

# FOSTERING CREATIVITY IN DIGITAL GROUP WORK

A Handbook for Individuals, Educators and  
Professionals



*Edited by  
Pia Gebbing  
Xingyue Yang  
and Christoph Lattemann*



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## Imprint

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*Print*: digitaldruck Bremen GmbH

### **Acknowledgements:**

The production of handbook is part of the project “Imparting Creativity in Distance Learning”, funded by the Jacobs Foundation (Bildung Beyond Boundaries” - Radical Ideas in Higher Education Challenge), project number 2019-1355-00.

DOI: 10.13140/RG.2.2.20853.24804/1

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# Preface

## Imparting Creativity in Distance Learning

Did you know that creativity is perceived as one of the most sought-after skills for future workforce, but is barely included in existing e-learning programs and courses? Have you ever experienced difficulty in creative work when collaborating online?

Addressing this discrepancy is the main objective of the cross-border project titled: "Imparting Creativity in Distance Learning", which brings forward an e-learning solution to foster student's soft skill "creativity" at three different universities, while enabling instructors to foster creativity in their courses and study programs. It further helps managers to set up an adequate environment to foster creativity in digital teamwork settings.

Learn more about innovations in creativity learning in this handbook that brings together findings from research and practice.

With best regards

The Authors



### Project Partners:



JACOBS  
UNIVERSITY



Technische  
Universität  
Braunschweig



### Funding Information

This handbook is a publication from the research project "B3 - Imparting Creativity in Distance Learning".

The project is part of the initiative B3 - Bildung Beyond Boundaries and fully funded and supported by the Jacobs Foundation.



# About the Handbook

## Imparting Creativity in Distance Learning

### Who is this handbook for?

In this practice-oriented handbook, all interested parties will find inspiration for creative digital collaboration.

The handbook draws from extensive experience and research in business and education. The content is especially designed to be understandable for students and teachers as well as employees and employers.

#### The aim of the book is ...

... to understand in which way creativity can enrich group results.

... to show ways how to unfold the creative potential of individuals in groups in a professional business setting and in a class-room setting



#### Individuals

At some point, most people wonder how to boost their careers and what skills will best prepare them for the demands of the job market. Researchers and market observers regularly identify skills, abilities, and learning dispositions that are prerequisites for the success of the future workforce in a modern society. The following "4 Cs" have been identified by international organizations such as the Asia-Pacific Economic Cooperation (APEC) and the Organization for Economic Co-operation Development:

- Creativity
- Critical thinking
- Collaboration
- Communication

All four Cs are strongly interwoven. As this handbook makes clear, creative digital group work in particular trains not only the skills of creativity, but also collaboration, communication and critical thinking.

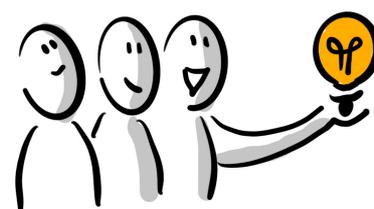
#### Instructors

While children are often still very creative, many seem to have forgotten how to use their creativity during their education. Considering the prevailing trends towards digitalization, globalization, and automation, higher education needs to redefine its curricula to prepare students for future requirements. These trends pose unprecedented challenges to educators. This handbook shows how to design an environment to teach, learn and foster creativity in an educational setting and in organizations.

#### Professionals

Companies constantly seek to offer new products, services, business models or processes to stay competitive. To be able to do so, they need creative people who come up with creative ideas. Yet, organizations and the existing work climate are often set up in such a way that people cannot develop their creative potential and approaches are stifled at the core.

This handbook shows how to develop a workforce for solving wicked problems of the future. It gives clear guidance to teams that want to improve their creative collaboration, especially in the context of remote work.



## 7 C's of creativity (Lubart, 2018)

In this handbook, we present findings from our research within the framework of the 7Cs, a framework for conceptualizing work on creativity. In the following, the 7Cs are briefly presented below.

### Curricula:

Why do we need to foster creativity in education and business, and how do we integrate creativity into modern teaching concepts?

### Creation & Consumption:

How do we embrace creativity in different activities and tasks?  
How to assess and measure the creative value of an idea?

### Creator:

Why do some people appear to be more creative than others and how to train creative skills?

### Context:

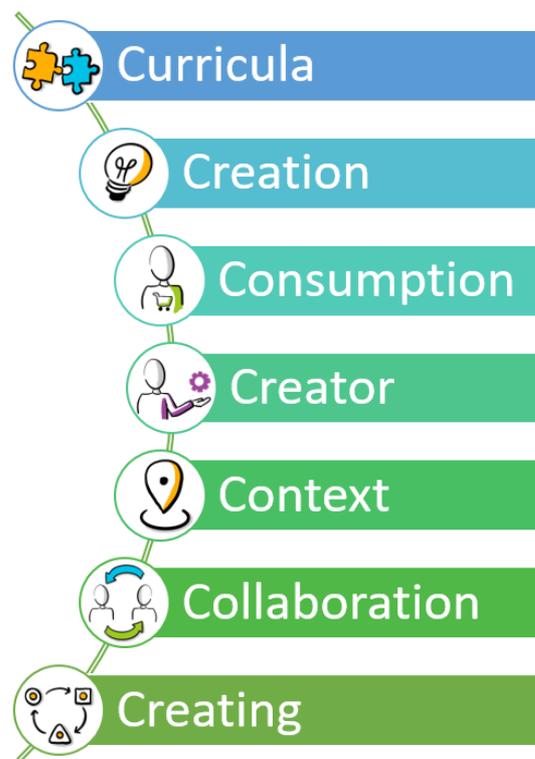
How should digital environments be designed to foster creative work in the digital classroom and work environment?

### Collaboration:

How can digital tools and techniques support digital creative collaboration?

### Creating:

How should a creative process look like? How can we evaluate creativity?



# Curricula

## Enhancing Creativity in Education

Written by Päivikki Lahtinen and Bjørn-Tore Flåten

University of Agder

### Why do we need creativity?

The modern and rapidly changing society has become more hectic and dynamic with its changes and development. Working life, educational institutes and organizations face more complex problems and challenges that require both adaptation and new innovative solutions. To tackle these challenges, working life faces a demand for more agile and creative abilities.

These societal challenges also require resilience from the society's community to create new knowledge, solutions, and inventions in addition to reforming its practices and concept of activity. Different organizations and work communities may promote their organizational resilience to tackle unforeseen challenges and produce innovations by fostering collective creativity and learning among their communities (Schulz et al. 2017, McCharen et al. 2011). Hence, these learning communities play a key role enabling the change and development in organizations and society.



At the same time, the COVID-19 outbreak has caused major disruptions and pushed forward implementing technologies and digitalization into working life and educational institutions. Hence, rapid changes enhance educational practices in designing learning and teaching for learners in all settings and contexts. Like other learning organizations, higher education institutions are forced to consider these critical demands on how they can promote creativity in their pedagogical design, and how it can be done in a digitalized learning environment.

Education has a vital role as a catalyst for learning future-oriented skills and competencies which may enable innovation and resilience in future society and working life. One of these future skills is creativity and a creative mindset. In the future, these valuable skills and resources will enable new employees to tackle more complicated problems in unfamiliar contexts. These skills can be used to develop new forms for working and production, and to foster a creative organizational culture. In the current form of education and setting of workplace learning, the student and learners at the workplace should be enabled to learn to utilize and enhance further their creativity and creative resources. By offering a space and time to test, try and even fail, creativity may take its place in developing a new and innovative culture. Therefore, fostering creativity in education, the pedagogical practices and working methods need a reformulation.

In modern society, digitation and digitalization have also intruded on education and classroom practices. Even though the digital learning environment offers a large variety to foster creativity and more vivid and illustrative materials for teaching purposes, we suggest beginning with a pedagogical design when setting up a creative classroom environment. The presented pedagogical design consists of principles which should be taken into consideration when introducing creativity in an education context. These principles are applicable to transform classroom practices, even if they are implemented in online or in-face encounters with learners.

In this chapter, we will introduce some basic principles with which creativity can be promoted in pedagogical design. When adopting creativity in an educational setting, teachers, instructors and other educational professionals need an open mindset to use their own creativity in planning pedagogy (see Chapter 3: Creator).

After describing the principles which stimulate creativity, we introduce Learning Design as a method to develop working practices in education. With this frame the development of teaching practices can be made with small developmental steps. Learning Design aligns with Lubart's seven C's, which makes it a workable way to develop teaching and learning practices to respond to the demand for creativity in education.



## Fostering creativity in education

Creativity is the ability to produce something new, different and practically usable product, service or knowledge (Sternberg & Lubart, 1999/2003). In this chapter creativity is not understood as solely embedded into an individual's skills or competencies. Instead, we understand creativity as a phenomenon emerging in a social interaction and materialized through different creative chains of actions by a group of people (Hyrkkö & Kajamaa, 2021; Sannino & Ellis 2013; Oddane, 2014). Through these actions individuals respond to distinct initiatives of one another. This corresponds to a learning process in which collective knowledge construction and shared understanding take place, and may lead into new and unforeseen ideas, inventions, and solutions (Sawyer & deZutter, 2009; Anderson et al. 2014; Schulz et al., 2017; Hyrkkö & Kajamaa, 2021).

To promote this process in the pedagogical design, time and space features should be embedded; to promote collaborative ways of working, to offer adequate challenges for students and to design a learning process which considers the experiences of learners and learning as learners' own process.

Next, we present some basic principles for developing a curriculum that promotes collective creativity and learning. These principles can be used to develop the curriculum to take better account of the learner's creative thinking, working methods and decision-making.

## What are the key elements for thriving creativity in creative group work?

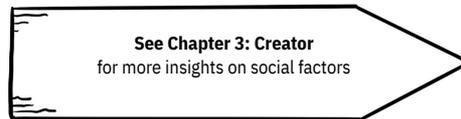
### Principle 1: Search for a challenging task with the option for multiple solutions

We suggest, that the assignments or tasks that foster creativity among the students are challenges that may have a linkage to real-life, but also imagination or fantasy-based challenges are motivating and engaging. The core point is that the nature of tasks is adequately engaging to motivate students to find multiple potential solutions for resolving (Oliveira et al. 2021.) The task can be a complex challenge or a challenge in which the level of difficulty will increase progressively. In terms of creativity, the challenging tasks will promote students' activities to try, fail, tune, improve and try again. With these actions, the learners need to reformulate their understanding to solve the challenging tasks, and therefore, they are exposed to producing something new (Oliveira et al. 2021, p. 9). These actions could be described as leading pathways for creativity with which the students may learn something new which does not exist yet.

See Chapter 2: Creation & Consumption  
for more information on design challenges

## Principle 2: Know your students

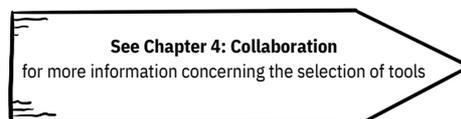
To promote creativity, the first principle is to get to know your students. It is known that pedagogical design acknowledges learners' prevailing knowledge, learning capacities and needs which will be needed to address and connect to the learning goals. Categorizing or profiling your students on their previous experiences, competences, and cognitive skills is a vital step in planning arrangements and tasks that support their own learning process, and are in the level of difficulty to promote their creativity. If you know your students and their background, it is easier to offer various teaching formats, learning methods and platforms which support learner-centredness. Doing so can promote and support students' creative thinking to search learning formats or offer different learning formats for them to choose.



## Principle 3: Choose methods, tools and platforms that support collaboration

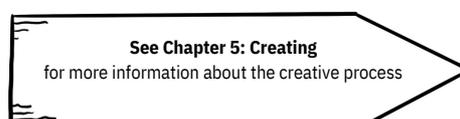
One of the key elements for promoting innovativeness and creativity is to offer appropriate tools, methods, space and time. We suggest choosing teaching methods, tools and materials that emphasize creativity, creative problem-solving skills and innovative capabilities. It is recommended for fostering creative actions to choose working methods that support collaboration and collaborative practices (Wong et al., 2021; Matuk et al., 2016). Teaching methods can be methods which encourage social interaction and creativity. These methods can be a discussion, role-play, brainstorming and a case study, and their coalitions.

A well-known method is brainstorming in groups which fosters two key characteristics of creativity, i.e. novelty and usefulness, and that are socially appreciated and valued (Sawyer, 2012). In group work ideas evolve, and new creative solutions emerge, when an individual's actions turn into collective creativity through group negotiation and group decision-making (Wong et al. 2021; Sawyer, 1999). As a tool, we suggest offering various imaginative tools through which creative actions can be manifested in different ways and means, from oral output to visual expression, and everything between. We suggest considering using imagination for offering the tools. For example, tools may include tools from visual art (i.e. papers, paint, clay etc.), technical tools, building blocks and digital whiteboards such as Mural or Miro, and digital environments such as Virtual Worlds (Fetscherin, Lattemann & Lang, 2008)



## Principle 4: Foster creative and collective actions in education

In pedagogical design, and fostering creativity, social interaction and creative actions promotion among students can be seen as core principles which also affect the choices of learning goals, activities and tasks. To foster a creative mindset in education, actors or learners should be seen as active contributors to create understanding and knowledge in collaborative manners. This could also be described as collective learning in which students together with the more advanced expert collaboratively cross-fertilize the distinct perspectives, experiences, and knowledge - the teacher's positioning would then be more of an equal member and co-creator of this learning community than a knowledge carrier who shares his/her knowledge for learners. Learning tasks should endeavor activities that foster learning through activities such as exploration, questioning, explaining and justifying, but also via testing and doing even potential failures. These activities enhance a forming of a chain of creative actions, which can lead to new solutions. Fostering creative actions and collectivity among the learning community, the students and learners establish a capability within the community with which knowledge, understandings and ideas are distributed among the group members to produce new ideas and inventions, processes, and solutions (Sawyer & deZutter, 2009; Anderson et al. 2014; Schulz et al., 2017; Hyrkkö & Kajamaa, 2021). Doing so promotes creativity among the learners and enhances them to learn to use a creative mindset.



## Learning Design

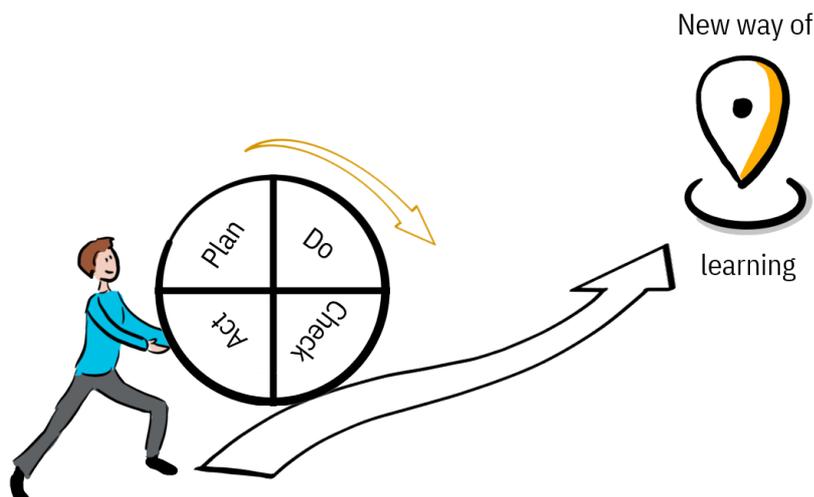
Originally, Learning Design was linked to an educational form in a digital learning environment. In its current stage it has been successfully implemented in distinct work settings, schools and educational institutes. The core point of Learning Design is to design workable learning experiences for students or learners (Boström, 2017). This has been possible because the learning design considers learning as a holistic, everywhere happening phenomenon. Learning Design is a creative and iterative plan to decrease learning as a process which utilizes methods from the field of design. The aim is to respond to the learning goals and needs in an individualistic learning process in which learning can be seen as a learning pathway for individual learners.

Learning Design fosters both educators and learners to take steps together towards developing working, i.e. teaching and learning, practices that support establishing learning communities and learning a creative mindset. The key elements of Learning Design are

- user- or learner-centeredness
- iterative and processual nature
- emphasis on collectivity and collaboration
- design thinking- and a research-based approach

This means that the starting point for designing learning is the learner's need, not the content or pedagogic method. This requires a good understanding of the learners' experiences and how the educator can utilize the learner's personalized experiences in developing the teaching activity. The nature of learning design is iterative enabling testing and remodeling during the process. In Learning Design, the process is co-creative. Traditionally, the representatives in this process are experts on the subject, facilitators, and designers of a learning process. Learning Design has a common ground in its emphasis on human-centeredness, creativity and empathy with Design Thinking. In its process, the learning design utilizes participatory methods such as facilitation and is based on research, especially driven from learning psychology and constructivism.

### PDCA as a developmental and continuous cycle



### Implementing a Learning Design Using the PDCA Cycle

Next, we will guide you step-wise on how to improve and develop your pedagogical design in a way that supports implementing creativity in an education. One of the tools for designing learning is a PDCA cycle (see Figure above) which can be utilized to enhance creativity in teaching and learning practices. Acronym PDCA comes from the words Plan, Do, Check and Act. PDCA is a continuous developmental cycle in which continuous testing and reviewing are natural. PDCA cycles can be utilized in smaller developmental processes, by going forward one step at a time, or in bigger transformation processes, as well.

# PDCA - Step by Step

## Preparation

Before starting, we suggest that you gather a group (3-6) representing a substance expert, facilitator, and expert of a learning process. If possible, we also suggest including a student who may be your former student.

Together with the group, you will need to frame a challenge (to learn how to formulate a design challenge, see Chapter 2: Creation and Consumption).

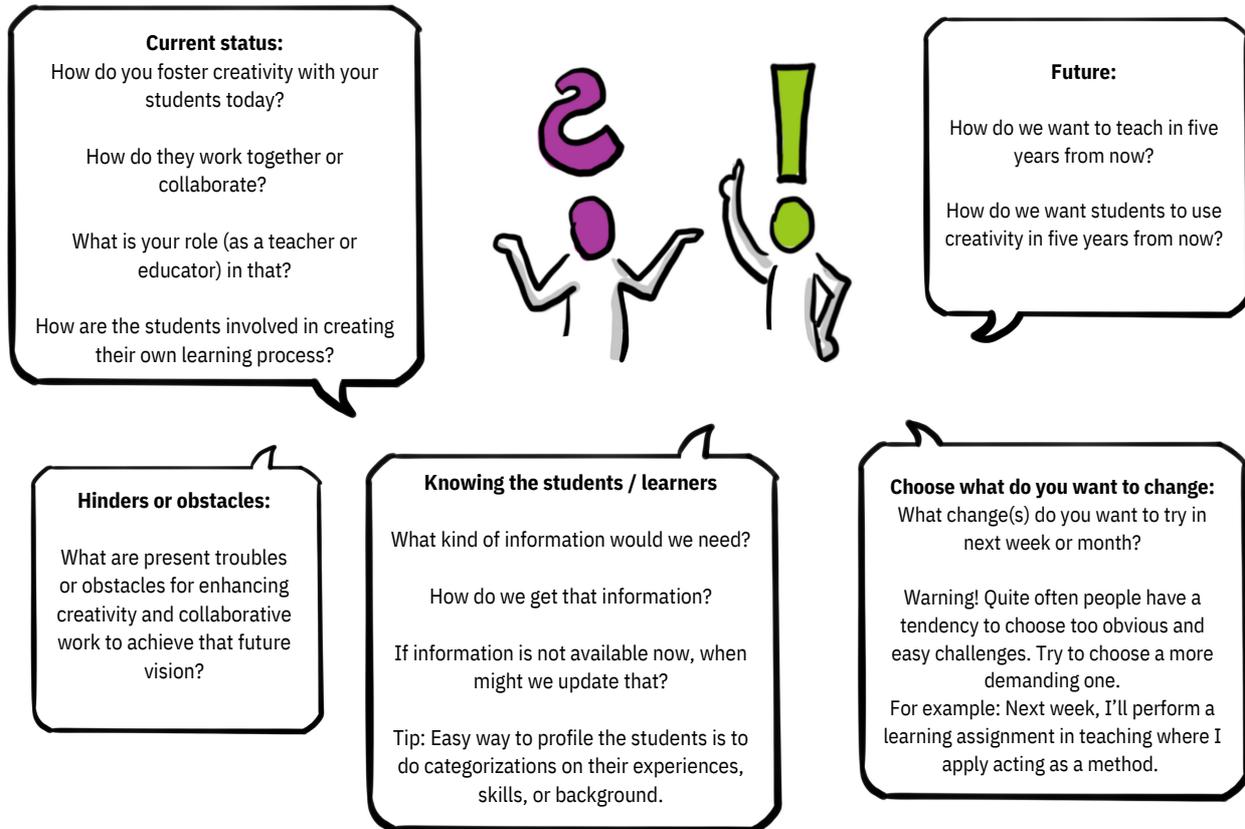
For example: *How might we foster creativity among students or learners in higher education or at the workplace?*

<p style="text-align: center;"><b>PLAN</b></p> <p>Setting up a plan. This is the most time consuming phase. Do a sketch of a plan in which you consider questions concerning the current status, future, hinders &amp; obstacles, changes, and knowledge about your target group.</p> <p>Plan the learning task that is adequately challenging for learners and how to apply creativity into this task. Is it in a teaching method which could enhance collaboration? What kind of way can the students express and communicate their perspectives and ideas? For example: We will encourage students to use simulation as a method in their task [Simulation is a learning method which imitates the real-life situation or process].</p> <p>Plan, how to explain the given task clearly for learners and how the process will go on. This will help learners to take an active role in their own learning process, eventually master their actions and complete tasks. For example: What are the milestones of the whole process or task? What are the criteria for the task?</p> <p style="text-align: right;"></p>	<p style="text-align: center;"><b>DO</b></p> <p>Performing your plan. This is a phase in which students and you, as teacher, should have time to repeat and test the ideas and execute the task. Allowing students to use their creativity is a crucial element of expanding knowledge. It should be constantly promoted and used to improve their performance and outcomes while they are working with tasks. Social influence and promoting social engagement can stimulate students to express and communicate their ideas in more various ways.</p> <ul style="list-style-type: none"> <li>• Perform and test what you plan.</li> <li>• Do changes when it is necessary.</li> <li>• Observe and document what is happening while students are executing the task or participating in the event.</li> <li>• Document the reflections, feedback and outcomes of learners.</li> <li>• Document your own reflections, thoughts and the potential new ideas.</li> </ul> <p style="text-align: right;"></p>
<p style="text-align: center;"><b>CHECK</b></p> <p style="text-align: right;"></p> <p>This offers you a way to track the progress and performance and improve your understanding of students. This provides a good ground for boosting social engagement. At the same time, this offers for students to learn from their process. In this phase, students should see their progress in tasks and the onward direction.</p> <p>Collect feedback from you students or learners:</p> <ul style="list-style-type: none"> <li>• What did they say? What kind of feedback did students give?</li> <li>• How did students express their experience?</li> <li>• If needed, ask for feedback also during the process.</li> </ul>	<p style="text-align: center;"><b>ACT</b></p> <p style="text-align: right;"></p> <p>In this phase you can recognize the next developmental challenges and the knowledge expansion. It is important to acknowledge the learning which learners have achieved. As an equal, it is important for you, as a teacher and developer, to analyze what you have achieved through your experiment. The main goal in this phase is to maintain continuous development.</p> <p>Therefore, we suggest analyze your proceeding:</p> <ul style="list-style-type: none"> <li>• What worked and what was not working in your plan?</li> <li>• How did the execution differentiate from the plan?</li> <li>• How was creativity materialized in their actions?</li> </ul>

## Follow-up:

If your plan was successful, integrate it in your pedagogical design. If not, continue your developmental work. Update your current status and choose the next challenge you and your group would like to tackle.

## Questions to ask yourself when planning the Learning Design



### Key Takeaways to Foster Creative Curricula:

- Creativity responds to the modern global challenges, which require transversal competencies, decision-making, innovation and resilience from organizations and working life and promotes lifelong learning.
- A pedagogically anchored plan embedding learner's experiences into pedagogical practice development motivates to produce, test and utilize the a wide spectrum of competencies and skills creatively.
- Changing Mindset: human-centeredness, creativity and empathy are key to a successful Learning Design. Collectivity and creativity enable the learner to play an active role in the co-creation process and the construction of knowledge

**Four principles in a pedagogical design to foster creativity:** knowing your students, fostering collective learning and creative actions, offering adequate challenges and choosing methods, material and tools which foster interaction and collaboration

- **Learning Design** as an iterative process for developing pedagogical activities, in which learner are active agents for developing their own learning process.
- **PDCA-cycle:** a step-wise approach for applying Learning Design and develop teaching practices.

# Creation & Consumption

## What is a Creative Idea?

## How to Measure Creativity?

Written by Pia Gebbing & Christoph Lattemann

**Why were you interested in this book? What are you expecting?**

**What does it mean to you to foster creativity in virtual group work?**



One of the biggest struggles that teachers or managers face when it comes to embracing creativity is that creativity is an abstract concept and rather hard to assess.

In **education**, teachers need to evaluate a student's contribution in order to grade it. Their assessment should be based on objective criteria, standardized and comparable to other students or peers. The measurement of the attainment of a learning goal is more straightforward when you can count wrong and right answers. In contrast to this, the assessment of creativity is often subjective and depends on previous experiences. It often seems that there simply is no right or wrong answer.

In the **business** context, performance evaluations are often supposed to be based on objective values, such as KPIs. Employees often get frustrated because they feel that reaching target goals is more valued than working on risky innovations and creative solutions – where failure is more likely and success is hard to measure. This might be why instead of risking going off the beaten path, managers and employees often decide to play it safe and stick with the standard procedure.

Yet, many people in business and education agree that creativity is important and much needed. Creativity has even been coined as one of the most important future skills (OECD 2021). This means that teachers who want to equip their students with the necessary skills to excel later in life should deliberately foster creativity in their lectures, seminars, and labs. Similarly, in order to embrace creativity at the workplace, managers need to find a way to motivate and engage co-workers to be creative, although it might be not defined as one of their KPIs.

This is why we decided that before sharing methods and best practices to foster creativity in a virtual setting, we have to explain what embracing creativity might actually look like.

The aim of this chapter is to describe...

... how embracing creativity can look like in different contexts.

... how to measure and assess the creative outcome.



## Theoretical background

**Creative ideas** are often defined as...

- different, new, innovative
- of high quality
- appropriate to the tasks at hand

A **creative product** is an idea that has been realized (e.g. as a prototype or a real product, or a service). The creative outcome can be anything from a piece of art to a new approach to solving a math problem or an inspiring way of presenting the results of a chemical experiment.

An **innovation** is a term mostly used in the business context and often describes a creative idea or product, service, work process or business model that has been further developed and has gone through an implementation process. They often have to match certain criteria, for instance, regarding budget specifications or feasibility in the business setting or comparability and grading in the educational context.

### **It does not always have to be a big leap. Embracing creativity can start with small steps.**

Creativity can take many different forms. Innovations don't always have to be something radically new but can also be small changes.

The following table shows suggestions for tasks and activities that have great creative potential (Cropley, 2006, Sternberg 1999):

#### **Different types of creative tasks and activities**

Genesis	Generating new solutions
<b>Replication</b>	Creating an analogy by applying knowledge to a new setting, context or task.
<b>Synthesis</b>	Recombining and merging different approaches into a new idea.
<b>Revival</b>	Ideas or approaches that were previously put on hold or abandoned are given new life.
<b>Redefinition</b>	The known idea/solution/approach is seen in a new way
<b>Vision</b>	Expanding ideas beyond what is currently possible. People are encouraged to think big and propose "crazy" or "wild" ideas.
<b>Perspective</b>	A different point of view is taken, which allows to see the idea from a completely new angle (e.g. user-centered approach).
<b>Redirection</b>	An idea is further developed in a new direction
<b>Improvement</b>	Extension or perfection of what already exists.
<b>Diagnostics</b>	Search for shortcomings in what already exists and suggesting new solutions
<b>Trimming</b>	Looking for ways to make an idea / solution more effective and efficient.

## Expectation setting: what is considered creative?

When working creatively, the first step of any task should be to set clear expectations for the outcome of the creative group work. This is often an initial challenge that might be changed and adapted throughout the process.

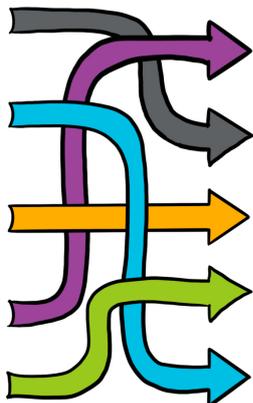
### Shift of mindset

Fostering creativity means shifting the mindset from assuming that there is only one right answer to an open mindset that allows for many different possibilities. This should be reflected in both the educational and corporate environments. Instead of thinking of tasks that require one single, true answer, such as “how can we become more effective?” we suggest thinking of a “Design Challenge” that is open to different solutions so as not to limit the mindset of the group members in advance. Later in this chapter you will learn one way to formulate such a design challenge.



## Three steps to clarify the expectations for the creativity of the outcome

When initiating creative activities, think ahead about the desired or required degree of creativity. Is it always necessary to have radical changes or only small incremental ideas? Here are some hints which guide towards the right “novelty”:



### Step 1: How much creativity do you want?

Where can you get creative? Consider different types of activities that require creativity. Reflect on your own environment: where do you see potential for smaller or bigger changes? If you think the circumstances do not allow radical innovations, start small and focus on improvements or analogies through knowledge transfer.

### Step 2: Motivate your choices

What are the benefits of inviting creative thinking and solutions to your group work?  
Why do you need creativity in your group work?

### Step 3: Designing your challenge

A design challenge should be formulated in such a way that it is open and stimulates a variety of new, different solutions and changes the way of thinking of the group members.

Our experiences from over 100 creativity workshops show that both managers and students have trouble defining a good design challenge. Managers often start from quite narrow and company-specific problem descriptions, such as “We want to become more effective!”. But this already shows that there is no open solution space, as a result will most likely end in more efficient processes and cost reductions. However, the solution could also lie in a completely different area, e.g., in improving services for customers.



## Method: How Might We Question

One method to help formulate a design challenge is to raise a "how might we" question (HMW question).

"How" asks for an open solution that required creative thinking.

"Might" reflects an open solution space with various possible solutions and no firmly defined goal that is or should be. There is no right or wrong answer.

"We" signals a jointly developed outcome. It means that group members should work together to find a creative solution.

### Formulation of a Design Challenge - step by step

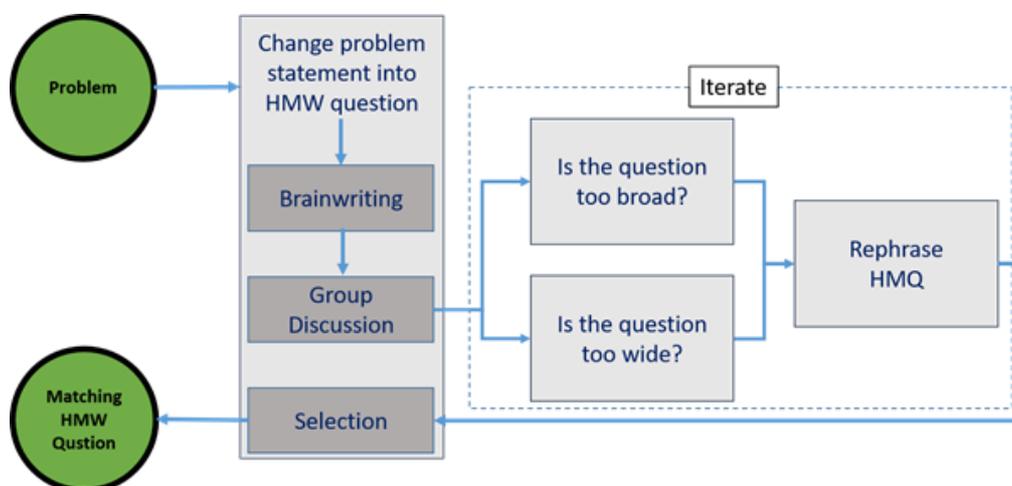
The "How-Might-We-Question" allows you to open up the problem space and think of different creative challenges.

- Look at your starting point or current state of knowledge and identify the main problem or challenge. Try to frame the problem by using the term "how might we" initially. For example, you might ask: "How might we improve the user-experience of our online shop?"
- Continue to ask yourself a multitude of different How Might We questions to expand your circle of ideas. The aim is to find new ways to approach a problem. Repeat this until you have a few different How Might We Questions.
- Check that each question allows you to generate a variety of solutions. If you can't find a solution, try recomposing or expanding your question. If the question is too vague, you need to ask a more specific question. The HMW questions form the starting point for your group work. But keep an open mind that the results might not be what you expect!

The discussion might end up in several (2-3) iteration cycles. This process might take 30 to 60 minutes. Finally, the HMW question is the starting point for the creative innovation process.

The following figure shows how to define a proper HMW-question.

### Formulating a How Might We Question



## Consumption: measuring creativity

As mentioned earlier, it can often be difficult to judge the creative outcome. With creative group work, you can't know in advance what to expect. In addition, creativity is often in the eye of the beholder. A very experienced artist will judge a painting differently than a beginner. A manager will judge the innovative potential of a product differently than an engineer. Differences in experience, expertise, and even preferences and tastes greatly impact on judgments.



However, you may find yourself in a situation where you need to evaluate the outcome of group work, for example, when grading coursework or making decisions about innovation investments. Therefore, you may need to establish objective evaluation criteria.

Ask yourself how you will evaluate the success of the creative solution developed by a group.

The table below gives an example of a rapid assessment scheme for creative ideas, developed based on scientific literature.

### A rapid creativity assessment

Evaluation Criteria	Grade
Novelty: How innovative is the solution? Did the students provide original ideas, insights, perspectives?	
Quality: How is the quality of the solution/prototype that was developed?	
Appropriateness: How well does the proposed solution address the challenge?	
Overall impression / overall grade	

#### Transparency:

You should note down your chosen criteria and make them transparent to the group before the group work starts.

Group involvement: Discuss the evaluation standards openly with the creative group to reach a common agreement on the goal and assessment.

#### Peer-review:

When evaluating a creative idea, ask several observers for their opinion. Chose judges with a variety of backgrounds, e.g. experience and expertise. Their judgements will probably vary but give you a good indication as to which solution is genuinely creative.

### Key takeaways

What is an creative idea?

- At the beginning of any creative group work, the expectation setting is pivotal.
- Creativity does not always mean taking the big plunge. Smaller improvements, developments or knowledge transfer also involve creativity.
- A Design Challenge should be formulated as an initial question that can be changed in the course of the creative work.

Measuring Creativity:

- Creativity is in the eye of the beholder. The degree of perceived creativity depends on the "recipient". Therefore, it is difficult to measure and judge creativity.
- Novelty, quality and appropriateness for the task at hand are three common criteria for evaluating creative ideas.
- The most reliable results are obtained through peer assessment.

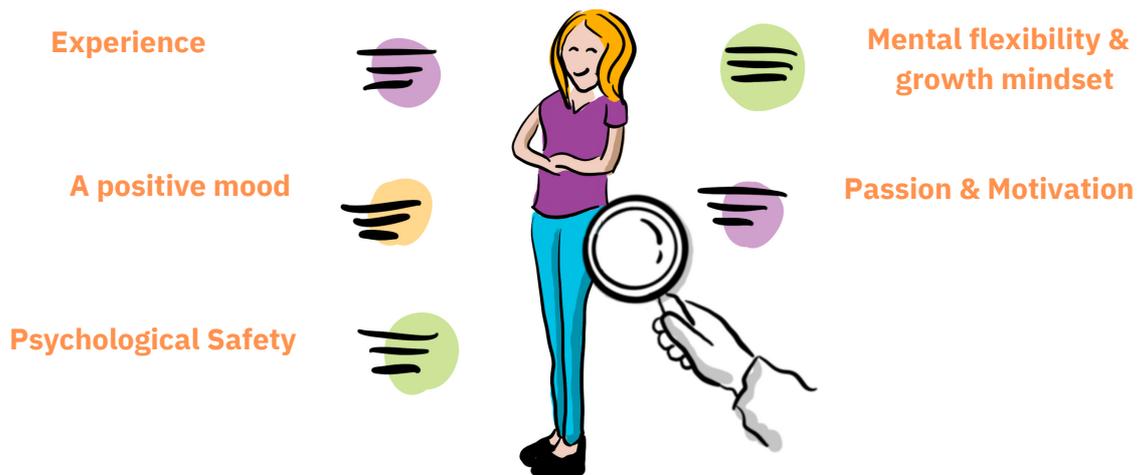
# Creator

## Are you born creative? Or is it a skill you can develop?

Written by Pia Gebbing

Many people believe that they are just not creative. Others are said to be born with great talent. However, this conception might be misleading. This chapter aims to highlight the creative potential that lies within everyone.

As an instructor or team leader it is not always easy to identify and foster individual potential. Moreover, in the digital work environment it is much harder to get a grasp of other peoples personalities, motivation or current mood. Is someone silent because he/she is not participating? Or because they are shy? In the following, we suggest how the creative potential can be brought to life with the right, systematic approach and training.



### Theoretical background

Some character traits are more frequent in highly creative people, such as openness to new experiences, risktaking, impulsiveness or perseverance. However, these characteristics seem only to have a small effect on creativity. On the other hand, there is a multitude of cognitive, motivational or emotional characteristics that can be influenced and trained throughout creative group work (Gebbing, 2022, Khalil et al., 2019)– we call them Creativity Drivers.

#### Creativity Drivers:

- **Experience:** even though it might seem like people have an innate talent, most creative professionals had years of experience (and failure) before they got known for their work.
- **Growth mindset:** similar to the accumulation of experience over time, cultivating a growth mindset describes the belief in one's own ability to learn.
- **Positive mood:** many studies have shown that we are most creative when we are in a positive mood. In the digital context, people often report a feeling of exhaustion and **techno-stress**, which is caused by an additional cognitive load of extensive use of technology. Digital novices often feel more impacted and overburdened by this overload than more experienced users.
- **Psychological Safety:** the confidence that it is safe to voice new ideas, ask for feedback and take risks is crucial for creative idea generation (Edmondson, 1999; Edmondson & Daley, 2020; Newman et al., 2017). This perception of psychological safety varies in the context and can be influenced by group norms and **explicit encouragement** of creativity. Jarvenpaa and Leidner (1998) emphasize that **empathy** and **trust** among the group members strengthen creative collaboration.
- **Mental flexibility:** being able to shift our perspective and change our approach is called mental flexibility. By trying out new strategies and ways to solve a task, as well as cultivating empathy, we can learn to see things differently - and therefore be more creative.

## 5 Tips to increase the creative potential

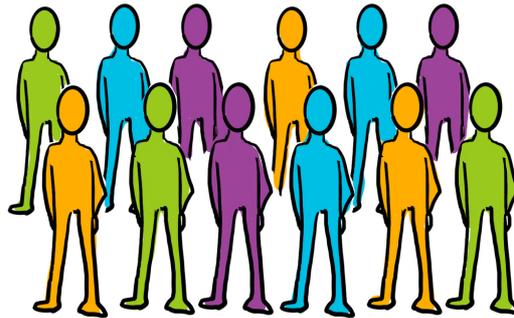
### Tip 1: Get to know your team

When we say that personality differences have an impact on creativity in groups, the first thing is obviously to detect them. However, especially in the digital setting, informal exchanges that would allow us to build a relationship are often lacking. We have the perception to be working more efficiently but do not get to know each other very well. In the long run, this has a negative impact on our mood and creative potential.

There are many ways to create a better bonding experience. From a more playful approach to a more in-depth, profound way to connect via group assessments that give you an overview who is part of your team.

The following activities can be an enriching way of creating more psychological safety and a positive mood.

- Start with an **online-icebreaker** activity, a little game or team-building exercise (you find many resources online).
- Split up big groups into smaller teams and facilitate informal exchange (use break-out rooms).
- Invite your team to take a short **personality test** and share and discuss their results. Ask for consent beforehand and whether everyone feels comfortable with sharing personal information.
  - Very popular is the Myers Briggs Type Indicator (MBTI), which is available online as a short version.



### Tip 2: Make room for personal differences

Once you have realized that there might be calmer people on your team who prefer to think things through before they speak and that you have outgoing leader-personalities, encourage the group to reflect on those differences during their group work (Gebbing et al., 2022). The group should come up with their own norms and rules they want to follow.

- Let them divide tasks according to preferences and skills.
- Make sure that each contribution is valued equally.
- In general: make it okay to be different.

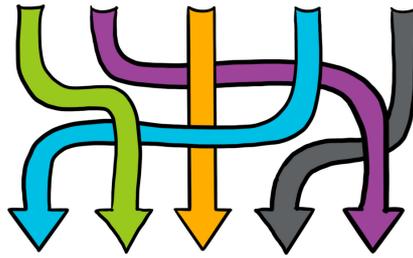
### Tip 3: Adapt the selection of tools to the target group and task



With regards to the digital setting, be aware of signs of technostress, fatigue and frustration. Especially if one of the members in a team is a novice and quite unfamiliar with virtual collaboration: Take it easy and reduce the tools and functionalities (Lohrenz & Gebbing, 2022). Less is more.

Has your group worked together before? Or are they completely unfamiliar with each other? Both will influence the group dynamics. Try to be aware and adapt how much you guide the process and how much feedback you give based on the group coherence.

See Chapter 4: Collaboration  
for the right selection of tools



#### Tip 4: Encourage your team to “go crazy and go wild”

Studies have shown that explicit encouragement by the supervisor or teacher can significantly increase each individual’s creativity. But the encouragement has to be wholehearted and consistent.

Trying out new ways to solve old problems fosters mental flexibility. They will gain experiences that will help them shift their mindset to a more open, flexible thinking style and growth mindset.

Therefore, the more often you encourage a team to think outside the box, the better they get at it.

- Research new methods and strategies online.
- Encourage using new ways to solve routine problems.
- Try not to say "no" too quickly.
- Be open for suggestions.

For a collection of methods from our research project DETHIS:  
<https://www.designthinking-methoden.de>

#### Tip 5: Instill passion, freedom & self-expression



Passion is a great indicator of intrinsic motivation. Motivated people will be more willing to engage in the creative process and produce more innovative ideas.

Passionate people need an environment that fosters task ownership and self-exploration so that they can engage in continuous self-improvement.

When guiding the process, think about how you can instill curiosity, independence and sense of a self-satisfaction.

- Encourage task-ownership
- Provide rich resources (e. g. methods, tools, work environment)
- Encourage self-reflection (e. g. ask them regularly to assess their performance and how they want to continue)

#### Key takeaways to foster creative potential:

- Consider creativity as a skill you can train, not a talent you are born with.
- Be aware of personality differences and empathic towards different perspectives.
- Let the group take task-ownership and set the rules for their collaboration.
- Explicitly encourage to be more creative and take risks (and mean it!).

# Collaboration

Written by Felix Becker & Raoul Pilcicki



In the following chapter, you will learn why collaboration is vital for creative tasks and what you can do to foster collaboration among team members. This chapter is targeted at teaching personnel and individuals who work on collaborative creativity tasks.

The reason why people work together in teams can be manifold. Research suggests that some goals can be reached through collaboration that are impossible for a single person to reach. On top of that, the results of collaborative tasks can equal or exceed the value or potential of individual tasks. So why don't we tackle all tasks together in groups? Modern systems for creative collaboration offer many capabilities for interaction, information sharing, idea organization, prototyping and more. This may appear convenient, but collaborators should keep in mind that additional capabilities can also increase the system complexity.

## Theoretical background

Although collaboration has the potential to better the outcome of tasks, some pitfalls should be considered.

**Evaluation apprehension** describes the situation where one or more team members are reluctant to share their input because of fear of being negatively evaluated by other team members. It can occur when trust is low between group members. The other major problem in team settings is **social loafing**, sometimes also referred to as **free-riding**. It describes the phenomenon when a team member does not contribute to the team effort and instead lets the others do the hard work. Both aspects are the result of dysfunctional social relations in teams.

To lower the chance of facing negative side effects of collaboration Siemon et al. (2017) suggest six principles that should be followed to ensure successful collaboration. Table below shows behavior objectives for team members to foster collaboration and gives suggestions on how to achieve the objective.

### Principles of collaboration and practical suggestions (Siemon et al., 2017)

Objective	Realization Suggestions	Principle
Team members should show the same commitment they expect from others.	Making individual efforts visible encourages reciprocity.	<b>Reciprocity</b>
The team members need a common goal.	Visualize the group members' individual goals at the beginning of the group work and try to find common ground.	<b>Common goal</b>
Trust and mutual respect should prevail among the team members.	Reduce anonymity by encouraging group members to turn on their cameras in collaborative work sessions.	<b>Trust and mutual respect</b>
Team Emotional Intelligence describes the ability of group members to assess their own emotions as well as those of other group members. This ultimately leads to better interaction with each other and thus to better group performance.	Social profiles and networking activities, sharing information about personal skills and knowledge fosters empathy for other group members and helps to collaborate more effectively.	<b>Team Emotional Intelligence</b>
Group members should act benevolently toward other group members and not intentionally sabotage the performance of others.	Keep the group aware of the advantages of working together towards their common goal.	<b>Benevolence and Commitment</b>
The group's sense of unity has a positive impact on group performance.	Foster group cohesiveness through task unrelated activities like small games or discussions about task unrelated topics	<b>Cohesiveness</b>

### Building blocks of collaboration

When thinking about collaboration, one can identify two main preconditions which have to be fulfilled for collaboration to actually happen. The availability of means for communication is the foundation on which collaboration is based, especially in scenarios that rely heavily on a variety of thought processes and opinions like creativity. Different communication channels are categorised after the level of communication richness they offer (Daft & Lengel, 1986, Daft et al., 1987). Choosing the right communication channel for the message you want to deliver is necessary. Sometimes short instant messages are the right channel to use, but when emotions, gestures and facial expressions are also important to deliver context in the form of non-verbal queues, text-based communication is just not enough. So in order to not obstruct meaningful communication, make sure to choose the right communication channel for the message you want to send.



The following table gives some guidance on the available communication options.

**Communication needs and suggested channels**

Communication needs	Suggested channels
Memos, News, Notifications (no answer expected)	Instant messages, eMail
Brief exchange	Instant messages, groupware solutions (e.g. MS Teams, Slack)
Longer exchange	eMail, Calls, Video Conferencing solutions

Even in highly collaborative settings, it is vital to have some degree of coordination among the people involved in your collaborative creativity setting. Generally speaking, coordination can happen in two different ways: hierarchical and heterarchical. In hierarchical coordination scenarios, one group member decides who is responsible for which task or when a meeting happens. In heterarchical coordination, such decisions are a matter of negotiation processes among all group members, involving social facilitation. According to social facilitation theory, the presence of like-minded people pursuing a common goal can increase individual motivation. For real collaboration to happen, team members must meet each other at eye level. Therefore, heterarchical coordination is usually preferred in collaborative creative group work.

Contrary to intuition, research shows that limiting feature availability, communication and overall media richness along a creative process can promote adaptation and engagement of inexperienced users and stimulate creativity. To benefit from media richness while preventing unnecessary overload or confusion during creative collaboration, specific constraint-based interventions for developers, facilitators and collaborators have been described (Schmidt et al., 2017; Chao et al., 2020). Many features require extensive learning, and large amounts of information can cognitively overload and confuse users, making it difficult to concentrate on essential and currently relevant tasks.

## Constraint-based principles to support creativity in virtual collaboration (Pilcicki et al., 2022)

Principle	Aim	Intervention	Mechanism
<b>Initial Limitation</b>	Engagement from the start	<ul style="list-style-type: none"> <li>Limit features in initial stages</li> <li>Offer basic functionalities for input, highlighting, navigation</li> </ul>	<ul style="list-style-type: none"> <li>Prevent hesitancy to contribute</li> <li>Promote social facilitation</li> </ul>
<b>Blocking &amp; Proceeding</b>	Promotion of focused activity and efficiency	<ul style="list-style-type: none"> <li>Block distracting applications and functionalities</li> <li>Limit overview of work areas</li> <li>Proceed through work stages with limited time</li> </ul>	<ul style="list-style-type: none"> <li>Prevent distractions and premature discussions</li> <li>Promote engagement</li> </ul>
<b>Late Variety</b>	Expression and simulation of ideas	<ul style="list-style-type: none"> <li>Increase feature variety in later phases</li> <li>Offer various forms of media input, elements, highlighting and connecting</li> </ul>	<ul style="list-style-type: none"> <li>Prevent cognitive overload</li> <li>Promote focused exploration</li> </ul>

To enable engagement of inexperienced collaborators from the start, features can be limited to a viable minimum in the initial stages of divergent thinking, involving only basic functionalities for input, highlighting or navigation. Hesitancy to contribute can be prevented by offering simple examples in work areas, social facilitation promoted by creating smaller subgroups of collaborators (“Principle of Initial Limitation”).

Focused activity and efficiency can be promoted by blocking distracting applications and functionalities on collaborator’s computers, their overview of work areas and visibility of user activities limited. Distractions and premature discussions can be prevented by making collaborators proceed through stages with a limited overview of work and limited time (“Principle of Blocking and Proceeding”).

To enable inexperienced users to express, simulate and differentiate ideas in the context of virtual collaboration, feature variety should be increased only in later phases of divergent creativity, involving various forms of media input, creating, highlighting and connecting of elements, in order to prevent cognitive overload at the beginning and promote focused exploration (“Principle of Late Variety”).

### Key takeaways for creative collaboration:

- Keep the effects in mind which can potentially decrease collaboration output.
- Embrace activities which fulfill collaboration objectives.
- Consider the application of constraints, as tools and apps can cause feature fatigue or cognitive overload and inhibit valuable contributions by group members.
- Choose the right communication channel for the message you want to deliver.
- Enable group members to meet and collaborate at eye level.

# The Process of Creation

## How to Approach a Creative Task

Written by Pia Gebbing & Christoph Lattemann

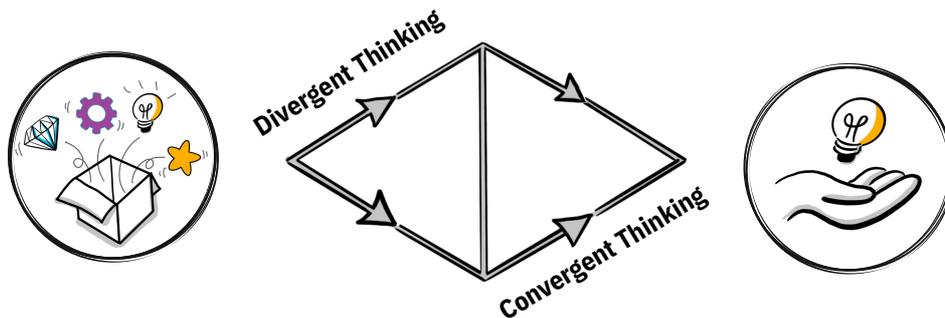
The creative process can be understood as the sequence of thoughts and actions that marks the generative activity and leads to an original, valuable idea or result (Lubart & Thornhill-Miller, 2019). In this regard, two highly researched thinking styles are often discussed as indicating different phases of the creative process : Divergent and Convergent thinking.

Divergent thinking requires constraint, anonymous collaboration and convergent thinking vivid collaboration with a lot of presence. When working on a creative task in online- and offline collaboration, it all comes down to the right balance of “togetherness” and “apartness” (Nemiro, 2002, Barki & Pinsonneault, 2001).



### Divergent & Convergent Thinking

**Divergent thinking** means approaching problems in an open, unsystematic and playful way, eliminating blocks to thinking and critical objections (Guilford, 1957). However, divergent thinking is especially prone to the previously described group dynamics, such as production blocking and social loafing, which can reduce the fluency and flexibility of the idea generation (see chapter 4 - Collaboration).



**Convergent thinking**, describes a rather logical, planned and rational thinking style (Guilford, 1957). In the process of convergent thinking, it is necessary to compare, evaluate, and coordinate the different ideas of team members to develop the best and most creative solution (Cropley, 2006).

Like a jigsaw puzzle, the individual pieces of information are put together to form an overall picture. Unfortunately, group members often fail to pool their information effectively.

The discussion tends to be dominated by information that all members had in common before the discussion, so that it gets repeated more often than less common, more original ideas (Stasser & Titus, 1985). As a result, a piece of information that might be important might go unnoticed if only one person knows about it and does not manage to bring it into the discussion.

Second, we tend to give more attention to information that supports existing opinions and preferences (Karau & Williams, 1993).

In the context of a creative task, a highly original idea is less likely to be shared by several people but rather suggested by one single individual and might receive less attention than more common ideas shared by many (Mueller et al., 2012; Stasser & Birchmeier, 2003).

#### Electronic-Brainstorming

**Disconnect** - To improve the outcome of a brainstorming session, first let group members brainstorm on their own. Encourage them to disconnect and even go away from their screen.

**Connect** - bring the group back together to share and discuss their ideas. Use a digital whiteboard for visualization & clustering.

**Large groups:** exchange in small breakout groups first, before discussion ideas in big groups.

## Design Thinking

For about a decade, Design Thinking has been considered a prominent collaborative innovation process or method in the scientific and business world as well as in education. In order to address complex challenges, wicked problems, and uncertainty, Design Thinking has proven to be a valuable concept to foster creativity and innovation. Therefore, business schools worldwide have introduced Design Thinking and related innovation and entrepreneurship courses to equip the future workforce with the needed soft skills and practical experiences in projects. However, as the application and execution of Design Thinking rely, among other factors, on creativity, empathy, intense collaboration, and tangible prototyping to unfold its full potential, the disruption of face-to-face collaboration and today's demand for new e-learning concepts poses a great challenge, in particular during COVID-19 and post COVID-19 times.

The Design Thinking process is based on **user-centered innovation** and idea generation. It aims to mobilize and maximize the intelligence and creativity of teams. By realizing the potential of teams, the Design Thinking method allows us to solve the highly complex problems of our time. To ensure this, Design Thinking draws on approaches from the design field. The following three elements are central to this:

- The Design Thinking process needs teams that are characterized by a certain disciplinary diversity and a mindset (see Chapter 3: Creator).
- The Design Thinking method consists of a six-part work process (see figure below). This work process aims to apply design insights to other types of problems and to "reframe" perspectives.
- There are more than 400 Design Thinking methods which supports team members in their creative thinking. Well-known methods are mind-maps for stakeholder analyses, interviews, Mad Libs, brainstorming, or rapid prototyping.



### 6 Steps of Design Thinking Process

Every Design Thinking process begins with a challenge or well-defined problem (called the "design challenge") to solve. In the first three steps, DT teams are gathering insights and data. It is important that teams focus on users or stakeholders (**steps 1 and 2**). Here, teams apply social science methods (e.g., qualitative interviews, participant observation). The goal is to build empathy with the stakeholders. This is less about hard-facts and robust data and more about rich descriptions of user experiences and insights. From these insights, the teams derive the needs of users.

In **step 3**, the teams synthesize a unique point of view based on the user experiences and insights – the so-called point of view. The problem is vividly represented – often metaphorically – by an ideal-typed user. In this step, teams are encouraged to interpret known problems from different perspectives and in innovative ways (reframing) by reinterpreting data, observations, and experience reports through a radically user-centered interpretive framework. These reinterpretations of known problems form the basis of idea generation in the fourth step.

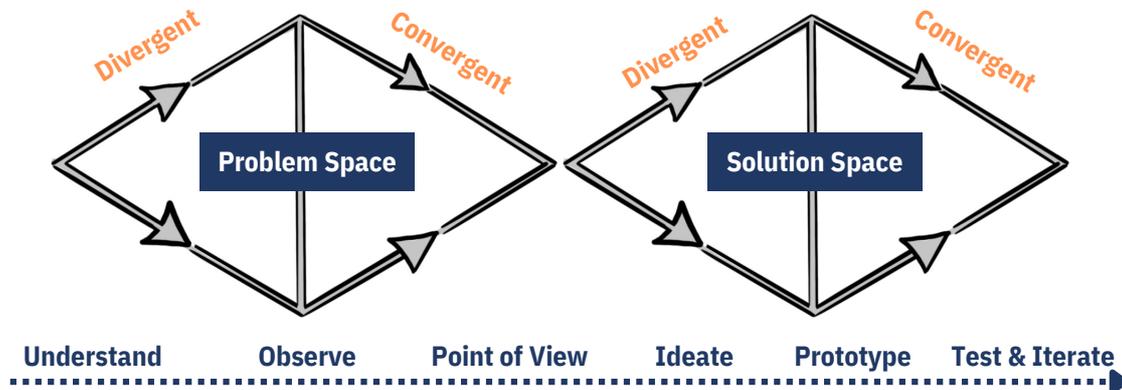
With the help of the "Point of View", a question is drafted based on which the generation of ideas – or brainstorming – is oriented. Brainstorming (**step 4**) stimulates the (further) development of "wild" and radical ideas. To do this, it is important to develop as many ideas as possible in a relatively short period (probably 15 minutes). Unlike many innovation and creative methods, the Design Thinking process does not end with the generation of ideas.

In **step 5** (prototyping), teams are asked to select one of the many ideas (usually through a voting process to avoid long and pointless discussions) and implement it prototypically. The purpose is to arrive relatively quickly at prototypes of an idea that are demonstrated to the users of the innovation for testing. Accordingly, prototypes in Design Thinking have a very rough and unfinished character.

In the final **step 6**, prototypes are presented to users for testing. In this phase, teams gather impressions and reactions to get back into the design thinking process.

## Best practices from Design Thinking

The following insights and recommendations were derived from online design thinking workshops conducted at the D-Forge Design Thinking Lab at the Jacobs University Bremen between 2016 and 2022 (Gebbing, 2022; Gebbing et al., 2021; Gebbing & Yang, 2022). The setting of the workshops altered between in presence, completely virtual or hybrid settings. Workshops were held with different target groups, ranging from students and graduates to teachers, professionals, and managers.



### Double Diamond Model:

The "Double-Diamond Model" reflects the sequence of divergent and convergent thinking in the Design Thinking process (Kim & Ryu, 2014). Individual phases are divided into (1) problem analysis (understanding) and (2) information gathering (observing) (3) reformulation of the design challenge based on the collected information, (4) generation of new ideas, (5) their implementation (prototyping), and (6) testing and adjustment.

### Differentiation between Problem and Solution Space

As illustrated in the two "diamonds", Design Thinking makes a strong distinction between analyzing the problem and finding the solution. Particular important is understanding and investigating the design challenge by looking at it from a different perspectives. This is the basis for developing new, original, high-quality solutions appropriate to the task at hand.

### User-centeredness

The problem analysis involves empathizing with other stakeholders and understanding their needs and values, e.g. by conduction interviews. The user-centered approach ensures that the developed solution is appropriate for the task.

### Anonymity & Exchange:

Some students prefer to work on their own in divergent ideation phases because they might fear getting criticized if they express their ideas freely. At the same time, the same student might love to synchronously co-work in convergent ideation phases (see Chapter 3 - Creator). These desires and preferences should be reflected in the offered and used functionalities of digital applications.

### Toolbox

Design Thinking coaches have compiled a rich collection of methods over the years, some of which are also suitable for online implementation. These are freely accessible on the Internet and easy to reach (see). Instructors should be familiar with the frameworks and should coach accordingly.

For a collection of methods from our previous research project DETHIS, visit: <https://www.designthinking-methoden.de>

### Key takeaways for the creative process:

- Design Thinking is a popular process, method and mindset for creative group collaboration and innovation.
- The Double Diamond Model divides the creative process in 6 phases.
- Divergent thinking in online settings requires more anonymity and greater freedom.
- Convergent thinking needs more exchange via richer communication channels.
- First explore and understand the problem before looking for the solution.
- The creative process requires a balance between togetherness and appartness which requires special attention in the digital environment.
- A user centered approach helps to find ideas that are appropriate to the task.

# Context

## Suggestions for instructors and individuals

Written by Xingyue Yang & Christoph Lattemann

It is important to understand how to establish a proper digital environment, and particularly in the context virtual group work, that can foster creativity in digital group work. In this chapter, insights on designing a creative environment for group work will be presented. The focus lies on technological, social and organizational aspects, which influence creative digital collaboration, especially in a learning environment. In addition to digital tools and their functionalities, which define the technological setup, it is also vital to understand how to organize a proper digital environment concerning social group dynamics and individual perceptions.

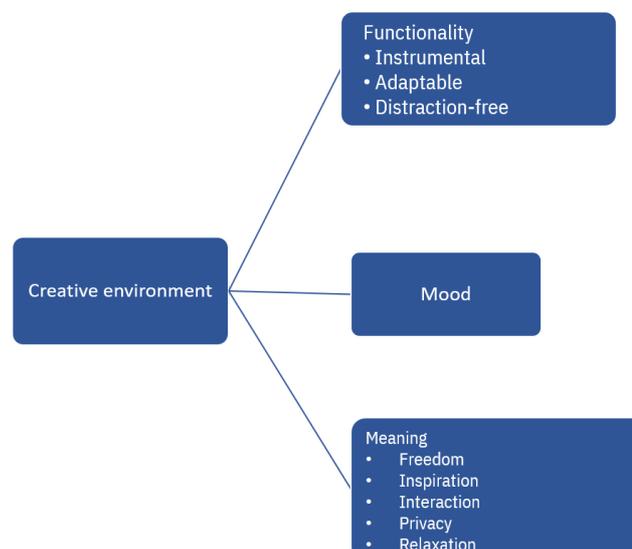


### Theoretical background: technological, social, and organizational influences on creative environments

The Triple Path Framework (Dul, 2019) describes three critical factors that impact creativity in a physical environment:

- **Functionality:** The availability of tools necessary for creative activities. It is a “must-have” or necessary condition to enable creativity. In a physical, in presence setting, the functionality is determined by the location, space and any artifacts in the physical environment. In a digital environment, functionality is defined by the availability of broadcasting infrastructure (internet), hardware devices (such as AR/VR devices) and software applications.
- **Meaning:** Each environment conveys a certain meaning to a person. A clean and tidy room might be inviting for focused work, a colorful and vivid environment instills curiosity and playfulness. Understanding how the environment impacts individual creativity is vital to provide incentives of creative performance in a group. It can be influenced for example by the organizational setting, the presence or absence of governance and incentives, individual autonomy and freedom and workload and organizational impediments and group dynamics.
- **Mood:** As explained in chapter creator, creative work also depends on the mood of individuals. Studies have shown that the design of the environment has a significant influence on the way people feel and how they collaborate (Baas, De Dreu & Nijstad 2008). Esthetic design often takes this into consideration and uses colors, affordances and cues to create very carefully designed environments.

### The Triple Path Framework (Dul, 2019)



## Technological aspects



In the past decade, several digital applications such as digital whiteboards have specifically been developed for collaborative creativity (Siemon, 2019). However, tools are often limited in their functionalities. That is why groups still need to combine existing applications for virtual creativity work; using one tool for **communication**, another one for **data storage and sharing**, and online documents or digital whiteboards for synchronous and asynchronous creative idea generation. A **digital whiteboard** basically offers the same functions of a physical whiteboard, allowing to work with post-it notes, add pictures, use templates, connect and save the progress. Prominent digital whiteboards are for example Mural, Miro, Google Jamboard or the MS Teams Whiteboard.

The following table shows some critical key features for collaborative creativity group work and selected prominent applications, which cover these features. The table shows that some products offer a broad range of applications, which cover the critical key features for creative group work. Our research shows however, that students are quite often reluctant to use new tools and are more likely to use a combination of various tools, which they know from their daily life, such as Whats App for speedy communication and coordination or Snapchat for sharing content.

### Communication and collaborations applications and key features for creative group work (as of May 2022)

Communication & Collaboration applications	Key features for creative group work					
	Video-conferencing	Break-out rooms	Screen-share	Creative workspace	File storage	Messaging
Microsoft 365	✓	✓	✓	✓	✓	✓
Zoom	✓	✓	✓	✗	✗	✓
Skype	✓	✗	✓	✗	✗	✓
Cisco WebEx	✓	✓	✓	✗	✗	✓
Mural	✓	✗	✗	✓	✓	✗
Miro	✓	✗	✗	✓	✓	✗
MS Whiteboard	✗	✗	✗	✓	✓	✗
Google Jamboard	✗	✗	✗	✓	✓	✗



See Chapter 4: Collaboration  
for more information concerning the selection of tools

## Social aspects

The following aspects of the organizational environment impact the performance of individual and thus group creativity (Amabile, 1996):



**Organizational encouragement** of risk taking and of idea generation (see Chapter 1): group members are more creative and voice novel, unusual ideas if they feel encouraged and safe, especially when they are not confident with their ideas.

- A supportive environment for the generation of novel ideas is an important aspect of organizational encouragement, because threatening and critical evaluation negatively affects creative performance, thus being supportive can always bring positive energy in the group, and motivate people to be creative.
- Reward and recognition of creativity: a confirmation of one's competence, positive feedback of one's idea can be an encouraging signal for others to act creatively.
- Moreover, collaborative idea flow is also an important aspect of organizational encouragement, which refers to the situation that creative ideas tend to be generated in a group when the exposure of others' ideas increases. In other words, a group is highly likely have a flow of generating ideas when they are exposure to each other's ideas.
- Shared Understanding - Goal clarity is a vital aspect in encouragement. The common goal should be clarified in the beginning of the collaboration, in order to make sure everyone is on the same page. Moreover, if your role is supervisor or group leader, be open to group members' ideas, interact and bond with them can foster intrinsic motivation necessary for creativity of your group members.
- Work group support - Working group normally consists of members that have different culture and education backgrounds. In these cases, it is challenging for group members to understand each other's perspectives and to build up a shared understanding and a commonly accepted group ethics. However, having diversity in a work group can also result in exposure of a great variety of unusual ideas, and it can positively creativity in a group (Albrecht & Hall, 1991; Amabile, 1996; Nemiro, 2001, Redlich et al. 2017).

**Individual autonomy and freedom** refer to a sense of ownership and control at work. Being able to have high autonomy and freedom at work has a significant influence on creative performance in a group, both physical and digitally (Nemiro, 2015).



**Workload pressure and organizational impediments** are often the obstacle for creative performance. Work pressure is synthesized by researchers in two distinct forms: excessive workload pressure, when it was imposed as a means of control, which is negative factor for creativity; and challenge, which is perceived as a necessary concomitant of important and urgent task, can foster creativity (Amabile, 1988).

## Recommendations for the set-up of digital environment for creative group work

The following findings and recommendations are derived from various design thinking workshops conducted in between 2016 and 2022. In these workshops groups of students and executives had to solve creative solutions for real-world or fake wicked problems. To solve the given problems, students had to follow sequences of convergent and divergent thinking by applying design thinking. The duration of the workshops varied. The setting of the workshop varied in terms of full virtual or hybrid settings, the use of applied digital tools (see list above) and their functionalities (applications to be used were pre-determined or could be freely chosen, sometimes functionalities of applications were artificially limited), the duration of workshops (from half day and five full days), the group size (four to seven) and the group members (undergraduate and graduate students, executives).

Quantitative and qualitative analyses of the described workshops show that the elements of environmental context, which are defined by technological, social and organizational aspects are intertwined. Variations of the technological settings impact social behavior and thus the performance of digital group work. Likewise changing organizational settings impacts technological requirements. That is why the following results just represent a list of factors that cannot clearly be referred to either technological or social aspects. The following results have been found:



- A **stable internet connection** is the basis for any creative group work in a digital environment. Network breakdown or problems prohibit digital group work and severely reduce the motivation of co-workers. A contingency plan should be in place in case of internet failure. The contingency plan must be communicated before group work starts.
- Purposefully plan **offline times** in long workshops - Digital collaboration is much more exhausting than collaboration in physically present teams. Long “screen times” may lead to techno stress and to a sharp decrease in attendance. Plan time for individual offline work during workshop days. This reduced workload pressure and perceived organizational impediments and increase creativity.
- Divide creative work in phases of **synchronous and asynchronous work** - Some activities of creative work, e.g. brainstorming and researching information can be conducted independently and asynchronously to a large extent. To reduce the mental strain of video conferences, it is helpful to allow participants to “retreat” from the group setting from time to time and work on their own.
- **Visualization** - In a digital setting, it is important that participants have a clear guidance throughout the creative process and track their progress. Visualizations should allow to evaluate the group work (see Chapter - The process of creating).
- Respect and reflect **individual preferences** and **adaptation of digital applications and functionalities** - Different personality characteristics influence individual preferences and needs in various phases of creative work (see Chapter - Creator). Groups should be enabled to work in a digital environment which is adapted to their needs (see chapter - Collaboration), using applications and functionalities that support and engage individuals in the process. It might even necessitate to purposefully constrain the use of existing functionalities in selected creativity phases (Pilcicki et al., 2021).
- Support **informal social exchange**. To achieve internal work group support and reach a common understanding among group members, groups need moments of informal exchange. Groups need a “forming” phase, where group members get known to each other, where they develop a shared understanding of the problem at hand and to develop a shared mental model (Redlich et al., 2017). However, whereas these informal moments occur naturally in the physical setting, it occurs not as naturally in the digital setting. Especially in the beginning, warm-up exercises such as ice-breaker activities have positive effects on personal bonding, trust, and empathy (Gebbing et al., 2022).



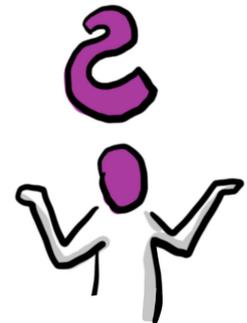
## Suggestions for supervisors



- The learning objectives of the course should reflect the given subject itself, the reflection of group work, as well as the use of new internet applications.
  - Be familiar with digital technologies yourself, do a test run before course, and give clear instructions to students.
  - Always be prepared for internet failure and communicate a contingency plan before the group work starts.
  - Use adequate frameworks for innovation and/or creativity work, such as Design Thinking or the Double Diamond model (see chapter 5: Creating).
  - Plan a reasonable schedule and allocate time for flexibility within this framework, and plan time for individual off-line work during a workshop day. Don't expect students to work collaboratively online over more than 60 minutes, schedule more breaks in the name than in a physical workshop setting.
- Purposefully plan offline times - digital collaboration is much more exhausting than collaboration in physically present teams. Long "screen times" may lead to techno stress and to a sharp decrease in attention. Plan time for individual offline work during workshop days.
  - Plan some time for get-to-know-your-mate for students in the beginning of the course.
  - Plan time for teaching and learning new applications, such as digital whiteboards.
  - Be encouraging, allowing students think freely and wildly.
  - Avoid criticism during idea generation phase.
  - Have feedback session, ask what students like and dislike.
  - Properly use time constraints - do not use it to control, but as a way to ask for commitment and propel progress.

## Suggestions for creative individuals

- Explore new technologies, don't be afraid. Try it out and let it help you to be creative.
- Use ice - breaker activities to be acquaint with your group mates.
- Understand the cultural and educational background of your group members, be empathetic to their situation and proactively reach out to them and offer help when needed.
- Define a clear goal and make sure everyone is on the same page from the beginning of collaboration.
- Make every member accountable of the task.
- Be committed to your assigned task and respect the deadline.
- Allocate your time reasonably and allow yourself "me-time" and be disconnected from internet when you feel overloaded.



### Key takeaways for creative digital environments:

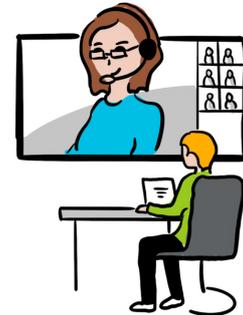
- The context or environment impacts creative performance in digital group work. Employers should pay attention to the environments they create for their potentially creative employees.
- The functionality of the technical tools used, the meanings and values of the work- and organizational culture, as well as the motivation and technostress are all factors that influence creativity.
- Group members should be provided with seamless access to internet and digital tools to produce creative work and to enable creative collaboration in the digital environment.
- Encouragement in group is vital to foster creative performance in digital groupwork.
- Risk and tolerance to novel ideas allows group members think more creatively and freely.
- To enable creative performance in a group, it is critical to allow autonomy and freedom at work so the group members can try out new solutions and, if desired, retreat themselves.

# Context: Remote work and creativity

## Suggestions for managers and employees

Written by Øystein Tønnessen

Remote work can foster creativity. The COVID-19 pandemic has shown us that working from home may improve creative performance on both individual and group levels, well aided by digital tools. However, the picture is complex with numerous factors and big individual and organizational differences. That said, the recent experiences provide a historic opportunity to rethink the organization of work to facilitate idea generation, problem solving and innovation. What can we learn from the unprecedented high-intensity remote work practice during the COVID-19 pandemic that can be used to foster creativity in the future of work?



### The big shift

The outbreak of COVID-19 and the resulting social distancing requirements have led to major disruptions in the world of work. Organizations were forced to impose work from home (WFH) on their employees, and an overwhelming majority of knowledge workers had no choice but to switch to WFH practice overnight. WFH during the pandemic differs from remote work practices pre-COVID-19 because it is unprecedented, forced, rapidly introduced and adopted in full scale across organizations and sectors worldwide. Hence, it is important to remember that although the dramatic changes bring about outstanding learning opportunities for organizations, managers and employees, the new experiences are based on an extraordinary and unparalleled crisis. It is no matter of course that successful practices and outcomes during the pandemic will apply to the post-pandemic era. However, this chapter will highlight findings from two recent empirical studies that provide insights for facilitating creativity as organizations develop work policies and practices for the future.

Due to the absence of face-to-face interaction for creative collaboration during the pandemic lockdown, employees had to rely on digital platforms to replace their previous co-located interactivity. In our research, digital platforms refer to communication and collaboration tools that connect knowledge workers virtually to one another in real-time, including video conferencing solutions (e.g., Zoom, Teams, Skype), enterprise social media (e.g., Slack, Workplace), and file-sharing tools (e.g., SharePoint, Dropbox, Google Drive). Studies have shown that digital tools and practices influence creative performance on both individual and group level (Chandra et al., 2020). Social relations that are mediated by digital technology could be just as important as physical co-presence for fostering creativity (d'Ovidio & Gandini, 2019).

### Creativity at a distance

Studies on WFH prior to the pandemic have indicated that remote work (including WFH) may result in higher employee creativity than working on-site in a traditional office. Shifting to remote work can help individuals and groups generate more and better ideas. Some of the reasons are increased flexibility and autonomy, as well as less distractions in the WFH setting (Vega et al., 2015).

During the pandemic, practitioners and researchers have observed that extensive use of digital tools may enhance creativity. Integration of diverse expertise from multiple digital sources, both within and outside an organization can foster creativity in a WFH context. Digital platforms allow employees easy access to a broad network of diverse professionals who might have ideas or perspectives different from their own.

Furthermore, virtual creative group sessions can make it easier for less vocal participants to be heard compared to physical meetings. Digital platforms impose more constraints on collaboration than face-to-face settings, and these constraints may spark creative thinking.

However, remote work and the extensive use of digital communication tools reduce spontaneous face-to-face conversations, which facilitate knowledge sharing, exchange of ideas and support for those ideas. Face-to-face interactions are likely to produce more unplanned casual and creative conversations than virtual interactions. Hence, remote work risks destroying opportunities to engage in collaborative idea-sharing with informal group work aimed at promoting creativity and innovation. The lack of informal and spontaneous interaction has proved to be a widespread issue in organizations during the pandemic.

Despite contrasting experiences and preferences of employees, recent studies suggest that remote work and digital collaboration will become much more common in the future (Brem et al., 2021; Wang et al., 2021). One big question is: What can we learn from the extraordinary WFH situation during the COVID-19 pandemic, and how can it be used to foster creativity in the future of work?

## Early phase of the pandemic

During the spring 2020 pandemic lockdown, we examined creative performance among Norwegian knowledge workers across business sectors (Tønnessen et al., 2021). Some key findings are summarized below:



- **Creative performance was affected by work from home (WFH).**  
41% reported increased individual creativity. However, this effect is not directly associated with the WFH practice. Research suggests that uncertainty in times of crisis may enhance creative exploration as organizations are forced to innovate and change.
- **Digital knowledge sharing was affected by the WFH practice.**  
Knowledge sharing within and outside the organization using digital platforms has a significant positive impact on creativity. 42% reported an increase in digital knowledge sharing internally. On the other hand, 31% reported decrease in digital knowledge sharing with actors outside the organization.
- **Digital platforms fostered creativity when employees WFH.**  
The introduction and implementation of digital tools for communication and collaboration in the early stage of the pandemic had a positive impact on creativity. Employees with digital skills and motivation to utilize digital tools tend to become more engaged in creative problem solving (Cai et al., 2020). Despite the overnight switch to WFH and steep learning curve for both individuals and organizations, the study results show that the use of digital tools affected individual creativity positively.
- **Individual motivation fostered digital knowledge sharing and creativity**  
Both internal and external virtual knowledge sharing was strongly affected by employees' motivation. Furthermore, individual motivation was crucial in fostering creativity in the sudden virtual context. Research has shown that numerous contextual characteristics affect creativity via its effects on employees' motivation (Amabile, 1996; Shalley & Gilson, 2004).

### Key lessons learned from the early phase:

- The use of digital platforms fosters creative performance when employees WFH.
- Promoting digital knowledge sharing among colleagues, as well as actors outside the organization, is crucial for creative performance in a WFH setting.
- Motivation drives knowledge sharing and creativity in a virtual work environment.

Our study shows that using digital tools plays a critical role in facilitating creative performance when employees WFH in the early phase of the pandemic. This highlights the crucial importance of new technology and digital transformation. To foster creativity in the future, organizations need to adopt and implement extant technology and ensure proper training and inclusion.

## Mature phase of the pandemic

During the third wave of the pandemic in spring 2021, we interviewed employees in a Norwegian ICT consultancy. The participants were asked about their experiences and perceptions of creativity when WFH had become a normal practice. We found a large variation in individual experiences and reflections. Some of the key findings with associated statements from the participants are summarized below:



- **Creativity is perceived as crucial during the pandemic.**  
"Creative thinking is required all the time in this situation."
- **The extensive use of digital platforms may negatively affect communication and interaction.**  
"Digitally, there are bigger barriers when you want to contact people directly. It needs to be planned much more."
- **Informal and external exchange of ideas suffer the most.**  
"It's those things that are not planned. You never know who you'll meet by the coffee machine. That's very difficult to achieve digitally."
- **Structured creative workshops can work well digitally, while open brainstorming depends on thorough planning and skillful facilitation.**  
"I prefer physical workshops. When discussing it is better to be co-located. But I would have digitized the results."
- **The approach to individual versus collective creativity affects the respondents' perception of WFH.**  
Four out of ten employees experienced being most creative when they work alone. These employees are among the most positive to the WFH practice, even after a year of enforced home office. The reasons they mention are continuous uninterrupted work, higher concentration, minimal monitoring and greater freedom to explore new things that are not directly task-related. All these factors may positively impact idea generation and problem solving.  
"I enjoy sitting by myself, exploring complex problems and understanding things on my own."

On the other hand, most of the participants in the study perceive increased creative capacity when they collaborate. They prefer creating ideas and solving complex problems together with peers.  
"Creativity happens when I interact with others."

The groups who need social interaction for creativity are among those who experience WFH most negatively.  
"An essential aspect of creative processes is to lift each other's spirits. That doesn't work very well on Teams."

The study suggests that employee creativity suffers from the absence of spontaneous and informal face-to-face interaction, while well-structured sessions on shared digital platforms promote creative collaboration. However, the participants indicate that physical co-presence is most appropriate for solving complex problems. The findings suggest that facilitating idea exchange and developing a creative organizational climate is crucial for creativity in the remote work setting.

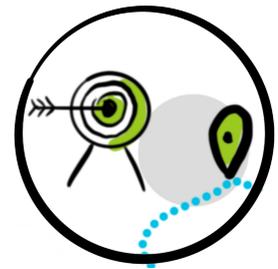
### Key lessons learned from the mature phase:

- The orientation towards collective versus individual creativity impacts employees' experiences of WFH.
- Planning and well-structured facilitation are required to succeed with virtual creative sessions.
- Spontaneous and informal face-to-face interaction is crucial to creativity and can most likely not be fully replaced digitally.

It must be emphasized that the findings in this qualitative study are not generalizable. However, they illustrate situational perceptions in a group of Norwegian knowledge workers and may serve to indicate some trends in the new world of work.

## Post-pandemic phase

So, what about the future? Will autonomy, productivity and efficient digital collaboration make employees want to continue WFH? Or will the need for social interaction and spontaneous face-to-face meetings make people return full-time to the office? Alternatively, will new flexible work models emerge and address more facets of fostering creativity?



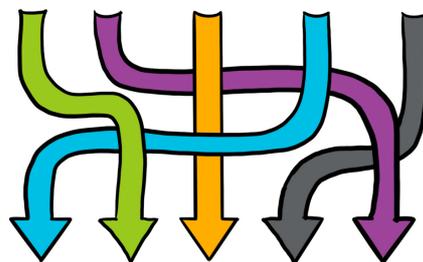
Companies observed increased productivity and creativity among their employees in the early phase of the pandemic, but over time, the social isolation at the home office seemed to affect job satisfaction and creativity negatively. Therefore, many companies are now embracing so-called hybrid work models. Hybrid work refers to various models with a mix of conventional in-office work and remote work. Recent surveys and reports conclude that the experiences from full-time WFH have made an extensive number of employers and employees prefer hybrid work as a sustainable solution for the post-pandemic era.

Research on hybrid group work is insufficient, especially concerning creativity and innovation. Understanding how social interaction and knowledge sharing unfold in hybrid work groups and how it influences creative processes is vital. For example, some tasks such as idea creation may be more suited in a hybrid format, whereas idea evaluation may be better conducted when all group members meet physically. Given a hybrid work structure, the role and function of the corporate office will change. Traditional offices may become primarily “culture spaces”, providing workers with a social anchor, facilitating connections, enabling learning and knowledge sharing, and fostering creative collaboration.

Experts agree that, done right, hybrid work models will allow organizations to recruit talent better, foster employee creativity, achieve innovation, and create value for all stakeholders. However, hybrid work does not necessarily mean a fixed alternation between home office and traditional office. There is a wide range of different possibilities that can meet individual employees’ needs and support various work tasks. One example is coworking spaces as a remote work location alternative to WFH.

In our study of ICT professionals, an overwhelming majority emphasized flexibility and freedom of choice as their main preferences regarding future locations and practices for conducting work. They also highlighted that motivation depends more on meaningful and challenging tasks than work location. Moreover, employees preferred occasional remote work determined by work tasks, collaboration and everyday practical issues. The findings indicate that individual flexibility, motivating tasks and social interaction are more crucial factors of creativity than the work location itself. In this regard, it is important to remember that flexibility in the work context is not only about the place where the job is done but also about time, tasks, methods and work arrangements.

Practitioners and researchers agree that fostering creativity in the future of work will not be an easy fix. There is no one-size-fits-all model. Below we have identified some guidelines which may be useful in this endeavor.



**The COVID-19 pandemic has fundamentally changed the way we work. Although our experiences are obtained during an unprecedented crisis, lessons learned will remain important in the time to come. The intertwined physical-digital future will be characterized by a great variety of flexible work models. In these times of complexity and uncertainty, facilitating and fostering creativity is more important than ever.**

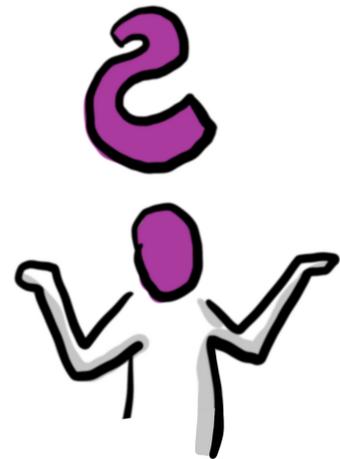
## Suggestions for managers



- Be empathetic and listen to your employees' experiences and individual needs.
- Experiment and trial alternative work arrangements with the intention of facilitating creativity. Evaluate and adjust.
- Embrace individual differences and various types of creative work.
- Encourage group work across departments and disciplines.
- Ensure thorough onboarding of new employees and allow them to contribute fresh perspectives and ideas.
- Facilitate social relationships and creative collaboration prior to determining permanent remote and hybrid work practices.
- Provide technologies, digital tools and proper training needed for idea sharing and problem solving in remote work environments.
- Care deeply about your employees' wellbeing, motivation and inclusion.
- Put your best effort into building an innovative company culture that values and supports creativity.

## Suggestions for employees

- Explore innovative technologies, digital platforms and enterprise social media to share ideas and provide feedback.
- Avoid an "us versus them" split between co-located and remote members of work groups.
- Check in with colleagues and help support social interaction both digitally and physically.
- Have virtual coffee and networking discussions with peers across the company and beyond.
- Take periodic work breaks, which give you space to reflect on ideas.
- Remember that flexible work arrangements should also take care of the company's and customers' needs.



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Christoph Lattemann is Professor of Business Administration and Information Management at Jacobs University Bremen, Germany. His research encompasses the two major global trends: Digital Transformation and Globalization. He is the founder and director of the Design Thinking Lab at Jacobs University.

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In his research Felix is concerned with the design of digital support systems for Smart Participation. This is characterized by its collaborative structure built on aspects of bottom-up participation. His work draws on the research paradigm of Design Science Research, which is based on the scientifically rigorous design of information systems. In doing so, he applies collaborative and participatory research methods and further develops existing process models towards a more meaningful stakeholder integration.

In the context of creative virtual collaboration, he focuses on how collaboration is actually characterized and how collaborative behavior can be fostered.



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The digital transformation is changing the way we collaborate - be it in education or business. Creativity is essential and considered to be one of the most important core competencies of the 21st century. In order to master digital group work, we need to develop creativity, innovative approaches and new ideas. This handbook demonstrates how creativity can be strategically fostered and encouraged in digital environments. Practitioners, educators, and every day people will find tips and advice from interdisciplinary research on creativity in the virtual setting.



Funded by the  
Jacobs Foundation.

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