age. In contrast, at school, children often focused on what is being repeated to them by parents and teachers—that they are there “to learn”; somehow, *what* to learn is left as a less clear concept. Learning and skills acquisition became contextualised.

ICT lessons for learning and practicing digital skills take center stage. The child becomes the guest who arrives to obtain what is offered during the lesson without initiation or inquiry. By developing a personal project, on the other hand, as a newly proposed framework for the ICT curriculum, children can find purpose in learning new things by taking an active role in the curriculum design and become the center of the learning process.

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