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Design thinking and *imitatio* in an educational setting

Abstract

Schools are expected to prepare students for the future, providing them with methods for dealing with the emergent world. This article considers how teachers can work with digital productions at primary schools even when they are not acquainted with the new production genres. We propose a methodological framework to assist students and teachers in their exploration of unknown media genres based on a case study. We revive the ancient concept of *imitatio* and integrate it with contemporary design thinking to support production dynamics that lead to increased digital literacy.

Keywords: Design thinking, *imitatio*, digital literacy, education, digital production.

Introduction

Two teachers instruct a class of fifth graders to make webpages about robots. They research online, reading articles, browsing images and watching videos and use the free website builder Wix (www.wix.com). Some chose to start with a premade template, whereas others make theirs from scratch. The teachers are not sure whether a template should be used or not. One (B) argues that a template helps to make something that looks good and allows students to focus on the content, as the learning objective is to practice the written dissemination of a subject. The other (A) emphasises that a template will limit their creativity and be too rigid. However, while they work, A reminds the students not to spend too much time on images. But they do spend time on images and are concerned with how their production comes across as a webpage. One student exclaims, 'Ugh, it doesn't look like a webpage. It looks like PowerPoint'. Actually, there is very little teacher focus on producing web pages. The

discussion of using images, how to write, how to arrange information architecture, etc. is not touched upon. The students are expected to figure this out on their own. The two teachers are primarily interested in them writing about the subject.

This scenario is one of our observations, but it could have taken place in any school attempting to expose children to learning through production in digital genres, which is a particularly strong way of learning (Smith et al. 2005, Atkinson 2006, Lazzari 2009).

Teachers are encouraged to embrace new technologies and genres and integrate them into their teaching even when these technologies are unfamiliar or they do not have a method to appropriate them. In order to promote creativity, engagement and critical thinking, there is a demand for teaching methods that let students learn through digital productive processes (Sørensen and Levinsen 2014). Student-centred learning approaches are favoured because they ‘allow students to collaborate, work on authentic problems, and engage with the community’ (Rotherham and Willingham 2010, 19); however, these methods are notoriously demanding.

We propose a method to exploit digital productions’ potential as pedagogical practice and to address the existing challenges. This method focuses on emerging digital tools and genres and helping teachers and students to use them. We build upon the ancient concept of *imitatio*, reinterpreted in alignment with contemporary design thinking.

Research context

The idea for this article originated while analysing hundreds of hours of empirical material in our project “Children as Learning Designers in a Digital School” (2012–2015), financed by the Danish Ministry of Education. We studied children’s learning processes and design

competences when involved in various kinds of digital production. It hybridised action and design research in which researchers collaborated with school-teachers to design a series of six interventions of increasing complexity. Each researcher followed two classes (first and fifth grade) for two years at five different schools across Denmark. The methods used were qualitative methods including observations, interviews, thick descriptions, media anthropological methods, informal chats and interviews with teachers and students, and quantitative methods such as digital surveys (Levinsen et al. 2014). We also collected artefacts such as students' digital productions, learning objectives and learning contracts.

The six interventions involved different subjects (e.g. mathematics, natural sciences, Danish, English, German, arts, physical education). In each intervention, the children worked in groups, producing various digital artifacts such as comic strips, films, video games, robots, etc. In all of the interventions, design decisions and process management concerning the digital production of a particular artefact were left up to the children, as the study investigated the implications of self-direction in learning processes. Teachers established a frame and general objectives; typically, they were more concerned with the learning outcomes related to their own specific subjects than those related to the digital platforms and media genres.

The project's main results concern pedagogical and didactical insights into digital production as a driving force in teaching and learning (Sørensen and Levinsen 2016). Our observations inevitably revealed 'best' and 'worst' practice scenarios of how a digital production process could unfold. This article goes beyond the scope of the initial project, although it is strongly anchored in its empirical data. Because both of the present authors are digital media scholars, we reflected on the pitfalls and opportunities that the learning form contains. We also proposed how to steer digital productions more effectively, drawing on our knowledge of digital design

processes in general. This article is based on a case study that serves as a best practice and was the exception to the rule in our observations in terms of embracing new digital genres.

Theoretical background

When children produce something – a feature story, a maze game, a newscast, a podcast, etc. – they must have an idea about the subject matter and the genre they are using. We found that this was often overlooked in the teaching situation and further challenged by using templates that render paying attention to the media structure unnecessary. However, we need awareness of new genres in order to exploit digital productions and promote true digital literacy.

Digital literacy is a contested term – Lankshear and Knobel (2008) suggest talking about ‘literacies’ in the plural form. We are inspired by Martin’s (2008, 167) definition of digital literacy:

The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesise digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.

Martin distinguishes between three levels of digital literacy (competence, usage and transformation) – technology to produce and communicate does not equal full literacy. The highest literacy level (transformation) implies that the learner is aware of genre traits and the meta strategies that characterise different media products. This aligns with Buckingham’s

(2006) view of media literacy – it is not only about making, but also about assessing and understanding cultural contexts.

We found that teachers focus more on their specific subject matter when facilitating digital production processes, probably because it is what the teachers need to assess in the end.

Digital genre traits and meta strategies are not in focus; thus, in the observation excerpt in the introduction, the genre traits of the website are not discussed when students make webpages about robotics, as the teachers focus on technical writing. Furthermore, their understanding of creativity involves creating something new and unseen (Ackermann 2013; Ejsing-Duun and Karoff 2015; Ejsing-Duun and Skovbjerg 2016). This mirrors a societal tendency that Tanggaard and Wegener (2016, 1) criticise: ‘excessive enthusiasm towards the novelty aspects of creativity and innovation, which overshadow the potential of old ideas and past experience as drivers of change’.

As teachers cannot be expected to know of every emerging digital genre *and* follow the newest developments in the subject, we suggest that the challenge of working with unknown genres can be met by reviving the practice of *imitatio*, which originates in ancient Greek art and rhetoric training, and interpreting it via modern design theory. *Imitatio* encourages the study of previous ideas and ways of expression as a foundation for making renewed and accurate expressions. We develop a framework for digital literacy inquiry by learning to express oneself and understand different media based on Dewey (1910, 1938) and design thinking (Dalsgaard 2014).

Imitatio

A typology for repurposing content is a powerful pedagogical tool. Imitation is a high-level cognitive endeavour that is effective in learning and teaching (Zhou and Guo 2016).

However, Jenkins et al. (2009, 57) asserted, ‘schools remain hostile to overt signs of repurposed content . . . and they often fail to provide the conceptual tools needed to analyze and interpret works produced in this appropriative process’. Ackermann (2013, 125) presented similar views:

Today’s authors rarely start from scratch, or stick to their creations for long. Instead, they *borrow* from those who inspire, and they *address* to those whose opinions matter. And if time permits, they reconfigure, repurpose, and remix incomes to leave a mark, or add their signature. A big problem among educators today is to come to grips with what they view as ‘plagiarism’: students’ tendencies to pick-up and pass-on readymade imports that have not been ‘massaged’ long enough, or mindfully engaged.

We found the same issues in our observations in a Danish context. Digital technologies change accessibility to content, making it easy to pick up and reproduce. Furthermore, genres emerge as a result of continuous imitation. It is ‘the complex interaction between imitation and invention that informs our disciplinary knowledge of what to imitate, in what way, and for how long, as well as when to reappropriate or transform what is imitated as our own invention’ (Bawarshi 2008, 79).

Imitatio is a learning technique in which neophytes were exposed to the best examples of a particular genre, such as political speeches, and then encouraged to imitate their form and content to develop satisfactory rhetorical competence (Frona 2012). *Imitatio* was mostly used

in connection with textual literacy, but it was also applied to artistic endeavours like poetry and the visual arts. *Imitatio* has been reintroduced in literacy studies for writing and composing (Matthiesen 2013, Edwards 2016). We propose a model for using *imitatio* to teach digital literacies.

We were reminded of *imitatio* when teachers and children faced genres for the first time (i.e. they did not have a ready repertoire of production modes) and imitated examples to kick-start production. Interestingly, this was an effective way for teachers to harness the tacit knowledge that children have by just being consumers of the genres in question. We present a nuanced understanding of this concept that can help support digital productions in a school setting. As our case analysis shows, *imitatio* can succeed, also when applied in a disorganised manner. Our goal is to provide insight into how it can be adjusted to contemporary teaching situations.

Studying great productions is not only about mindlessly copying, as ‘the lessons of the past were meant to serve as a springboard to new invention’ (Gazda 2002, 14). *Imitatio*’s focus as a learning technique is not on the product but on the dynamic creative process (Pechat 2001). Indeed, producing exact copies of one particular object is not the objective; rather, exposure to different authors and styles fosters a meta-critical awareness of genre and style so that *imitatio* can eventually lead to *superatio* (which is about leaving this beginner stage behind). *Imitatio* thus evolves from a ‘superficial, rule-based imitation’, which is appropriate in the training period, into a ‘natural sort of imitation predicated on long experience and thorough analysis’ that is typical of mature artistry (Gazda 2002, 158–159).

Matthiesen (2013) reviewed the use of the *imitatio* method in contemporary education and concluded that it fosters rhetorical agency (8) and citizenship (13). She argues that imitating

always has an ideal dimension – a fascination with a particular master text can be a powerful motivation for students to engage in a dialogue with their teacher about the features that make the text (or media production) a great example (Matthiesen 2013). This way, they train their desired meta-reflective competences related to the genre in question (for Matthiesen, film). In her PhD thesis, she proposes five dimensions of student-driven imitation:

- 1) Fascination
- 2) Identifying the qualities worth imitating
- 3) Critical reflection
- 4) Acceptance
- 5) Interaction

These can be adapted to understand an *imitatio* digital production situation. We illustrate this with an example from our project: the children had to produce a comic strip on their iPads using the app *Strip Design*:

- 1) *Fascination*: The children selected comic strips that they found worthy of imitation and showed them to their group.
- 2) *Qualities worth imitating*: They looked at the example comic strips and discussed which qualities were worth imitating were (e.g. from *Garfield*, they liked the thought bubbles and how often panels contained no words and conveyed meaning with facial expressions).
- 3) *Critical reflection*: The children considered all of the qualities they had chosen in relation to their assigned theme. The teacher gave them constraints (the story had to be

about friendship, use photographed LEGO figurines and follow plot sketching tools they learned in class).

- 4) *Acceptance*: The children agreed on which qualities were most appropriate, met the teacher's requirements and were ready for production.
- 5) *Interaction*: The ideal production process was confronted with the reality of the tool chosen for this exercise. Some of the groups discovered, for example, that the rigidity of the ready-made templates of the app did not allow them to do the panel transitions they had envisioned. Thus, they had to change their strategy.

The *imitatio* process helps children to travel between the part (their product) and the whole (their collective knowledge about the genre and its ideal aesthetic qualities) several times, allowing for reflective practice. Teachers guide them in this process, ensuring that they attain knowledge of the particular genre (and subject matter), such as by telling them that a word that resembles a 'noise' is called an onomatopoeia, and assisting them to develop the most important competence of all: learning to learn.

Designerly inquiry

Imitation in an educational context is not a new concept (e.g. Dewey 1910; Vygotsky 1931; Piaget 1962). Dewey's approach is foundational in relation to the present study. For him, imitation stimulates learning in children, but it must not be understood as pure imitation, where children mindlessly copy adult behaviour and automatically acquire it. Instead, the process is more complex, resembling the movement between the part and the whole (concrete and abstract thinking), as described in the comic strip production (Dewey 1910).

In this context, inquiry is an important notion as a process of exploration and reflection that begins with doubt and ends with knowledge (Dewey 1938). In order to engage in this process, the student must be full of doubt and seek answers to eliminate that doubt. Dewey (1938, location 1809) defines inquiry as ‘the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole’. Here, the controlled or directed transformation is a design process in which students learn about a subject matter through a transformation. Selecting and experimenting with features is part of the design process, as students are expected to produce something. Design thinking has been related to inquiry as defined by Dewey (Buchanan 1992, Rylander 2009, Dalsgaard 2014).

Design thinking

Design thinking is a way to frame and address the challenges characterising design (Dalsgaard 2014). It can be applied beyond the design context by and with people without a scholarly background in design (Johansson-Sköldberg et al. 2013). In our context, this includes the teachers and students. Dalsgaard (2014) proposed six central issues to understand design thinking, which he derives from pragmatic thinking. We briefly introduce them as a skeleton for our own reflection about design, where we also contextualise Dalsgaard in relation to other design thinkers. We then combine them with Matthiesen’s (2013) five dimensions of *imitatio* to inquire about the design process and how *imitatio* appears in a selected case.

Theory–practice and reflection–action are intertwined in design

Designers work with complex issues, ‘wicked problems’, that cannot be thoroughly analysed and solved (Buchanan 1992). Rather, designers work in iterative phases of action and

reflection, drawing on theories and ideas to scaffold their inquiries of design problems (Dalsgaard 2014). These theories and performances are evaluated during the process on the basis of how well they scaffold the design practice (i.e. through a loop of action and reflection on action). In *imitatio*, the uncertainty is how to create a specific expression. The complex issue is to understand how the design parts work together in a certain context with users. The designer forms ideas from similar projects or from searching for something worth imitating in combination with prior experiences and theories that identify qualities worth imitating.

Design is characterised by emergence and interaction

Designers create design drafts based on their understanding of the situation and materials. Consequently, problems and solutions emerge through the process (Dalsgaard 2014). Cross (2011) emphasised design processes in which relevant features emerge in solution concepts, leading to a solution through interaction between tentative solutions. Related to *imitatio*, the initial ideas of how to make something work change as the designer makes drafts and learns more about composition, means, ends and effects. Through interaction between the designer and the material, as the designer combines the parts identified as qualities, a new meaning emerges.

Design is situational and systemic

Designers' main task is to overcome a 'hermeneutic gap' (Hallnäs and Redström 2006) between their current understandings and the mapping of ideas and concepts contained by the product (Dalsgaard 2014). They bridge the gap in a process where they move between considering the design as a whole and as its parts. This interpretation process requires understanding of the design and use situation; it is systematic and characterised as designerly

inquiry (Stolterman 2008) consisting of a conscious, iterative movement between the whole and the details. This interactive and iterative process is crucial to imitating design aspects in order to critically reflect upon what is working in which context. This contextual understanding of design suggests that mere copying is seldom possible if the design must fit a situation.

Design is experimental

Designers ‘. . . ask “What if?” questions to imagine future scenarios rather than accepting the way things are done now’ (Kimbell 2011, 287). Designerly inquiry is experimental. Dewey (1938) states that during inquiry, researchers must test hypotheses by trying them out and then reflecting on the consequences. Thus, to deal with ‘wicked problems’ and an emergent design space, they must work investigatively and experimentally with the problem and solution: ‘The design process can be understood as a learning process in which the designer develops an increasing understanding of the use domain through studies, experiments and interventions’ (Dalsgaard 2014, 145). An important aspect of *imitatio* is interaction with materials and situations and iteratively suggesting how things could work. This experimentation is directed toward imagining how the user will experience the design.

Design is an interventionist and transformative discipline

Brandt and Binder (2007, 12) state, ‘. . . any experiment which is worth considering as a contribution to research inquiries must somehow involve an intervention with the world’. Designers are interested in how the world could be – they create change through intervention (Dalsgaard 2014). This transformation is also part of the inquiry process – by throwing suggestions into the world and reflecting upon the consequences, designers learn more about

their assumptions and choices (Dalsgaard 2014). A key element in *imitatio* is reproducing the observed qualities in a new situation, or learning how to transform.

Designers use techniques and tools central to the workflow

By using different methods, tools and engaging with materials, designers learn about users’ perspectives and actions (Kimbell 2011). They draw on both knowledge and a range of techniques that create knowledge (i.e. understanding the current situation and studying potential futures to evaluate their visions) (Dalsgaard 2014). *Imitatio* is about identifying qualities and understanding how to reproduce them with the materials and tools at hand via the adequate method.

Relating Dalsgaard’s six issues to *imitatio* as described by Matthiesen (2013), we develop a framework for our method to promote design-oriented media literacy. The framework offers questions that bridge teaching and design thinking, leading the inquiry into the digital genres and productions that we have observed are not in focus in a school context.

Design-oriented digital literacy inquiry

Table 1 shows Matthiesen’s five dimensions of *imitatio* in the context of design thinking and how they lead to inquiry that promotes digital literacy.

Table 1: Design-oriented digital literacy inquiry

<i>IMITATIO</i>	DESIGN THINKING	INQUIRY promoting digital literacy
Fascination	Experience forms of	Experience: What are you

	ideas/theories; inquiry about examples of design	spontaneously fascinated about? (Whole)
Identifying the qualities worth imitating	Examples are analysed to identify parts (naming) through experimentation	Ideas: Why is it great? How does it work? (Parts)
Critical reflection	Parts are related to the situation of the design and to the designers' own style; effects are reflected upon	Inquiry: How can I use it in my own way? How does it work in my design context? (whole)
Interaction	Throughout, designers must consider and use tools/materials and methods	Action: How does this work? What if I do this? How do I make it? (Consider tools, methods and materials) (Parts)
Acceptance	The effects might confirm initial ideas or create conflict that must be further investigated to understand the qualities; choices are made	Situation, effect, conflicts and qualities: What do I keep? What fits my criteria? (Reconsider parts and whole)

Children should engage with these five dimensions in an experimental and iterative fashion so that they can observe and learn from their actions. The dimensions are not linear steps – students can go back and forth between the different stages, and the iteration runs until they reach a stable situation or their time is up (see Figure 1). By combining imitation and design thinking, we adapt the imitation of written literacy (Matthiesen 2013) to the multimodal productive process that digital literacy requires.

This approach requires an initial fascination or inquisitive stance toward a digital product. The children already have ideas about the product, which they should be prompted to critically reflect upon and inquire about. Building on this, they can produce something that imitates or negotiates with the initial example. This production is now a sign in the world (i.e. it meets the world and affects it). The children can observe these effects and relate them to the experience they try to create. Their product might conflict with their ideas, causing new iterations. The process is less schematic than the depiction in Figure 1, and the cycle should be understood as an analytical distinction.

Figure 1. The cycle of critical designerly inquiry

Design processes are iterative regardless of whether the material is analogue or digital. However, digital materials' malleability, the zero cost of experimenting with different versions of a product and speed of implementing changes all mean that iterating is easier in the digital realm. Production software provides immediate feedback, proof of concept and polished aesthetics that make children-made digital products, such as a comic strip, look like the real cartoons printed in newspapers. In this sense, the iterative, explorative approach required by *imitatio* is more suited to the digital realm.

We illustrate our *imitatio* design thinking cycle by analysing a concrete project we observed in the abovementioned study. We chose this example because it displays how the teacher harnessed the children's curiosity and willingness to imitate – to work effectively with an unknown digital genre. This situation inspired us to explore the field of imitation and digital literacy.

Case: The Garbage Project

The sixth intervention 'Children as Learning Designers in a Digital School' involved children in a multidisciplinary digital production where they engaged with their community in an innovative way. The second grade class (eight-year-olds) at Absalon School, Roskilde worked with the topic of garbage. The project had three distinct phases:

Figure 2. The Garbage Project's three phases

The first phase was about knowledge construction (i.e. learning about garbage). The second phase was about researching and innovating. Children had to find a garbage-related challenge in their school and find solutions to it. We focus on the third phase, where children had to make a movie about their problem and proposed solution in the form of a news programme (i.e. the production artefact). The children had never worked with this genre before, so the teacher recommended watching some news programmes 'in order to find out how it is done'. The children's main concern was how to comply with the genre, ensuring that their programme was truthful and could change the attitudes of their peers (e.g. to convince them to stop throwing food on the stairs). This third phase is the basis of our analysis below.

Analysis

We followed a group dealing with ‘food on the stairs’. They decided that the reason other children are careless is because the stairs did not have rubbish bins, so everybody just threw stuff on the ground. The group invented a system of pipes (with opening holes at regular intervals) to attach to the banister all the way down so that rubbish could be disposed of at all levels of the building. Then, they made a news video about the problem and their solution.

Experiencing the media: fascination

They began by talking about the example news features they saw online and the things that ‘are cool’. ‘The best programmes are surprising’, said one child, ‘and you don’t get bored’ added another. They discussed why those programmes were surprising and interesting, hypothesising that it related to the content: ‘you cannot just tell people what they already know’; therefore, the information they presented must be new. This posed a problem, since ‘everybody knows that there is rubbish on the stairs and it is disgusting’. However, maybe nobody knew how dangerous it really was (people could tread on the food and fall or get diseases from the bacteria). The public also did not know that there could be a solution to the problem ‘because we have thought about this problem longer than anybody else’. The children found a solution (the pipe system) they were very proud of. They believed that the pipe system was news in itself: ‘We have found a good problem and have thought of a smart solution’, ‘Our problem is nearly impossible to solve’ and ‘Nobody has ever thought about building this before’.

The other aspect of the best news programmes, not getting bored, received less attention.

They agreed that ‘not being boring’ was about the form, or how things are told, so they decided (without any teacher intervention) to work with a script (Figure 3) after a girl in the group stated, ‘that is how it is done on TV’. The script would contain what they had to say

and descriptions of camera movements and props in order to avoid ‘empty’ spaces. They understood that news should be concentrated, quick and free of nonsense.

Figure 3. A script

Qualities worth imitating

They discussed which elements, or ‘ingredients’, from example programmes they would like to have in their own production. Here, the attention was mostly on the form – isolated elements that different group members observed. Some were accepted as shared values, others not. They agreed on the following:

- ‘Cool’ intro music (by which they meant lively and strong) and a good logo (e.g. a world sphere and a fadeout – a world would indicate serious news)
- An important person (expert) that had a lot of knowledge
- Interesting changes of scenery (from a studio with a talking head to ‘reality’ in the street and back)

They rejected using cue cards, which one of the children proposed because ‘it looked good’ (and most of the other groups adopted). This group thought that cue cards were ‘old fashioned’ and gave the impression that the participants were not prepared. They would rather prepare a script and memorise it to give an even more heightened impression of professionalism.

Critical reflection

Critical reflection is about figuring out how to apply the qualities they saw in the news programmes to their own context. It is difficult to isolate any of these aspects, as they re-occur at different stages (e.g. evaluating and discarding cue cards is a critical reflection process). Therefore, we do not identify each aspect with a fixed place in a timeline; however, as the children prepared for the actual production, the critical reflection accelerated when they found things inadequate. One example is the discussion they had about how to convey the 'expert' ethos: 'We are not adults. Nobody will believe we are experts'. Here, the children slid from critical reflection into reflection in action. They found props they assumed would support the qualities they identified. The presenter and expert would wear costumes (a jacket and a lab coat, respectively) to establish importance. This was supported by an agreement to use 'serious voices'; further, they would all wear glasses to look intelligent. They made drawings of the piping system to lend seriousness to the 'surprising' content.

Figure 4. The pipe system sketch

A more prosaic manifestation of critical reflection was deciding to use one of the pre-made logos and intro music effects in the iMovie library, as the group did not have the technical expertise or time to make their own, as they had wanted in the beginning. In this way, critical reflection allowed them to be realistic about their own limitations, comparing complex variables to make the best decision: What is the ultimate goal of the activity? What do we gain/lose by making our own logo? Will our audience (the other children at school) care? This also involved interacting with the materials (the editing programmes) and situation (their skills and the target audience), which related to the interaction phase.

Interaction

Interaction is about production – how the tools and methods might be reconsidered if they do not address the situation as expected. Here, this became evident with the problems that arose when filming with the original script. If followed verbatim, the script made the children sound robotic, causing them to repeatedly delete the takes because the news programmes they liked (they now realised) were ‘fresh’ and ‘natural’. In contrast, filming without the script caused long pauses and hesitation as the speakers struggled to find the right words. Another crisis meeting was held, where the two production strategies were weighed. Ultimately, one of the boys convinced the group that they could trust his ability as a film editor. He knew how to cut and paste film bits together in iMovie, which meant that they did not have to shoot long sequences that were perfect, but just a few seconds that he would then piece together. When testing this new strategy, they discovered that shooting very short sequences was easier; they assumed that they would always throw away the first six or seven takes until the speakers found both a wording and a rhythm that satisfied everyone. The painstakingly written script was used as a springboard for improvisation. In the end, they put together 2:30 minutes where the problem and solution were soberly presented.

Acceptance

Acceptance involves solving any conflicts between the ideal format and the concrete context that might arise in the actual production situation. When the children arrived to film, the person responsible for the costumes did not bring them. They had to film without costumes, but then they tried to be even more serious in their voices and adopt adult frowns as they had seen on television. However, the impostor voices and frowns made them laugh, and after an hour of work, they had not managed to shoot any decent footage. They held a crisis meeting to

reconsider their approach and find a solution: to take a serious picture of the children who could not stop laughing to use in place of live footage. The video would show the static picture while a voiceover introduced them. Another way of establishing the expert's seriousness (now without a lab coat) was to introduce him as follows: 'Axel is a rubbish expert. He is 28 years old and has dedicated most of his career, actually most of his life, to working with rubbish'. The children perceived 28 to be an advanced enough age to be authoritative.

This group of eight-year-olds working independently was able to respond to the changing demands of a design process, fuelled by their enthusiasm and willingness to make a good product. They made decisions and changed their strategy when confronted with the realities of their production context, discovering that the initial decisions were not appropriate to their means and ends. The main point is that all of their decisions were made against the background of the ideal news feature, which they had constructed in their minds after watching real news programmes. This ideal format, which they strove to, was not static since it was up for discussion several times along the way. The experience they obtained was 'learning by doing', forcing them to revise their previous abstractions.

The group was exceptionally focused and motivated, but their final production was not perfect from a journalistic perspective. There were still 'mistakes', like redundant information, lengthy shots of the stairs that served no informative purpose or mumbled speech that lost significance and focus. An evaluation session at the end of the intervention highlighted these problems. The teacher organised it as a viewing, where all of the news features the groups produced were watched, after which they collectively discussed 'What was good/what could be improved?'. The teacher led the discussion, probing the children with 'Why?' questions whenever bland feedback was offered, so empty statements like 'it was good' were substantiated with real

arguments ('because it is a genius solution and I would use it', or 'because you really wanted to hear what happened next'). This collective discussion was fascinating, as the teacher got the children to once again change their mental image of the ideal news feature. Their 'making' knowledge was pitched against the more complex meta-awareness that the teacher had of the news genre. Because the new meta-knowledge was anchored in practice, the children understood and assimilated it quickly, immediately using it in the collective discussion of each other's products. The level of digital literacy in this evaluation session was remarkable.

Discussion

The Garbage Project was a successful digital school production because the teacher kick-started the process ('go and watch some examples') and then supported the groups throughout (solving social problems and asking the right questions, especially during the evaluation), even though she did not use a specific framework like the one we present here. The group we focused on was the most successful at the task, as some of the other groups fell apart, were unable to produce independently or were unwilling to imitate the example videos they watched at the beginning of the project. In other words, the group that succeeded was the 'imitator' group.

Our case shows that thinking and skills can be integrated so that the imitation process harnesses the learners' fascination with an object. Through attentive observation, the learners selected and experimented with imitating its parts in a new context and with a purpose. By reflecting upon the effects of this in relation to what was intended, they developed an understanding of the qualities of what they studied. This led to a renewed understanding that could be applied in practice. The teacher appreciated the learners' fascination and intention to

apply the parts they identified, understanding their effects and qualities and supporting the students in this reflective inquiry process.

Do children learn to think by imitating others? It depends on how it is done. Dewey (1910) warns that studies focused on acquiring skills tend to emphasize getting things done. When this happens, the study is rendered mechanical instead of intellectual: ‘sheer imitation, dictation of steps to be taken, mechanical drill, may give results more quickly and yet strengthen traits likely to be fatal to reflective power’ (Dewey 1910, location 797). It might even be fatal to output in an emergent world. Schön (2000/1983) uses the example of weavers who for generations had imitated a pattern of weaving using the same materials but failed to make beautiful garments when new colouring methods were available. The weavers did not understand the qualities that made up beautiful garments – they were merely imitating the tradition without the critical reflection of why it worked (i.e. they lacked reflection on action). Indeed, critical reflection is paramount to navigate an emergent world, and we argue that *imitatio* can be key in this learning process. Edwards (2016) follows Corbett (1971): ‘to imitate’ might be the wrong verb when translating *imitatio*, as it seems to indicate mindless reproduction. It might be better to use ‘emulate’ because *imitatio* originally ‘was part of a process that asked rhetors to navigate, decipher, and critically examine a cultural reservoir of knowledge, components of which were to be redeployed to fit the occasion of future speech acts’ (Edwards 2016, 45).

Conclusion and contribution

Our model of critical inquiry builds upon the theory of *imitatio* in the context of design thinking, illustrating the different operations and phases that successful production requires.

We showed how imitative processes lead to heightened digital literacy and suggested a way to systematically support children in this process.

The interesting thing about our model is that it can be applied to new genres that teachers and children might have no knowledge of. Our case dealt with a relatively well-known genre, a news feature, but next time it might be a webpage, a podcast or a game.

We have shown that to acquire the critical competence that characterises the highest level of digital literacy (Martin 2008), we can build upon the tacit knowledge of media and digital genres that children and teachers already have. *Imitatio* in a design thinking context provides a manageable path from fascination to production to heightened digital literacy. *Imitatio* combined with critical reflection is not the enemy of creativity, but it is quite the opposite, for no human creation has meaning in a vacuum.

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