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# Wise Humanising Creativity:
## Changing How We Create in a Virtual Learning Environment

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## ABSTRACT

This article interrogates how a particular conception of creativity: 'wise humanising creativity' (WHC) is manifest within a virtual learning environment (VLE) with children and young people. It reports on the outcomes of C²Learn, a three-year European Commission funded project which introduced innovative digital gaming activities to foster co-creativity in the VLE between players. Theoretically the paper builds on previous work, which has conceptualised the potential for WHC within VLEs, as well as other educational contexts. Within C²Learn, arguments have been made for WHC as an antidote to overly-marketised, competitive notions of creativity, as well as for WHC supporting a view of childhood and youth as empowered—rather than 'at risk'—within digital environments. In particular, this paper focuses on outcomes of the project's final piloting in England, Greece and Austria across the primary and secondary age ranges. This research employed a bespoke co-creativity assessment methodology developed for the project. In order to document WHC, this methodology opted to evidence developments in lived experience via qualitative methods including teacher and student interviews, fieldnotes, video capture, observation and student self-assessment tools. The paper articulates how WHC manifests in C²Learn's unique VLE or C²Space, and its potential to develop more nuanced understandings of creativity across digital environments. It then goes on to consider WHC as a useful concept for changing how we create within VLEs, and the implications for educational futures debates and wider understanding of creativity in education as a less marketised and more ethically driven concept.

### KEYWORDS

(WHC), C2Learn, Co-creativity, Digital Gaming, Gameful Design, Social Networking, Wise Humanising Creativity

## INTRODUCTION

In the last twenty years, there has been a growing shift in understanding creativity in education, from an individualised concept, to one which is collaborative or group based, and which is 'everyday' in its occurrence (Banaji, Burn & Buckingham, 2010; Craft, 2002; John Steiner, 2000; Sawyer, 2003). These shifts have provided the foundations for new arguments for creativity as a 21st century ability which children, young people and citizens need to thrive together as a response to rapid change and

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constant uncertainty (Chappell & Craft with Rolfe & Jobbins, 2011; Craft, 2011; Robinson, 2015). Simultaneously, much has been written, especially in the United Kingdom, regarding the multiple rhetorics of creativity which place differing emphases on creativity's social, cultural, democratic and personal dimensions and their influences on creativity in learning and teaching (Banaji, Burn & Buckingham, 2010; Sefton-Green, Thomson, Jones & Bresler, 2011). Developing within this shifting conceptual landscape are a collection of ideas that have emphasised the importance of co-creativity within education, the role of generative possibilities, the question of the ethical impact of creativity, and the related pedagogical dynamics. These ideas are Wise Humanising Creativity (WHC) (e.g. Chappell & Craft, with Rolfe & Jobbins, 2011; Chappell & Craft, 2011; Chappell & Swinford, in press; Craft 2013), Possibility Thinking (PT) (e.g. Burnard, Craft & Grainger, 2006; Craft 2002; Craft, 2014), and the '4Ps' of creative engagement (Craft, 2011). They spotlight and challenge the dominance of Western-centric, marketised creativity, positing a more humanising ethically aware alternative which views children and young people as empowered creative contributors alongside adults.

Together and separately, these theories have been elaborated from empirical research in a variety of educational settings (e.g. Chappell & Jobbins, 2015; Chappell, Slade, Greenwood, Black & Craft, under review; Craft & Chappell, 2014; Cremin, Burnard & Craft, 2006; Cremin, Chappell & Craft, 2012). Together, they put forward a strong theoretical argument for better grasping the meaning of creativity as distributed between people, objects and ideas (e.g. Chappell with Craft, Rolfe & Jobbins, 2012; Craft, McConnon & Matthews, 2012) and for the need to engage with the consequences of creative activity as ethically laden (e.g. Chappell, 2008; Craft, 2013). Primarily, these ideas have been applied in formal education within a multitude of settings including within generic (e.g. Craft et al., 2012), arts-based (Chappell et al., 2011) and science-based learning contexts (Craft et al., 2014; Cremin, Glauert, Craft et al., 2015). Most recently, triggered by Craft (2011), this collection of ideas has been applied within explicitly digitally driven educational contexts (Chappell, Craft & Walsh; 2014; Walsh, Chappell & Craft, 2017; Walsh, Craft, Chappell & Kouloris, 2014; Walsh & Whitehouse, 2017). This has been with the aim of challenging more competitively, individually derived conceptions of creativity within digital learning (e.g. Edwards-Groves, 2011; Tapscott, 1996; Walsh, 2007) and of placing a stronger emphasis on collaboration and ethics.

This conceptual entry into the digital arena was marked by the Creative Emotional Reasoning Computational Tools Fostering Co-Creativity in Learning Processes ($C^2$Learn)[1] Project (www.c2learn.eu). This was a three-year European Commission funded research initiative, which aimed to introduce and pilot an innovative VLE to foster co-creativity in learning processes in formal and informal educational settings with seven international partners. Rather than focus on creative competition and 'winning', the $C^2$Learn computational tools and environment were designed to incorporate the fundamental elements of co-creativity such as WHC, PT, the 4Ps (Walsh et al., 2014; Walsh et al., 2017) as well as reframing (Stenning et. al, 2016) and emotive lateral thinking (Scaltsas, 2016). These included the WHC notion that the computational tools coupled with engaging experiences, could potentially encourage students to go on journeys of 'becoming' (Chappell et al., 2012). These journeys are based on the reciprocal relationship between the participants' creative ideas and their developing identity. As they co-create, it is argued students collaboratively and communally develop new ideas but as they themselves are the substance of those ideas, they are also creating or 'becoming' themselves. In this sense, students through co-creating with each other and VLE's artificial intelligence (AI), are making and being made. These journeys are characterised by co-participative generativity (students playing with one another, with adults and AI), within shared group creative identities, for example within the digital quests, games and activities. The tools also raise dilemma-based questions

as to the consequences of players' digital creative actions, the ethics of which inform the journeys of becoming; hence the use originally of the term 'humanising' (Chappell, 2006; 2008).

The C²Learn VLE was influenced by a gameful learning design (Walsh et al., 2014) so that these journeys of becoming were informed by players experiencing the core Possibility Thinking (PT) activities of 'what if' and 'as if' thinking (Craft, 2002; Craft, Chappell & Walsh, 2013). These both require game players to understand the system of the game—or systems-based literacy practices—in terms of how the game and game player work together in a cybernetic relationship, effecting various actions of the digital game by successfully understanding and navigating those structures that underlie their participation (Walsh, 2010). This navigation was designed to be informed by the 4Ps of playfulness, possibility, participation and pluralities (Craft, 2011).

As a design-based research initiative, it was vital that the C²Learn project incorporated formative and summative evaluative feedback embedded within piloting activities (Scaltsas, Stenning & Alexopoulos, 2014). Within a broader research methodology and design, applied across Greece, England and Austria, this aimed to allow researchers to evidence whether WHC, PT and the 4Ps were developed through participation in C²learn's VLE (see methodology below and Walsh et al., 2017). This was achieved through the main project research question, which was applied across a range of pilot contexts: How do participants manifest co-creativity through C²Learn gameplay? The C²Learn digital tools and environment's gameful learning design was therefore a complex integration of collaborative and ethically driven creativity theory and practice, understandings of digital engagement, and formative and summative evaluation procedures (Chappell et al., 2014; Craft et al., 2013; Walsh et al., 2017).

This article reports on the outcomes of the final stages of the formative and summative evaluation and research piloting of the C²Learn environment or C²Space and how children and young people engaged with it in order to manifest co-creativity. In order to frame the analysis and discussion of these outcomes the next three sections explain the project's VLE or C²Space, the detail of the C²Learn conceptual framework with its related literature and then the C²Learn Learning Design.

## C²Learn's VLE or C²Space

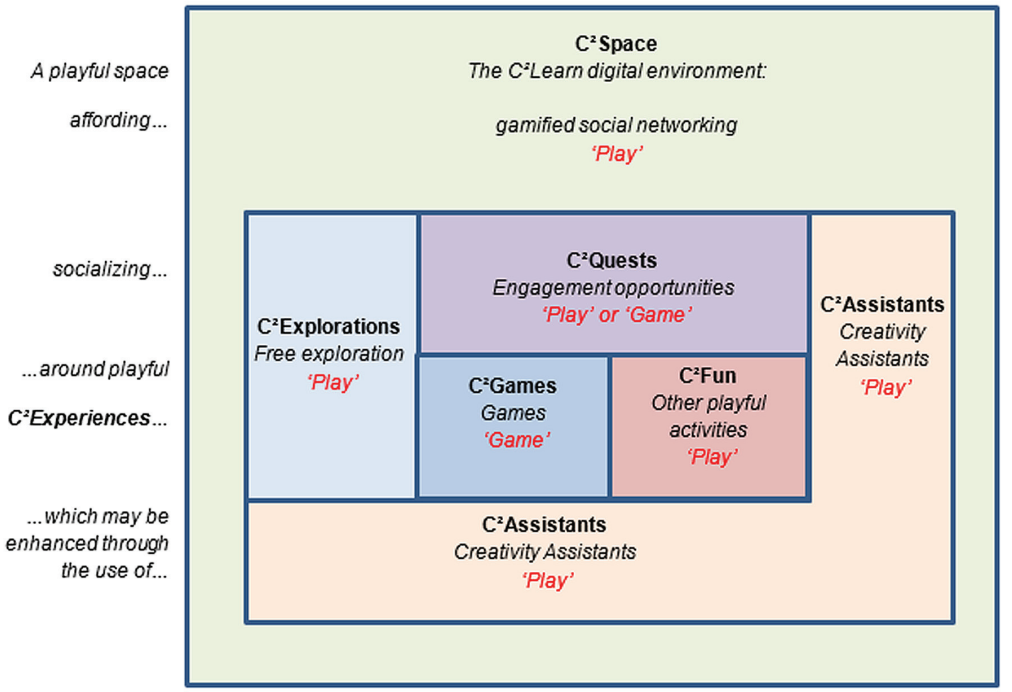
In C²Learn's VLE or C²Space (Figure 1), students and teachers individually and collaboratively explore new ideas, face and overcome challenges, play games to assist them in reaching their goals and connect with others through engaging in fun, contextually relevant and meaningful playful 'C²Experiences'. The C²Space encourages explorations, games and quests that provide students and teachers with multiple opportunities to put forth new ideas—meaningful to them and their communities—that require them to imagine more new ideas or solve problems via playful C²Experiences. In this journey, they are assisted by each other and AI or Co-Creativity Assistants (C²Assistants) that interact with them and their teachers to challenge their established thinking patterns and enable them to use mechanisms of creative thinking and their imagination.

## C²Learn Conceptual Framework

C²Learn's aim is to foster co-creativity which is defined as novelty which emerges through shared ideas and actions and involves participants taking into account the impact of that novelty. Within this framework, PT (Craft, 2010), the process of moving from what is to what might be was a guiding principle for C²Learn co-creativity, and was closely connected to the 4P's of creative engagement (Craft, 2011). These are

- Pluralities (opportunities for learners to experiment with multiple pluralities of places, activities, personal identities, and people);
- Possibilities (opportunities for possibility thinking, transitioning from what is to what might be, co- constructing with others through the C²Learn experience, designing, editing, extending, and exploring content);

**Figure 1. The C²Space**




- Participation (opportunities for learners to take action, make themselves visible on their own terms, and act as agents of change); and
- Playfulness (opportunities for users to learn, create and self-create as active and connected users in their emotionally rich, virtual and actual play-worlds).

Craft's theorising sits within the flux of viewing children and young people 'at risk' as in need of protection (Frechette, 2006), and viewing them as empowered and moving beyond adult 'control' (Newburn, 1996). Applying PT and the 4Ps within the C²Learn design was about acknowledging children and young people's capacity for generative possibility in VLEs, whilst ensuring that they are not placed in unnecessarily risky situations.

Framed in this way by PT and the 4Ps, Scaltsas et al. (2014), and Chappell, Craft and Walsh (2014) argued that this kind of co-creativity could be catalysed via the tools and strategies of Creative Emotional Reasoning (CER) contributing to generating WHC between C²Learn participants. CER draws on cognitive science research and refers to a principled, unifying theory of non-linear thinking techniques that foster co-creativity. Premised on a notion of creativity as an intervention resulting in reframing, CER's set of core creative learning tools aimed to support the manifestation of WHC by providing methods for the disruption of established thinking routines and patterns. WHC and CER were therefore coupled together to provide the five key categories, which characterised C²Learn co-creativity. Scaltsas et al. (2014) and Chappell et al. (2014) argued that when engaged in co-creativity, C²Learn participants would:

- Generate, explore and enact new ideas with a valuable impact on the community, discarding other ideas that lack such potential (ethics and impact)
- Pose questions, debate between new ideas, find ways to negotiate conflict or to go in a different direction to others if conflict is not resolved (dialogue)
- Take charge of different parts of the creative process, understanding the rules of the system and how decisions have consequences, making decisions around new ideas and taking action(s) through various scenarios and/or quests (control)
- Be immersed in the C²Learn environment, and possibly addicted to gameplay, exploration, quests and/or the interactive drama played out within it, as well as in real-world spaces. Such immersion will sometimes lead to taking risks and generating surprising individual or collaborative ideas (engaged action)
- Have their thinking and action disrupted by the environment's computational tools embedded within which are CER non-linear thinking techniques. This will them move them away from established routines and patterns (intervention resulting in reframing)

Chappell et al. (2014) argued that co-creativity would therefore occur in C²Learn as an active process of change guided by compassion or the close and active awareness of the needs and hopes of others (Chappell, Craft, Rolfe & Jobbins, 2012) and reference to shared values derived from VLE users' collaborative thinking, shared action, gameplay and social interaction. They went on to argue that over time, small incremental personal changes or journeys of becoming would result from their WHC. This is because there is a core reciprocal relationship within WHC between creativity and identity in which as creators make, they are also being made. There is then the potential for these smaller changes to accumulate incrementally together to fuel larger scale communal change. Chappell et al. (2011) refer to this as 'quiet revolutions' which grow from the bottom up, and align personal with wider values. Within C²Learn, both analogue and digital activity has the capacity to generate these quiet revolutions as players create individually, collaboratively and communally. The C²Space was therefore carefully designed to facilitate this; the project Learning Design is described next.

## C²Learn's Gameful Learning Design

C²Learn's Learning Design and its grounding in the digital design literature has been detailed at length elsewhere (Chappell et al., 2014; Walsh et al., 2014; Walsh et al., 2017), but briefly for context here, at the heart of the C²Learn Learning Design is the 'playful' digital gaming and social networking environment or "Co-creativity space" (C²Space). Figure 2 shows a screenshot of the C²Space in action.

The C²Space allows students to draw on their gaming literacy to interact creatively and collaboratively with each other (Apperley & Walsh, 2012; Beavis, Bradford, O'Mara, and Walsh, 2009). Figure 2 shows a C²Space page offering ethically-driven quests in the middle which when selected offer the choice of games to be played within the quests; 4scribes (Eladhari, Lopes & Yannakakis, 2014), Iconoscope (Liapis, Yannakakis, Alexopoulos & Lopes, 2016) and Creative Stories (Koukourikos, Karampiperis & Karkaletsis, 2016) being the 3 main C²Learn games available in the C²Space or VLE. Designed in this way, the C²Space aims to leverage games' deeply satisfying properties through 'playful experiences', or C²Experiences. Within these, players can autonomously and collaboratively: explore; face and overcome challenges; play games to assist them in reaching their goals; connect with others by engaging in fun and meaningful activities; and evidence compassion and shared values or put forth new ideas that require other students to imagine new ideas. This provides a co-collaborative context for them to shift from 'what is' to new possibilities of 'what might be'. Figure 3, then, shows one of the C²Learn games, 4Scribes, in the middle of play where players are co-generating an ethically driven story.

In their journey, players are assisted by each other and AI or Co-Creativity Assistants that interact with them. One of these Assistants (the Mad Scientist) can be seen in the top right of Figure 3 from the 4Scribes game. Within the C²Space, engaging game affordances are used, including feedback,

**Figure 2. C²Space in action**


**Figure 3. 4Scribes game mid-game**

agency, emotion, and relevant challenges, over gamified elements such as points, levels, and rewards. Figure 2, above, shows different coloured icons for the C²Learn feedback system on the right-hand side. These are better suited for C²Learn because they have the potential to increase students' intrinsic motivation (Amabile, 1998) and capacity for active learning in a way which is more sympathetic to the wider goal of WHC (Deterding, 2012, 2013). This takes place through playful C²Experiences, as opposed to game-oriented strategies. This 'gameful design' stance addresses the widely-theorised critique of gamification within game studies which argues such game oriented strategies provide primarily extrinsic reward motivators (Nicholson, 2012). The intention of the C²Learn Learning Design's gameful design is to harness students' motivation and engagement through enjoyable learning and a goal-oriented approach that fosters co-creativity (incorporating both WHC and CER).

Classroom-based educational scenarios used within the C²Space provide a framework in which digital games are used to help deepen students' relationships with real-life contexts through action and play, to facilitate co-creativity (Dimaraki & Koulouris, 2013). The core scenarios were developed in an iterative co-designed process with teachers and in collaboration with school communities (Dimaraki, Schmoelz, Koulouris, 2013). They are appropriate for a range of contexts and learners, and address specific learning objectives. They also provide a content framework in which the innovative technologies and practices of the project are deployed. Examples of the kinds of scenarios developed can be seen in Figure 2 where the quests contain elements of the scenarios offered to the students (Creativity Futures in the classroom). During piloting, students played with C²Learn games described above. The methodology described below was designed to document the manifestation of their lived experience of co-creativity, including WHC.

## METHODOLOGY

The collaborative C²Learn project aimed to respond to the main research question: How do participants manifest co-creativity through C²Learn gameplay? The methodology drew on Stenning and Michell's (1985) evaluation in cognitive science as well as on educational/arts informed evaluation (Craft, Chappell & Best, 2007; Chappell & Greenwood, 2013). A mixed methods approach to data collection was used, seeking to document both change and the lived experience (Van Manen, 1990) of children, young people and their teachers' engagement in the C²Space (Walsh et al., 2017). Repeat research visits gave researchers the opportunity to track change over time.

### Piloting

In the Spring and Summer of 2015 the C²Learn games, within the C²Space were piloted in schools in England, Greece and Austria. Details are shown in Table 1. In the table, the term primary covers the 10-12 age range and the term secondary is used for the 15 – 19 age range, with one English and the Austrian site a secondary school, and one English site a setting of Further Education. In the English primary 1 and 2, site activity was focused around the 4Scribes game, using themes promoting 'sustainability' and 'animal welfare' to deliver creative writing sessions within the English curriculum. In the Greek primary activity was focused on the 4Scribes game leveraging the Greek historical period under the Ottoman rule engaging students in societal issues at that time and a series of ethical dilemmas based on unprecedented geographical situations. In the English secondary 1 site activity was focused around the 4Scribes game using an ethical dilemma taken from the Sociology curriculum. In English secondary 2, site activity centred on using in-game challenges from Creative Stories and Explore and Expand. In the Austrian secondary, site activity centred on personal and societal challenges, which were identified by the students. The educational activity was facilitated with mixed playful pedagogies (Schmoelz, 2016; Schmoelz, in press) involving game-based learning, gamification and game-based dialogues.

Piloting primarily used the 4Scribes digital game (Figure 3), whereby participants co-created a story, situated within a designated scenario. Gameplay with the older participant groups used the

**Table 1. Piloting across three countries**

| Location of Pilots | Ages of Participants | Number of Participants | No. of Sessions | No. of Research visits | Tools used for pilot | App used for pilot | Teacher interview conducted | Video/ audio used for data collection |
|---|---|---|---|---|---|---|---|---|
| **English primary 1** | 10 | 24 | 3 | 2 | Paper | 4scribes | yes | audio and video |
| **English primary 2** | 10 | 16 | 5 | 2 | Digital | 4scribes | yes | video |
| **Greek primary** | 10-11 | 24 | 2 | 2 | Digital and paper | 4scribes | yes | audio and video |
| **English secondary 1** | 17-19 | 4 & 9 | 2 | 2 | Paper | 4scribes | yes | audio and video |
| **English secondary 2** | 15-16 | 5 | 2 | 2 | Digital | Creative stories explore and expand | no | audio |
| **Austrian secondary** | 17-19 | 12 | 30 | 5 | Digital and paper | 4scribes Iconoscope creative stories | yes | Audio and video |

**Figure 4. Creative Stories**


Creative Stories (see Figure 4), Iconoscope and Explore and Expand (see Figure 5) applications. Where the table shows use of paper prototypes this was because of issues with the technology's stability, both in terms of the software and access to it via school firewalls. Progress in rectifying these issues across the life of project piloting was extremely slow, and so this final pilot phase did not use digital tools as advanced as originally intended and the planned time periods were also somewhat curtailed.

**Figure 5. Explore and Expand**

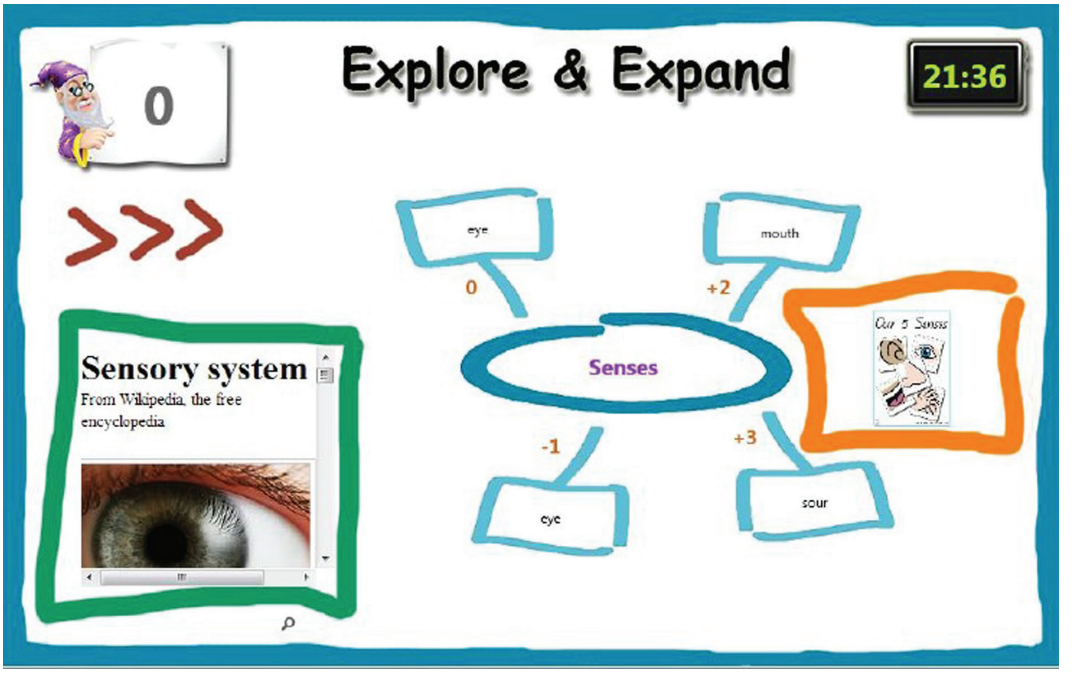



**Table 2. WHC Elements of Co-creativity Categorisation scheme**

| Category | Characteristics |
|---|---|
| Attending to the **ethics and impact of ideas** | 1. Creates new associations between ideas<br>2. Actively explores the consequences of the newly created associations between ideas<br>3. Exhibits awareness of and concern/interest for the impact of new ideas on the group's values<br>4. Actively promotes the ideas that are deemed valuable by the group |
| Engaging in **dialogue** | 1. Engages in debate over ideas<br>2. Promotes dialogue with group (poses questions, respects different viewpoints and/or encourages members of the group to voice their ideas<br>3. Actively negotiates conflict and/or seeks alternative path |
| Being in **control** | 1. Takes a leading role during different phases of the creative process<br>2. Exhibits a firm grasp of the rules in the system underlying the challenges facing the groups<br>3. Takes decisions and investigates action |
| **Engaged action** | 1. Immerses him/herself in the experience of the creative process<br>2. Facilitates immersion in the experience of the creative process for the rest of the group<br>3. Willingness to take risks and/or leave his/her comfort zone |

The categories and characteristics shown in Table 2, developed from the conceptual framework detailed above, were used throughout the pilots, to enable researchers to focus on the core goals of the co-creativity framework for WHC.

## Data Collection

Qualitative data collection methods determined the extent to which students' and teachers' participation in the C²Space had the potential to foster WHC. Clear protocols (Scaltsas et al., 2014; Walsh et al., 2017) were developed by a representative team from the 3 pilot countries in order to ensure that tools were used as consistently as possible. There were six main tools for collecting data in the C²Learn pilots; these are detailed in Table 3 and Table 4. Gameplay audio and video capture (Foster, 2006) allowed observation of physical and linguistic behaviour, whilst self-assessment tools, such as creativity wheels (see Figure 6 and Figure 7 in the Appendix) (drawing on Edmond, 2005; Spencer, Lucas and Claxton; 2012); and participation axes (Chappell and Craft, 2011) were used to understand how students experienced C²Learn. These methods were augmented by teacher observations, gathered during interviews (Kvale, 1996), which followed a semi-structured schedule, and researcher field notes.

In the English pilot sites the class teacher requested a 'gatekeeper' role, whereby they selected participating children, identified times for play and for research visits, and designated the location of play. This control precluded the full use of the protocols. In Austria and Greece teachers and assistants co-designed learning activities and the way in which C²Learn tools were implemented in regard to learning outcomes. This collaboration facilitated the full use of the data collection protocols, and is an approach recommended where possible for future piloting of this kind.

## Data Analysis

For this article's findings, rich instances taken from the audio and video were used to identify whether the WHC characteristics listed in Table 2 were inherent in the digital contexts within C²Space. Analysis commenced with coding to the pre-specified categories, where instances were classified as strong, medium or weak. Strong instances were then transcribed. This analytic stage was extremely thorough with identification criteria honed between researchers from the three countries. This aimed for agreement on what visually defined a rich instance ie evidence of the key sub-categories in order that researchers were not simply over-assuming the presence of WHC because the VLE had been designed to facilitate it. Triangulation of the strong instance analysis was conducted by at least one member of the research team from each location, using a process of blind analysis followed by comparison, again to ward against assumption. The triangulated analysis and strong rich instances were then analysed in conjunction with analysis of the teacher interview, field notes and self-assessment tools in light of the research questions, in order to produce the second stage analysis. It was important that detailed film analysis was the first level analytic priority with teacher interviews and student self-report used for analytic verification rather than leading analytic outcomes. It must be taken into account though, that WHC categories could be said to be apparent to participants through the creativity wheel and teacher interview question structure, as well as through teachers' interest and involvement in the C²Learn project intentions. This was a further reason for prioritising film rich instance analysis over these data sources. Following this second stage analysis, the data was then analysed both geographically and within age ranges, resulting in overall primary findings and overall secondary findings. As we have written up the analysis of the findings below we have acknowledged, where appropriate, how the different activities undertaken in different countries are likely to have impacted on the way in which findings vary.

## Quality and Trustworthiness

Trustworthiness, quality, and rigour were ensured via adherence to the principles of credibility, transferability, dependability and confirmability (Lincoln and Guba, 1985) with particular attention paid to data and colleague triangulation techniques, negative case analysis and evidence of clear data trails for all coding and categorisation.

**Table 3. Methods used with descriptions**

| Method used during research visits | When used in research visits | How method was utilised | Expected outcome of method used |
|---|---|---|---|
| Video and Audio Recording | During gameplay | Focused on one group and ensured all dialogue was recorded. | Identification of WHC categories during gameplay. |
| Field notes | During gameplay | Researcher made notes of WHC categories observed during gameplay. | Identification of WHC categories during gameplay. |
| Socratic Dialogue (SD) Plenary session conducted by teacher | Following gameplay | The SD was a semi-structured dialogue with a group of students. The researcher utilised open-ended questioning. Students were also asked to identify 3 important things of the session. | The SD and 3 important things were used in order to gain a better understanding of the students' reasoning processes and experiences as regards a particular gameplay session. |
| Teacher Interview | Following gameplay and Socratic dialogue | These interviews were recorded, and notes were taken to supplement the recording. The interviewers used a combination of open and closed questions. | Interview recordings were used in order to understand aspects of the teachers' pedagogy and pedagogical strategies within the C2space, as well as inviting the teachers' observations across the 5 categories of WHC. The interviews also helped us identify teachers' perceptions of their students' co-creativity through their individual, collaborative and communal interactions within the $C^2$Space. |
| Co-creativity wheel drawing on creativity wheel design, but using the $C^2$Learn WHC categories to populate the wheels. | Following gameplay | Students were asked to tick which WHC categories they did a bit, quite a bit or a lot during gameplay. | For self-evaluation of the WHC categories identified of gameplay. |
| Axes | Following gameplay and completion of Co-creativity wheels | Students were asked to plot their participation and possibilities on the axes | For self-evaluation of participation and possibilities of gameplay. |

## Ethics

The assessment methodology was underpinned by a clear set of ethical principles. Ethical procedures were informed by the guidelines of the British Educational Research Association (BERA) (2011) as well as the Data Protection Act (DPA) (1998) and Directive 95/46/EC. Digital data was collected and stored following this strict ethical protocol; Owncloud file hosting allowed secure storage accessible to all research teams.

## FINDINGS

The findings reported in this paper are structured using the co-creativity categorization framework and draw on the cross-site analysis responding to the question: How do participants manifest co-creativity

**Table 4. Actual number of methods used in pilots**

| Location of Pilot | Research visit 1 | | | | | | Research visit 2 | | | | | | Supplementary data | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wheels | Axes | Socratic dialogue | Field notes | Video | Teacher interview | Wheels | Axes | Socratic dialogue | Field notes | Video | Teacher interview | Plenary notes | 3 things |
| English primary 1 | 8 | 8 | 2 | 1 | 2 | 0 | 24 | 24 | 4 | 1 | 6 | 1 | 0 | 3 |
| English primary 2 | 4 | 4 | 1 | 1 | 2 | 0 | 12 | 12 | 1 | 1 | 3 | 1 | 1 | 4 |
| English secondary 1 | 0 | 0 | 1 | 1 | 1 | 1 | 9 | 9 | 1 | 1 | 1 | 1 | 0 | 0 |
| English secondary 2 | 5 | 5 | 1 | 1 | 1 | 0 | 5 | 5 | 1 | 1 | 1 | 1 | 0 | 0 |
| Greek primary | 24 | 24 | 1 | 1 | 2 | 1 | 22 | 22 | 1 | 1 | 2 | 1 | 2 | 0 |
| Austrian secondary | 12 | 12 | 1 | 2 | 1 | 0 | 12 | 12 | 1 | 3 | 1 | 1 | 0 | 0 |

through $C^2$Learn gameplay? The analysis was carried out for two separate age groups, 10 – 12 year olds (primary findings) and 15 – 19 year olds (secondary findings) which are presented separately below.

## 10 – 12 Year Olds

Each of the five sub-categories of co-creativity is evidenced in turn for this age group. In terms of the ethics and impact sub- category, there was a small amount of data (e.g. at least three rich instances in English primary 1) across the three sites which suggested some students were exhibiting awareness and concern for new ideas about the group's values, exploring and actioning new ideas that make a difference (wheel data showed students mostly rated themselves 'quite a lot' here) and creating new associations between ideas. In support of this, the English primary 2 teacher observed: "they did think about ethical issues more through this system" and the Greek teacher commented to this effect too. Also in Greece, within the geography scenario, Sakis, a student pointed out that gameplay "puts me in thought process" and "it (gameplay) depends on peoples' imagination", highlighting that students were exploring new ideas. An English primary 2 student was also seen steering the ethical trajectory of the story: "Me and Metal Mario are going to share it, we're going to steal it from you – I'm going to be like Robin Hood, steal it from the wealthy give it to the poor".

Across all three sites, dialogue was mostly used for debating ideas. In English primary 1, the teacher noticed that students were debating their co-constructed story: "it had engaged them enough for them to keep going, discussing, and going over what things had happened and what they might change". In English primary 1, rich instances of data analysis indicated that dialogue was more evident in the second pilot and was used for questioning storyline and collaboration. When interviewed the teacher reported, "I think there was an element of 'a story can't be competitive,' it can be collaborative". This was evidenced in self-assessment data where most students thought that they worked with other people quite a lot. In the Greek Primary School, the teacher confirmed that by the second pilot, dialogue was occurring. There was a strong rich instance in English primary 2, when Jaboscus said "I'm the woman of water. We had this argument last time. To be 'of' something means to be made of it." He was posing questions, and also attempted to draw the researcher into the conversation, widening the dialogue.

Across all three settings analysis suggested that control was evidenced through taking charge of the story, individually or in teams, in order to get the student's ending. In English primary 1, fieldnotes indicated that: "Using the symbol that was in the magic unicorn hoof she brought everyone back to life". There was a small amount of data to suggest that some students were mainly deciding and

actioning to change the story perspective. English primary 2 provided the largest evidence count, where the children were enabled to be decisive, regardless of ability, and the methods they employed seem to evidence a level of confidence which transcended gameplay ability. For example, the teacher noted them controlling "continuity" and "re-engineering the rules to meet their own ends". The Greek data shows this sub-category as 'in development' with the teacher reporting, "I think if they played more, they would have started to see those links a little bit more clearly. Their ability to manipulate the events to their own conclusion, I think that would have got better with experience". This is an example of where the amount of activity carried out in different countries influenced the analysis outcome within countries differently.

Across all three pilot sites, engaged action was mainly evidenced via immersion where it was observed as students being engaged throughout ensuring their stories flowed from one to another. The English primary 2 teacher noted: "C2Learn - they have been engaged. They've wanted to do it". This was also demonstrated in a rich instance regarding engagement leading to surprising ideas, when ChiChi invented a card, saying that she had forgotten her original cards. Her card was particularly useful to her in achieving her secret ending. Overall most of the students, using the self-assessment tools across the 3 sites, rated themselves on engagement and taking risks as quite a lot. The Greek teacher highlighted how students took risks when immersed in the VLE: "they tried to present something new even if there had some difficulties". Although, there was some negative evidence in this sub-category, where students across sites showed disengagement in-between turns.

Regarding intervention and re-framing, evidence suggests that English students were creating connections between ideas, developing new perspectives and sometimes going beyond the material provided; more so in English primary 2 than 1. For example, in English primary 1, Bobby said: "Can I say who the person talking is?" as he wanted to change the narrative perspective and Brian asked: "Shouldn't The Elder Woman of Water be against the Girl of Fire?" in order to try to change the collaborative story into a conflicting one. In English primary 2 using stimuli in creative activity was evidenced when a child saw the character on the card in a more personalised way, as the 'wind grandma' rather than the old woman of wind'. The authoring of the co-creative story itself also appeared to stimulate imaginative thought processes. The teacher believed that "assisting with cards does help them when they get stuck…it starts your imagination working." In the Greek Primary School, there was limited evidence of intervention and reframing, but the self-assessment tools showed that students did believe they were using the stimulus a lot or quite a lot to think in new ways.

For the 10 – 12-year-olds across all three countries, all five sub-categories were evidenced, although to different degrees. This suggests that for this age group co-creativity, and therefore WHC, was manifesting during interaction within and around the project's VLE through gameplay, despite the shortened piloting periods and technological issues. This point is strengthened by the fact that evidence is triangulated above for each category not only across country but also across the variety of data sources, including students' self-assessment. Having said this, there were some sub-categories within which Greek students did not show as much data as English, namely intervention and re-framing, with dialogue, and being in control increasing across time in the Greek site. Perhaps to be anticipated, there was little evidence of journeys of becoming or quiet revolutions in the primary data because of the curtailed length of the pilots and continuous technical challenges of the $C^2$Space on the tablets. This will be considered further in the discussion and conclusion.

### 15 – 19 Year Olds

Across all three countries' pilots each of the five sub-categories of co-creativity is evidenced for this age group.

Upon analysis, the data evidenced that the 15 to 19-year-olds were thinking about the consequences of their ideas in regards to ethics and impact. English secondary 1 teacher's comments supported this: "Some students were given a lovers card and they were suggesting that perhaps the rapist and the victim ended up becoming lovers and partners", "That was quite a challenging idea". In English

secondary 2, a small amount of evidence in the rich audio instances analysis showed students toned down their suggestion which was originally mocking another student. Also in this site's student self-assessment co-creativity wheels, the students rated themselves as quite a lot or a lot for exploring new ideas and making a positive difference. Austrian students wrote about how humankind treats the environment which is indicative of the unique activities within which their C²Learn experience took place, and which influenced their trajectory. It was extremely important for them to generate a storyline about destruction but also about injustice and prejudices against people who fight the system. Demonstrating this, Andrew said: "Maybe we should write that politics and humans become more radical, exclude everyone and the artists want to do something against it." The end of the students' story took a firm stand against the way mankind treats the environment, with one student saying: "I really believe that an intense ending can have more impact."

There was some English data and numerous Austrian examples of students engaging in dialogue via debating, negotiating conflict and posing questions. Teacher interview analysis evidenced students being respectful and reflective, rather than openly conflicting: "they were respecting each other's ideas and opinions, they seemed to be thinking more, reflecting more". In English secondary 2, there was evidence from rich instances of dialogue in all pilots supported by field notes which stated: "… discussion took place between a few of the students" and "all students took part in the discussion of the story", and which also recognised conflict or "banter" as a driver. In English secondary 2 self-assessment wheels, the students rated themselves as working on their own and with others quite a lot or a lot. Austrian secondary data examples also evidenced this in the following discussion:

- Andrew: "Okay. We have to come up with an end. Maybe the forest is being destroyed by a tornado."
- Annette: "The forest was cut down."
- Francine: "No, that's too apocalyptic."
- Andrew: "Yes, that's true."

Students debated different ideas and dialogued to consider consequences, and come to a collaborative end, where, as Francine put it: "The ideas were coming from everyone". The head teacher confirmed that students sometimes had strong debates, but also pointed out that they listened and respected opinions.

There was a small amount of data to suggest that students were taking control. English secondary 1 showed a very small amount of evidence (based around one film rich instance) of students taking charge of the creative process, with field notes identifying one student using control to put a stop to the direction of the story where one student wanted to eliminate the dilemma by killing off all involved apart from the innocent baby. English secondary 2 data also saw students taking control via typing and whose storylines they chose to include where one player took control to type, while another other took control of the words which were being added. However, fieldnotes also shows this student giving the control to others: "This student also started to include others more by asking them to contribute individually, thus letting go of the control of the direction of the game". In English secondary 2, on the co-creativity self-assessment wheels, most students rated themselves as being in control quite a lot. Austrian data showed girls and boys successfully leading at different times. Their headteacher noted that "the class leaders, the group leaders…set the tone." And the field notes backed this up where "There is an obvious leader in the group with the boys."

Data suggest the students were engaged in the VLE across all three pilot sites. In English secondary 1, data from fieldnotes illustrated students were engaged with C²Learn's games during their turns and showed a good understanding of the storyline. Rich film instances also showed one student sometimes coming up with surprising ideas when immersed in the game. In interview, a teacher confirmed this: "they seemed to be thinking more, reflecting more perhaps". Immersion in English secondary 2 also appeared to be maintained through conflict and banter, as evidenced in fieldnotes

where they were engaged in story construction most of the time but also used the story in their banter in between turns. English secondary 2 self-assessment wheels illustrated students thought they were engaged and taking risks quite a lot. Austrian data also showed immersion from a number of sources where it resulted in surprising ideas, such as a tree being the narrator of the story instead of using a human's perspective. The Headteacher commented: "They engaged very heavily in it…they were very much part of the whole process and very involved." Although Austrian data also showed some issues with immersion – both students not engaging with tablets because of technicalities, and not wanting to engage out of their comfort zone, for example in dance. This is another example where the activity in focus influenced the Austrian data, perhaps in terms of levels of immersion because of the discipline being taught. Regarding sustained immersion, the students themselves said that being part of a group made it easier to concentrate. However, both teachers and researchers reported different findings saying that: "They distracted each other."

In the three sites, there was a small amount of data that suggests students were using intervention and reframing, and were aware of how it functioned. Evidence showed students were intervening and reframing in order to develop a new perspective on the challenge, which led to the creation of surprising ideas that were sometimes ethically driven. In the English secondary schools, rich film instances showed a student reframing a perspective on rape in a surprising and ethically challenging way, considering the consequences of a "rapist…return [ing] to look after the baby". There was a very small amount of re-framing evidence in fieldnotes where it was noted students reframed words to fit in with their own direction of the story and added their own words in unusual ways. This was also reinforced in rich instances where a student reframed the accumulation of his own ideas to generate a more creative entry. The English co-creativity self-assessment wheel data showed mixed evidence of reframing from a lot to a little bit. Austrian secondary data evidenced intervention and reframing through the Socratic Dialogues. For example, students mentioned one story turning point and stated that the ending was the most important aspect. One participant wanted the 'whole universe to decay' whilst others thought this was "too dramatic" saying that: "the earth dying doesn't mean that everything else is dying as well". They all agreed on that moment being the most crucial part of the story and were very reflective about their personal opinions.

As with the 10 – 12 year olds, for the 15 - 19 year olds across the three sites all five sub-categories were evidenced, although again to different degrees. For these older students co-creativity, and therefore WHC too, was manifesting using the C$^2$LearnVLE and in dialogues, gameplay and discussions outside the VLE. This point is strengthened because the evidence is triangulated for each category across the variety of data sources, including student self-assessment. And even more so than the primary data, the secondary data from both countries is strongly triangulated. This is perhaps because of the intensity of the Austrian pilot structure allowing for an in depth C$^2$Learn experience which manifested all the co-creativity categories. However, as with the primary data, overall there is almost no evidence of journeys of becoming, and in turn no quiet revolutions.

## DISCUSSION

Across all three countries, these pilots were undertaken using both paper-based and digital prototypes. The goal was for all final phase pilots to be wholly digital and longer, but as explained earlier this was not possible. And, yet, the collected data provides an understanding of how participants manifest co-creativity including fledgling WHC through C$^2$Learn's 4Scribes, Creative Stories, Explore and Expand and Iconoscope games.

Approaches to understanding how children and young people manifest co-creativity in VLEs is new. C$^2$Learn has proposed and now illustrated across three European countries that co-creativity including fledgling WHC can manifest for children and young people in a specifically designed VLE. For the 10 – 12 year olds across all three countries, all five co-creativity sub-categories were evidenced, with intervention and re-framing evidenced the least. This indicates that for the younger

children they were attending to ethics and impact, engaging in dialogue, feeling like they were in control, and engaging in action. If we see reframing as a stage which might result from these combined processes, this perhaps explains why this was least evidenced. Children did not reach this point, nor did they achieve journeys of becoming. The 15 – 19 year olds more consistently manifested all five sub-categories. This is perhaps because they are older and more quickly able to engage with C²Learn's complexities, as well as the Austrian students experiencing a week-long intense project; an example of different timelines influencing data manifestation in different countries. Even so they also did not achieve journeys of becoming.

So, although WHC was not fully evidenced through to journeys of becoming and combined quiet revolutions, we would argue that the gameful design of the VLE did foster co-creativity, which includes the core elements of WHC. Other studies showed that specific elements of the VLE, such as 4scribes enabled dimensions of co-creativity, such as co-determined actions (Schmoelz, in press). In time, with further development and testing over longer periods, the C²Learn VLE is therefore highly likely to have the capacity to foster fully-developed co-creativity and WHC. It is intended that through the C²Space's structure of challenges (e.g. 4Scribes), building into achieving creative missions within wider quests, there is the framework to build individual's journeys of becoming via collaborative and communal activities and achievements to develop VLE-based quiet revolutions.

The findings then, contribute new understandings of creativity within VLE's. How can they contribute to understanding WHC itself? This is the first time the concept has been considered within digital environments, which is particularly interesting as WHC was first conceptualised in a dance education context (Chappell et al., 2011). WHC is certainly manifested differently in C²Learn compared to arts contexts. In C²Learn the emphasis on control via for example 4-Scribes turn-taking via a shared tablet, is stronger than in arts contexts where it is less about control and more about distributed leadership (e.g. Chappell & Swinford, in press). But understanding the creative power dynamics is still the important commonality between the two contexts – reinforcing this as a key component of WHC whatever kind of context it is being considered within. In C²Learn the dialogue is present but only partially embodied, in contrast to Chappell et al. (2012) and Craft (2013)'s original discussions of WHC which emphasise the importance of embodiment per se. And yet interestingly because of the mixed analogue/digital design of C²Learn, embodiment has still been a part of the dialogues evidenced in the rich instances above. They have not remained wholly verbal or digitally written. This is perhaps an important new point both for understanding creativity in VLEs, and understanding what it means to nurture creativity grounded in the body in a digital environment. What is clear is that embodied engagement per se is possible in mixed digital/analogue creative processes. This is an important lesson for the ongoing design of co-creativity nurturing with and through co-creative participation in VLEs, as well as understanding that WHC, with embodiment at its core, need not be limited to disciplines or modes of learning which are traditionally more focused on the body.

In C²Learn, we have not seen fully-developed making and being made, via the interaction between identity and creativity (Chappell et al., 2012) most probably because of the unavoidably shortened pilot period. However, the strength of evidence for both age groups demonstrating awareness of ethics and impact, thinking about the consequences of their decisions on those around them is telling. Making and being made comes from an embodied, often felt experience of empathising with others (Reid, 1980) – empathising to consider impact and change creative decisions accordingly is evidenced here. On these grounds, we would argue that with longer interaction within the C²Learn VLE, it is highly likely that making and being made could occur. Considering the ethicality of creative impacts has been posited as another key component of WHC whatever the context. Returning to arguments that we should push against marketised notions of creativity to incorporate ethics grounded in making and being made (Chappell, 2008, 2011; Craft, 2013), these findings show that this could be possible in digital environments. VLEs are more often characterised in competitive and consumer-driven terms. And here we can argue, with evidence from three European countries, that engagement in

educational VLEs can be driven by ethical creativity which in turn engages positively with children and young people's identity formation.

There is no doubt that this study across three countries has its limitations. This is in part due to the fact that some of the findings emerge from he project's paper-based prototypes when the digital games themselves could not be accesses in some school contexts due to factors outside the project's control. Furthermore, the number of students who participated in the study using C²Learn's games, across the three age spans is limited, making it difficult to make substantial claims about the suitability of activities with VLEs to foster to WHC. That is why we have called, what has been evidenced a 'fledgling' WHC. In this sense C²Learn's VLE or C²Space does evidence seems to be promising because the findings do illustrate students have developed more nuanced understandings of creativity through participation within a digital environment. This in turns illustrates, that the concept of WHC has the potential to change how students create with VLEs.

## CONCLUSION

This article has provided data from pilot studies in Austria, England and Greece, in both primary and secondary settings that involves to date, the largest student population engaging with a VLE environment gamefully designed to foster co-creativity. Despite technological problems, the data demonstrates co-creativity including fledgling WHC across all sites within varied educational activities, with the indicated potential that the VLEs could nurture journeys of becoming and quiet revolutions in time. It therefore makes a new contribution both in terms of articulating and evidencing co-creativity within VLEs, and evidencing WHC in a new context and honing its core elements which manifest across contexts.

Stepping back to gain a wider view of creativity in education, these findings also demonstrate young people creating together in VLEs responsibly and capably; and differently to that which would normally be anticipated in more competitively structured VLEs. As Craft (2013) argued it should be possible internationally to decouple creativity from a marketised agenda that sees young people as at risk and vulnerable when digitally engaged. C²Space creates a digital environment which can be integrated with analogue pedagogy within which young people can potentially make and co-create their own collective change in response to challenges. This is Craft's (2013) argument in action. One of the most recent C²Learn quests focuses on the question 'What is the future of creativity in schools?' (see Figure 2). The presence of this demonstrates that C²Space might be used even more explicitly to contribute to altering the path of our educational futures. It might not only act as a curriculum teaching tool for nurturing co-creativity, but might also help students and teachers to question the very structures (digital and analogue) within which they are working. Although only in its infancy this approach to WHC-fuelled VLEs therefore has potential both as a creative teaching and learning tool, and as a powerful implement for educational change.

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## ENDNOTES

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## APPENDIX

**Figure 6. C²Learn Creativity Wheel: Younger Students**

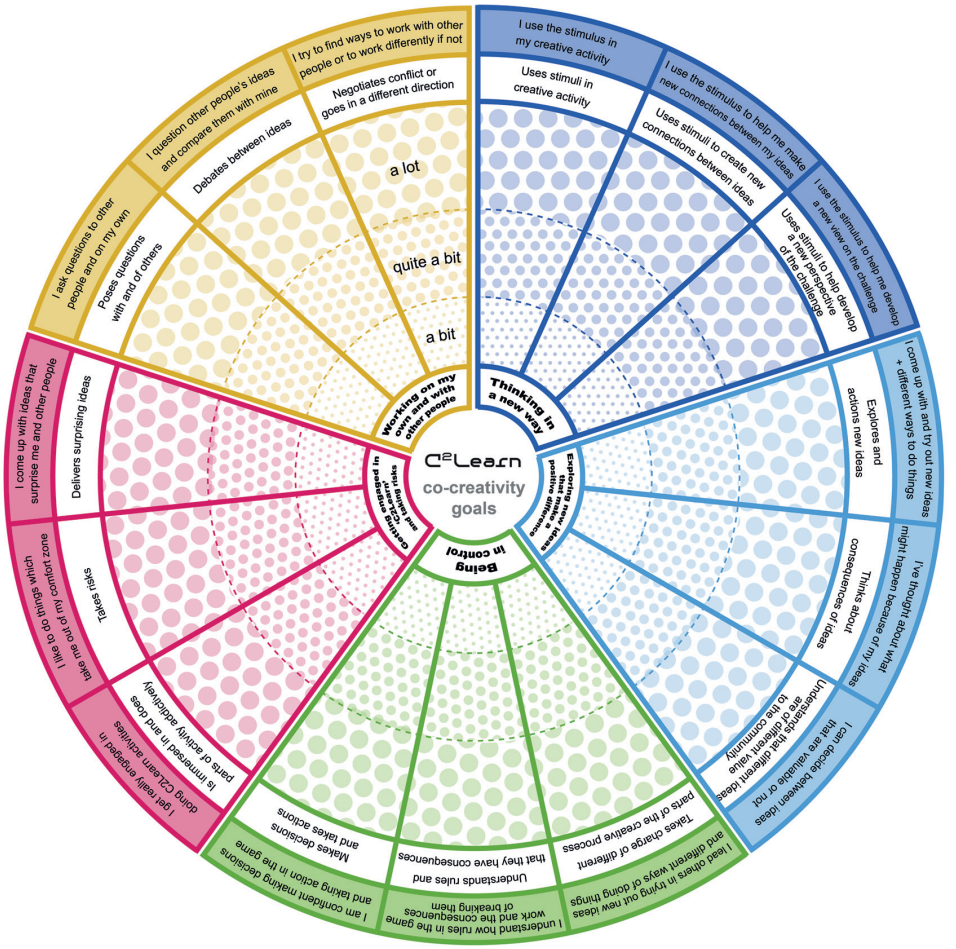
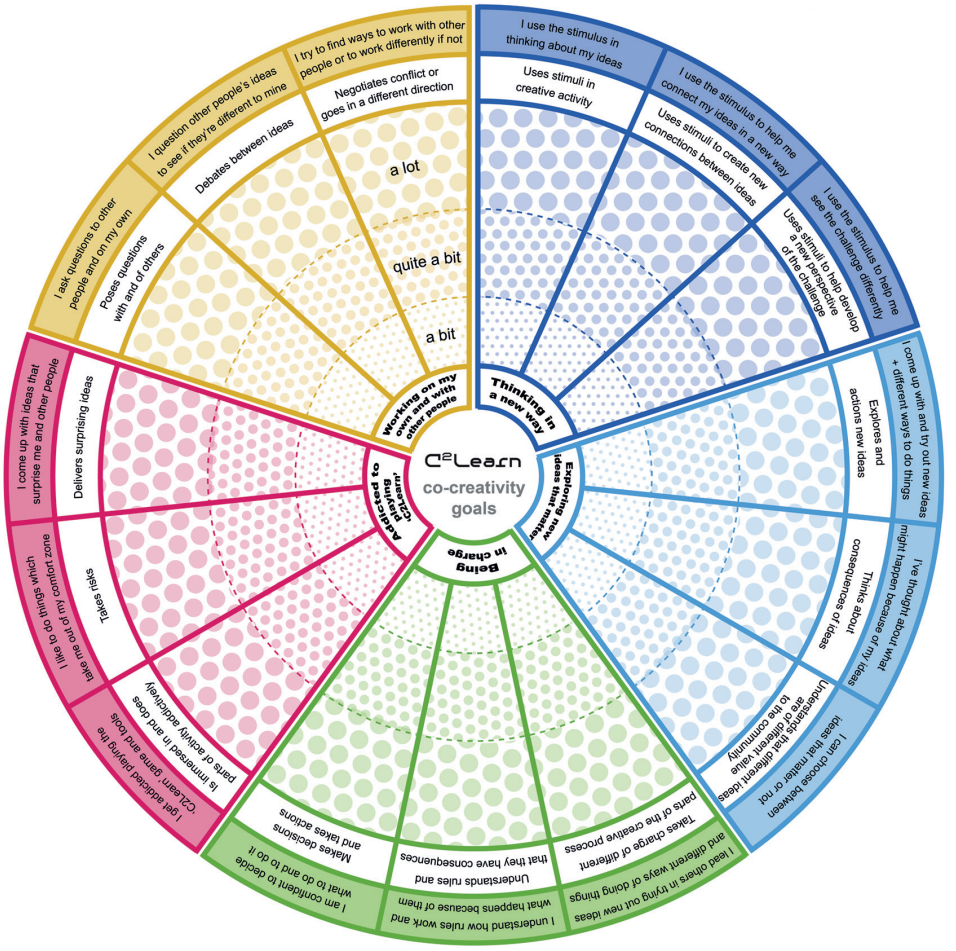


**Figure 7. C²Learn Creativity Wheel: Older Students**



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