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MASTER'S THESIS

Rap music videos in the Global Science Opera – towards a teaching design

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Creative Disciplines and Learning Processes

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Abstract

This thesis aims to present a research-based educational method and design for using rap and hip hop in transdisciplinary science and arts rap music video (RMV) projects in the classroom within the context of the Global Science Opera (GSO). Building on theories of the GSO pedagogy, hip-hop-pedagogies, and theories of creativity in education, suggested guidelines of GSO RMV have been developed through the implementation of 10 RMV projects in the same teaching environment. 4 of these have been implemented in the context of the annual participation of the online GSO production. As a suggested signature pedagogy, GSO offers a transdisciplinary approach to teaching science through art activities. This study suggests expanding the creative activities in the GSO pedagogy to include a teaching design of RMV projects, as proposed in this thesis, through research on GSO RMV practices.

A structure of an RMV teaching design has been inspired by, developed, and mapped through a retrospective Educational Design Research process, with an emphasis on the lyrics production of the RVM projects. In this qualitative study, conjecture mapping has been used to build an analytical framework for systemising the data collected through the three EDR phases, concretising the high-level conjectures, embodiments, and mediating processes involved to achieve the preferred outcomes of the iterations.

Through the iterations of the study, a teaching design emerged and was proposed as suggested GSO RMV guidelines consisting of the four design thinking phases (Feel, Imagine, Create, Share) of the GSO pedagogy, a 5-step locally developed RMV model and a 5-step model of inquiry-based activities to developing RMV projects inside or outside of the GSO context.

This study's findings may contribute to future research on using RMV projects in a GSO context or as a teaching design used in a different educational context.

Keywords:

Creative pedagogies, Global Science Opera, Hip hop pedagogies, Rap music video

Acknowledgements (In Norwegian)

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Abbreviations

EDR	Educational Design Research
FICS	Feel Imagine Create Share
GSO	Global Science Opera
HVL	Høgskulen på Vestlandet/Western Norway University College of Applied Sciences
RMV	Rap Music Video
WASO	Write A Science Opera

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Rap music videos in the Global Science Opera – towards a teaching design

1 Introduction

1.1. Background

Through my master's studies in creative disciplines and learning processes at the University College of Western Norway, I came into early contact with the leader group of the international initiative *Global Science Opera (GSO)*. We had many interesting discussions where I, as a representative of the field of practice, came with input, seen with the eye of a teacher employed in a school in the process of changing from an old (LK-06)[1] to a new national curriculum (LK-20)[1]. The school where I work as a music teacher was later invited as a participant in the project. In recent years students in Valderøy Barneskule have participated in five GSO productions, four of which are student-produced rap music videos, through different interdisciplinary projects within the genre of rap/hip-hop. When our school was invited to participate in the GSO production *Gravity*[2] with a self-produced song in 2019, the students suggested producing a rap song with a music video. This was a genre and form of expression that had not been used before in the GSO context, and we have continued to develop the rap music video (RMV) teaching design during the three following projects, *Energize*[3], *Thrive*[4]*, and Creavolution*[5]*,* all as RMV projects within the framework of GSO.

Developing our local teaching design for this transdisciplinary context has been exciting but challenging. Because of the work we have done at our school in developing the RMV design over several years, this topic was a natural choice for me in writing this thesis. My aim is to propose the RMV design as a possible way of working

[1] https://www.udir.no/laring-og-trivsel/lareplanverket/
[2] The Global Science Opera, 2019, retrieved from https://www.youtube.com/watch?v=tQVyogfaJ_w&t=4800s Timestamp: 1.12.52
[3] The Global Science Opera 2020, retrieved from https://www.youtube.com/watch?v=uwmyYtyxzeM. Timestamp: 40.14
[4] The Global Science Opera 2021, retrieved from https://vimeo.com/653056743. Timestamp: 1.14.50
[5] The Global Science Opera 2022, premiering on the 20th of November, 2022

interdisciplinary and creatively for students at the intermediate level through a separate methodology for transdisciplinary work with rap/rhyme, both inside and outside of the GSO context. In my thesis, I wish to focus more on the "how" than on the "why." This thesis aims to suggest a teaching design for RMV projects in the context of GSO and map the main phases of such projects, as well as the elements of lyrics ideation and production in integrated RMV projects inside and outside the GSO context.

1.2. Why rap music videos?

When the students in our school suggested the genre hip-hop for the first GSO RMV in 2019, this idea was discussed in the teacher group. One of the teachers had a simple explanation for their choice: "Rap music is cool! It is a part of their culture. And the students already know how to create videos on their ipads and phones." This was also my own point of view on the matter. Being representatives of the TikTok[6]-generation, many of our students were already skilled video editors. So the teacher group decided to support the students in their vision of an RMV about a scientific topic: Gravity. According to Hooton, 2015[7], hip-hop was the most popular genre of music in the world on the youth-oriented platform Spotify, as well as being number one in overall American music sales in 2015. According one of the leading music research and analytics platforms, Viberate[8] hip-hop was still the most listened-to genre on Spotify in 2021[9]. Alexander Hone`s thesis (Hone 2017) also supports my and my collegue`s notion that hip-hop could be a culturally relevant music genre to use in education. Hone refers to Springer (2016) and Williams (2014) when he writes this on p 1:

> Nonetheless, in order for teachers to be able to engage with music that is relevant to students, they should not only know *about* music styles that are popular, but they should also possess knowledge and skills to teach them in the classroom (Hone, 2017, p 1).

At first glance, I think the cultural understanding emphasized in this quote is crucial in the face of the rising generation. Many students lack an inner motivation to embark on a

[6] https://www.tiktok.com/en/
[7] Retrieved from https://www.independent.co.uk/arts-entertainment/music/news/hiphop-is-the-most-listened-to-genre-in-the-world-according-to-spotify-analysis-of-20-billion-tracks-10388091.html Oct 18, 2022
[8] www.viberate.com
[9] Retrieved from https://909originals.com/2021/08/17/hip-hop-the-top-genre-on-spotify-while-radio-continues-to-go-pop-study-finds/, Oct 18, 2022

learning process, and cultural barriers between them and the teachers can, in many contexts, as I see it, be a source of misunderstanding, mistrust, and conflicts in today`s school, also in my own everyday teaching reality. According to researchers in the field of hip-hop pedagogy, hip-hop can be a lifeline for students who have lost the faith in the school system. When the teacher team of GSO RMV project nr 1 of this study decided to implement an RMV-project the emphasis on supporting the student`s own ideas and suggestions was high. As a music teacher, I was also curious to see the motivational effect of choosing hip-hop and rap in combination with video editing as work methods in my teaching.

1.3. Literature and previous research

Production and implementation of RMVs in a GSO context is a new phenomenon, and there is no existing literature on this specific field of creative pedagogies. However, literature on rap pedagogy and science rap pedagogy, also called hip-hop pedagogies, is an existing field with much research. In my thesis, I have tried to connect different traditions, using elements of them to build a new teaching design that could fit my own context. In my literature search, Oria and general searches via Google have been helpful. Regarding the literature on research design and conjecture mapping, I have also communicated with some of the authors of the articles and books used in this thesis. Using conjecture mapping and retrospective use of Educational Design Research has not been done within my field in Norway before, as far as I know, so it has been a challenging process with a steep learning curve. The main context of this thesis is the implementation of RMV projects in the GSO. GSO is already a part of an international community with a significant amount of research related to transdisciplinary work and research on creativity and creativity pedagogy. I see myself as a part of this tradition, and in this thesis, I am trying to link our work to existing research about GSO and hip-hop pedagogy, at the same time hopefully developing something new at the intersection of the two research areas.

1.4. Global Science Opera

Global Science Opera[10] (GSO) (Robberstad, 2017; Urbaniak et al., 2021) is a global initiative started in 2014 which builds on the previous work of WASO (Write A Science Opera)[11]. One of the main pillars of the GSO methodology is the emphasis on the arts, role-play, planning, and implementation of a science opera in an educational context of STEAM (Science, Technology, Engineering, Arts, Mathematics) (Colucci-Gray et al., 2017). Global Science Opera can be seen as a global creative educational initiative exploring science and arts simultaneously in an interdisciplinary framework. In 2019, the international project GSO4SCHOOL[12] was started, aiming to build a wider international network of teachers and students and provide a context for understanding the strengths and weaknesses of the GSO and propose new ideas to improve it. Students from all over the world participate in the annual opera, working with a sub-topic of the over-arching scientific topic, according to *The GSO4SCHOOL Teachers`Guidelines* (Robberstad et al., 2019). GSO4SCHOOL[12] is built on GSO initiative that was crystallized as a good practice in the CREAT-IT project[13] (Craft et al., 2016). This practice was further developed in the CREATIONS project[14] (Chappel et al., 2019) and also implemented in the Norwegian Research Council's iSCOPE project before developing the GSO4SCHOOL project (Robberstad et al., 2019; Sotiriou et al., 2019) and later analyzed and described as a signature pedagogy of GSO (Straksiene et al., 2022). The GSO4SCHOOL methodology is based on the Design thinking methodology developed by British Design Council[15] and is inspired by the OSOS Open Schooling Model[16] (Sotiriou et al., 2017, p 41), namely Feel, Imagine, Create and Share (Robberstad et al., 2019; Sotiriou et al., 2019), developed from the Design for Change-movement.[17] After the end of the GSO4SCHOOL project in Dec-2022, this methodology will be referred to as the GSO pedagogy (Straksiene et al., 2022).

[10] https://globalscienceopera.com/
[11] Ben-Horin, O. (2014). *WASO Guidelines EN | ISE Portal*. Retrieved the 15. April 2022, from https://portal.opendiscoveryspace.eu/en/edu-object/waso-guidelines-en-845084
[12] https://gso4school.eu/
[13] http://www.creatit-project.eu/
[14] http://creations-project.eu/
[15] https://www.designcouncil.org.uk/our-work/skills-learning/tools-frameworks/framework-for-innovation-design-councils-evolved-double-diamond/
[16] https://www.openschools.eu/open-school-model/
[17] https://www.dfcworld.org

1.5. Choice of the research arena and research questions

My work on the topic of this thesis started four years ago. It has been an interesting journey, where the research questions have changed through several revision rounds. During my first draft (master`s thesis draft document June-19), the literature on hip-hop pedagogy and reality pedagogy (Adjapong, Emdin, 2015; Adjapong, 2017; Emdin, 2011) inspired me. The same did the literature on the new Norwegian curriculum (LK-20)[1] and in-depth learning (Fullan et al., 2014; Gilje et al., 2018). At this time, my suggested research questions were related to these topics on a more general basis. After starting the process of planning and implementing the first GSO RMV project in the fall of 2019, I realized that I had to be more specific in how I articulated the research questions and problem definition. One year later, I narrowed the topic to analysing an interdisciplinary teaching design, including a rap/hip-hop approach. In this design, work with rhyming texts/rap in a GSO context could be included as a proposal for a practice with creative pedagogy as a foundation. I also wanted to find out if rap and rhyming texts as a form of work in a transdisciplinary project in primary school could cover some of the goals for the new curriculum (LK-20)[1]. At that point, I had already implemented two GSO RMV projects, and I realized that a focus on the RMV design itself, and more specifically the lyrics production, was needed to be able to develop guidelines used in future RMV projects, as such guidelines did not yet exist. After implementing the third project, I found it necessary to narrow the research questions even more down to the essence of the RMV design itself in a GSO context. I ended up with these research questions for this thesis:

> How can rap music video projects (RMV-projects) be designed and developed in schools as an integrated part of a Global Science Opera (GSO) pedagogy?
>
> A) What are the main phases of RMV-project designs in GSO pedagogy, and how can these be described, analyzed, and characterized?
>
> B) What are vital elements of lyrics ideation and production in integrated RMV projects, and what is the relationship between lyrics ideation/production and the overall educational design framework?

The empirical data collected through this study give some answers to these questions. New questions have also arisen, and hopefully, future research will be able to continue the work in this area.

1.6. Thesis structure

In chapter 2, *Theoretical framework,* I present the theories I have used in my analysis. In chapter 3, *Research design and methodology*, the methodology of EDR is presented, with a particular emphasis on performing retrospective EDR (Wozniak, 2015) and conjecture mapping (Sandoval, 2014; Wijeesoriya, 2020; Wozniak, 2015). In chapter 4 *Context and practice implementation*, my approach to data collection is also presented. At the end of the chapter I present an overview of the process of developing an RMV teaching design through the implementation of 10 RMV projects. Two comprehensive tables are presented to give a detailed picture of the projects in this study. Educational Design Research (EDR) has been the inspiration for the structure of my work. Chapter 5, *Analysis and findings*, is structured around the framework of Archer 2019 and her three phases of EDR. This chapter contains a large number of tables and figures in order to systemize the data and findings and present examples from the fieldwork. At the end of this chapter, I present a suggested framework and guidelines for a GSO RMV teaching design. Chapter 6, *Discussion and summary,* is built around Archer 2019 and her model of evaluative criteria and evaluators in an attempt to discuss the proposed teaching design in the GSO context within an existing EDR framework.

1.7 Delimitations of this study

Within the framework of a master`s thesis, my chosen topic is broad, and there is a lot to cover concerning all the different parts of the GSO RMV teaching design, too much to fit within the scope of this study. During the implementation of the ten RMV projects, the peak moment of every project for the students seemed to be the artistic processing of the rhyme texts, the recording of music, video, editing, and the final sharing of videos in class or with a broader audience. The students created their RMVs on their Ipads, individually or in groups, creatively processing their individually or collectively produced rhyming lyrics. Sharing these videos with the teachers, the students` peers, and family members, or even online has been an important part of the process. The videos made the lyrics come alive, as the students visualized the rap lyrics through colorful illustrative pictures, recorded dance videos, short drama theatre pieces captured on video, and the song lyrics recorded with audio and subtitles.

In my suggested RMV framework (tab 5.10) presented in chapter 5, phases 3-5 comprise the following steps of the process: 3) The artistic processing of the rhyme texts, 2) Performance and sharing, and 3) Evaluation /reflection/celebration. These 3 steps of the RMV process have been the parts of the projects that, from my perspective as their music teacher, seemed the least challenging and most fun for the students compared to steps 1) Introductions and Exploration of the science topic and 2) The processing of topical rhyme production. In this thesis, I, therefore, decided to focus on the more challenging parts of the process, steps 1) and 2). As the last steps of the RMV framework are important for both the transdisciplinary process and the final end product, I still decided to use the term Rap Music Video (RMV) in my thesis, even if the emphasis on the video dimension in this thesis has been toned down.

2. Theoretical framework

2.1. Introduction

Because of the nature of my findings, I have used many different theoretical sources to explore, support, and discuss them in chapter 5. As I consider myself positioned in the tradition of creative pedagogies, I start by presenting research relevant to GSO, followed by literature on creativity, improvisation, and relational aesthetics. I further present literature within the tradition of hip-hop pedagogies. As some of my sources concerning rap/hip-hop methodology are found online, these are presented at the end of this chapter, followed by a presentation of literature concerning the different micro-designs presented in chapter 5. They are not considered to be my main sources of theory but are still relevant to some of my findings concerning the details of the designs.

2.2. Global Science Opera, WASO and GSO4SCHOOL

In the article *Designing creative inter-disciplinary science and art interventions in schools: The case of Write a Science Opera (WASO)*[11](Ben-Horin et al., 2017.), the authors use the theory of Wise Humanizing Creativity (Chappel et al., 2012, Chappel et al., 2016; Chappel, 2018) to provide answers to what characterizes creativity in the WASO context and what such qualities entail for the design of WASO as a creative learning environment. When it comes to a method for our participation in GSO, literature about WASO was all that existed at the time the first GSO RMV project was implemented in our school. The document *The Write a Science Opera (WASO) "Introductory Workshop" - Guidelines* (Ben-Horin, 2014), therefore, was the starting point of my process of developing the suggested RMV framework (tab 5.10) and guidelines (tab 5.11). As mentioned in chapter 1, the GSO pedagogy has recently been proposed as a science-art integration transdisciplinary signature pedagogy (Straksiene et al., 2022), building on the work of Lee Shulman (2005) about signature pedagogies in the professions. According to the already mentioned newly published article *Towards a rationale for science-art integration as a transdisciplinary signature pedagogy* (Straksiene et al.,2022, p 6), the GSO pedagogy is built on 4 underlying theories: Inquiry-based learning (Ben-Horin, 2014); Wise Humanizing Creativity (Chappell et al., 2012); Design Thinking education (Sotiriou et al., 2019), and a STEAM approach in

education (Colucci-Gray et al., 2017). In the GSO pedagogy, the four-phase design thinking model can be used in both micro and macro format, whether it is a 2-day workshop or a larger project over several months. According to *GSO4SCHOOL Teacher guidelines* (Robberstad et al., 2019, p. 10), the process is not necessarily linear. As with all creative processes, it will sometimes be necessary to go back and forth between the different phases of the project. According to Robberstad et al., 2019 and Straksiene et al., 2022 FEEL (question, evidence) is the first encounter students, teachers, researchers, or anyone has with a given topic. IMAGINE (analyze, explain) is the step where students will imagine possible solutions to the problem/topic at hand. If they have learned about the topic during the FEEL step, this is when they start imagining what they can do about it. The CREATE (connect, develop) phase is where all the ideas and imagination come into form and where the ideas of a project get concretized. The final phase of the GSO pedagogy and the project process is the SHARE (communicate, disseminate) phase. It is the moment when students will share their work with their target group, other colleagues, other classes in the school, the whole school community, or the world in GSO. I have implemented these four phases in my suggested RMV framework (fig 5.10) and guidelines (fig 5.11), chapter 5. A figure of the four phases is also presented below (fig 2.1).

Fig 2 1 The Four steps of Design Thinking (Robberstad et al., 2019).

2.2.1 Creativity research and relational aesthetics

In addition to the theoretical foundation of GSO, in my findings chapter, I have also referred to one of the most prominent researchers in the field of creativity research, Keith Sawyer. His article *Collaborative Discussion as Diciplined Improvisation* (2004) describes the phenomenon of improvisation in an educational context. He suggests that teaching is a form of improvisational performance and compares the relationship between teacher and students with the dynamics you see in an improvisation-based theatre, where together, they create a performance without the use of a script. Sawyer

further suggests that a basic structure is important for improvisation to take place in the classroom. He calls this phenomenon "disciplined improvisation." Sawyer also explains what he calls "Peer collaboration," a form of group work where the students in the group improvise solutions to academic problems. He points to how natural such an improvisation-based practice is for children and to what extent teachers and adults make use of such a practice in the interaction with the pupils. In another book chapter from 2011, *What Makes Good Teachers Great? The Artful Balance of Structure and Improvisation* Sawyer further emphasizes the importance of balance between structure and improvisational activities in the classroom. According to Sawyer 2011, creative teachers are experts at disciplined improvisation, balancing the structures of curricula and their own plans and routines with the constant need to improvisationally apply those structures. They create improvisational learning experiences for their students by implementing scaffolds that are appropriate to both the content knowledge and the student's current level of understanding (Sawyer, 2011, p 15-16). This is also emphasized in the interview by Henriksen/Mishra 2016.

In my findings, I also refer to literature on relational aesthetics concerning the performative elements of hip-hop. The French art critic, theoretician, and curator Nicholas Bourriaud (2007) defines relational aesthetics as "aesthetic theory that consists in judging the works of art in the function of the interpersonal relationships they imagine, produce and evoke" (2007, p. 165). He further says that relational art is "artistic practices that take interpersonal relationships and their social context as a theoretical and practical starting point, rather than an autonomous and private space." (2007, p.165). Bourriaud calls being in a team and experiencing a good encounter between performers and audience a "place for a specific social production" (Bourriaud 2007, p. 20). In my findings chapter, I also refer to the Norwegian author Tony Valberg (2012), who refers to what Bourriaud calls collaborative impulses and how these impulses touch the actors with their presence. (Valberg 2012, p. 177). Concerning the relational nature of hip-hop, I have also mentioned an article written by Jeremy Gilmore in the Journal of Pastoral Care & Counseling: (Gilmore, 2018), where the author emphasizes the relational and pedagogical aspects of rap music used in his context from pastoral education.

2.3. Hip-hop pedagogies

During my early online literature searches, I came across a vast amount of research publications about what can be categorized as *hip-hop pedagogies* (Adjapong, 2017; Emdin, 2010; Hill, 2009; Hill&Petchauer, 2013; Kruse, 2016; Petchauer, 2009). Through the process of developing our own local transdisciplinary music/science project in our school in the spring of 2019, at the intersection between science and art, I found interesting literature online related to the community around the American organization HipHopEd[18] where the researchers Christopher Emdin and Edmund Adjapong are central. Both have researched hip-hop as a cultural phenomenon and what importance the cultural understanding of the students' background has for good teaching. As I see it from my position as a music teacher, this cultural understanding is decisive when interacting with the rising generation. In his article *Affiliation and alienation: hip-hop, rap, and urban science education* (2010), Emdin claims that the school can not ignore the power that lies in the hip-hop culture of which today's youth is a part. He further suggests that teachers in the school should get acquainted with the youth culture and facilitate a form of teaching that embraces the culture the students come from. He takes this work further in the development of what he calls *Reality Pedagogy* (Emdin, 2011), a pedagogical direction that emphasizes the importance of making use of the student's culture in the teaching context but also to make use of the students' reality. He bases his work on the framework of critical pedagogy and culturally relevant pedagogy. Reality Pedagogy is built around the 5 C-s, which are practical tools for teachers in any culturally relevant setting, based on the reality of the students in order to be able to carry out good teaching. The 5 Cs stand for co-teaching, co-generative dialogues, context, cosmopolitanism, and content (Emdin, 2011, pp. 287-291).

More relevant to my GSO and Norwegian context is Edmund Adjapong, another key researcher in the American academic hip-hop community. He has published several articles with Christopher Emdin and builds much of his own research work on Emdin's findings. In his doctoral dissertation (Adjapong, 2017), he researched the use of hip-hop pedagogy to teach students science in middle school. His aim with the study was to

[18] https://hiphoped.com

uncover the effect this form of teaching has on teaching and learning, and his findings show that as a result of the utilization of hip-hop-based practices, the students expressed that they developed a deeper understanding of science material. According to his findings, students also experienced that they could relate to roles as researchers and expressed that they were given access to a room where they could change the traditional classroom structure and gain ownership of a new way of taking part in teaching.

2.3.1 The five creative hip-hop elements

Adjapong proposes a framework of hip-hop pedagogy and the practical implementation of the five basic creative hip-hop elements (Adjapong, 2017; 2021). These are Graffiti art, MCing, Breakdancing/B-boying/B-girling, DJing, and «Knowledge of self» (fig 2.2). This is also what he emphasizes in his Ted Talk. [19] Adjapong claims that active use of these elements in the classroom will encourage students to share their everyday experiences from life outside the classroom and use them in the learning situation.

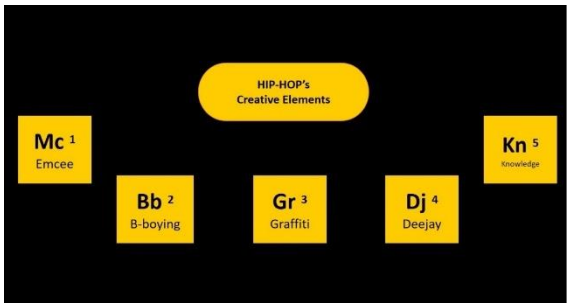


Fig 2 2 HIP-HOP`s creative elements. Adjapong, 2019.

He bases his research work on Reality Pedagogy, and he also points to Emdin's 5 Cs (Emdin, 2011), which he sees as practical tools teachers can use in any cultural setting to be able to benefit from students' cultural background to teach more effectively. Adjapong writes this in his short article from 2021 *5 ways to use hip-hop in the classroom to build better understanding of science: "*While most studies focused on using hip-hop in science focus on Black students, I believe that using hip-hop can support all students, as hip-hop is the most popular genre of music in America."[20] In the context of our own RMV projects, the most relevant basic creative hip-hop elements (Adjapong, 2017, p.45) are MCing, Graffiti, and B-boying/B-girling, as our focus has been on the

[19] Retrieved from https://www.ted.com/talks/edmund_adjapong_transforming_urban_education_through_hiphop_pedagogy , Oct 18, 2022.

[20] Retrieved from https://theconversation.com/how-hip-hop-in-the-classroom-is-raising-the-volume-of-learning-4-essential-reads-166189 Oct 20, 2022.

development of rap lyrics, music, and producing a rap music video (RMV). I will refer to these elements in chapter 5, as I propose these as a part of the design principles for the assessment phase (tab 5.8, DP 8) of my study.

2.3.2 The four hip-hop principles

Marc Lamont Hill (2009) provides three classifications of hip-hop pedagogies: Pedagogies with hip-hop, Pedagogies about hip-hop, and Pedagogies of hip-hop. Adam J. Kruse, one of the co-editor of the online hip-hop website HiphopmusicEd[21] and assistant professor at the University of Illinois, describes these three categories using the labels of Hip-hop as a bridge, Hip-hop as a lens, and Hip hop as a practice, in his article *Toward hip-hop pedagogies for music education* (2016a, p 248). In my work on developing the RMV design, the most relevant of these categories has been Hip hop as a bridge in teachers connecting the schools' curriculum to hip-hop cultures (Emdin, 2010; Kruse, 2016a, p 249). Kruse (2016b) also offers four principles relevant to hip-hop cultures: Keep it real, Flip the script, Make some noise and Stay fresh. I propose the use of these four principles in my final suggestion of design principles for the assessment phase (tab 5.8, DP 8) in addition to the five creative elements of hip-hop.

2.4. Online resources

When it comes to step-by-step methodologies for student-produced rap lyrics and music videos, there are several resources found online. Both Rapademics[22] (Hall, 2009) and Flocabulary[23] (Alexander, 2014; Hall, 2009; Hanson, 2016;) have built an online library of songs that teach literacy and vocabulary (McFadden, 2012). On Flocabulary different student rap resources have been published, among them one called *Student raps in 4 steps*[24]. In this post, the 4 basic steps of student rap are presented: 1) Choose a beat 2) Write lyrics 3) Record 4) Upload. This process resembles the process of the production of our RMV`s. Little Kids Rock[25] (Elfrank, 2008) is also an online source for various music lessons and tutorials, including the *Start with a rhyme*-lesson[26] with a worksheet,

[21] http://www.hiphopmusiced.com/
[22] www.rapademics.com
[23] www.flocabulary.com
[24] https://blog.flocabulary.com/summer-fun-make-a-rap-video-in-4-steps/
[25] https://www.littlekidsrock.org
[26] https://jamzone.littlekidsrock.org/lessons/start-with-a-rhyme/

also available as a video tutorial[27] on youtube. This lesson and worksheet ended up being the backbone of the lyrics writing design used in the 8 projects of this study, in my study referred to as the LKR worksheet. Another inspirational source has been the work of Tom McFadden and his online resources. [28] [29] When looking for ideas and inspiration for our own rap music videos, the students watched several of McFadden`s science rap videos. In his master`s thesis *Music in the Science classroom: The impact of content based songs on learning and engagement* (2012), McFadden investigated the impact of professionally created content-based music videos on intermediate school-aged students in New Zealand. His thesis also examined the benefits and costs of student and teacher-generated songs produced as part of the New Zealand Science Idol 2012 music video competition. On his youtube-channel, McFadden shared a folder called *Science Idol 2012*[30], with different video tutorials on how to create student-produced rap music videos. In his thesis, his attempt was "to make progress on a number of questions in the field, particularly the motivational and learning impacts of watching a professionally produced science song and the tradeoffs of science song authorship" (McFadden, 2012, p 85). The online resources mentioned above have been the main inspirational sources for our own RMV development concerning the development of a step-by-step RMV methodology.

2.5. Literature concerning the micro-designs in the prototyping phase

In n the section about the findings from the prototyping phase in chapter 5, I refer to literature concerning mind mapping, five-line poems and narrative poetry, when elaborating on the different micro-designs developed during this phase. Mind mapping is a well-known tool for organizing information. In the field of mind mapping used in the classroom, very little research exists. My main source for choosing mind mapping as one of the basic elements of the GSO RMV teaching design is the article *A Graphic Organizer for the Pedagogical Toolbox* (Goodnough & Long, 2002). The authors base their research on Tony Buzan and his work on developing mind-mapping rules from his book *Use both sides of your brain* (1974). They also refer to Gardner`s book *Frames of*

[27] https://www.youtube.com/watch?v=D3hS-d8Dk0M
[28] www.sciencewithtom.com
[29] https://www.youtube.com/sciencewithtom
[30] Retrieved from https://www.youtube.com/watch?v=ux7IEedRa4&list=PLvgILFwoRX2mNjUm5vlBT59L0r_AnqdT7

mind: The theory of multiple intelligences , (1983) and the book *Intelligences reframed: Multiple intelligences for the 21st century* (Gardner, 1999), arguing that mind mapping is a technique well suited for children, as it caters to both the verbal-linguistic and visual-spatial intelligence. On mind mapping used in poetry writing, very little research written in English exists.

Mind mapping is also a well-known technique used by several poets. An example is Ruth Awolola in her video *Mind mapping for poetry*, published by The British Library[31]. My main source for literature on five-line poems was the textbook used in English, *Stairs 5* (Thorsen & Unnerud, 2006), where the structure of the five-line poem is explained. The tasks of the five-line poem structure are very specific. According to Thorsen & Unnerud, 2006, the structure of the five-line poem is like this: Line 1: A noun, 2: four adjectives, 3: an action, 4: feeling, 5:repeat the noun.

Concerning narrative poetry, my main sources are Özlem Görey`s book *English Narrative Poetry: A Babel of Voices* (2017) and Brian McHale`s article *Beginning to think about narrative in poetry* (2009), as well as the following online sources: *Masterclass*[32], the blog *Razib`s world*[33]. According to the book *Poetics of American Song Lyrics*, Pence, 2011, several different patterns and forms can be used in poetry, some of them even with no rhyme at all.

[31] https://www.youtube.com/watch?v=x4TUL35ae34
[32] *Retrieved from https://www.masterclass.com/articles/what-is-a-narrative-poem-3-different-types-of-narrative-poems-with-poetry-examples*, Oct 30, 2022
[33] Retrieved from http://write-translate.blogspot.com/2008/11/major-divisions-of-poetry-narrative-and.html, Oct 30, 2022

3 Research design and methodology

3.1 Data collection and approach to data analysis

Based on the topic and my research questions, I found it appropriate to have a qualitative approach to this study and use qualitative research methods, despite the vast amount of data collected. When we think of qualitative research in general, it is common to emphasize how such research differs from quantitative research, according to Aksel Tjora 2010. Several factors are then highlighted, such as emphasis on understanding rather than explanation, closeness to the people one performs research "on" with an open interaction between researcher and informant rather than distance to their respondents, data in the form of text rather than numbers, and an inductive exploratory and empirically driven approach rather than a deductive theory and hypothesis-driven (Tjora, p.24).

My study focuses on the factors that affect a creative teaching process where the goal is an end product of a certain aesthetic and pedagogical quality. Therefore, I have retrospectively (Wozniak, 2015) used EDR as a methodological framework for researching the development of a teaching design through four years of RMV as part of the GSO. The study used data from a variety of sources: Minutes from meetings, planning documents, student-produced material, rhyming texts, mind maps, sound recordings, video recordings, and my own and others reflection notes. It has also been crucial to analyse project plans, timetables, the organization of student groups, and the tasks assigned to students during the projects. Through conversations and interactions with students and teachers, I have tried to map what factors were decisive in the design development of the pedagogy used in the four different GSO projects and the additional six smaller projects implemented. The data were organised in tables of data sheets, design principles, and conjecture maps. The focus during the prototyping phase was narrowed down to the text-writing process. This process turned out to be the most challenging part of the RMV projects according to reflection notes and observation notes. Still, in chapter 5, all the phases of the RMV process will be mentioned and elaborated on to a certain extent through the introduction of my suggested RMV guidelines. In this study, the quality of the end products has not been assessed, as this

was taken care of by the teachers and coordinator of the GSO in projects 1-4, and by the teachers and classes themselves in projects 5-10.

Archer`s figure called *The overall Design Research Framework* (Fig 3.1) has been the framework inspiring my analysis. My work is also inspired by Sandoval (2014), Wozniak (2015), and Wijeesoriya et al.,(2020) and their models for conjecture mapping and design principles. In my study, one project was implemented in what could be called the preliminary phase, nine in the prototyping phase, and the development of my suggested GSO RMV framework and guidelines in the assessment phase.

3.2 Bricolage and epistemological curiosity

At several stages in my work on the projects included in this thesis and the research I have performed, I have felt like I was putting together a complicated puzzle because of the different and complex methodological choices and the tools I chose to use. According to Mclaren et al. (1987, p 244), the French word 'bricoleur' relates to "a handyman or handywoman who makes use of whatever tools are available to complete a task," and that "bricolage implies the fictive and imaginative elements of the presentation of all formal research." In their paper *Approaching the Conceptual Leap in Qualitative Research* Klag and Langley (2013, pp. 161-162) also used the term bricolage to describe the process of "conceptual leaping" in qualitative research. (Pratt et al., 2022). I have read literature about the concept of bricolage, and I sometimes felt that my work was inspired by this approach (Denzin & Lincoln, 2011; Kincheloe, 2001; Kincheloe, 2005), although a very unsophisticated and novice-like form of bricolage. I have been guided by my own curiosity and urge to build new structures based on what I have developed through my teaching and my literature studies.

In his book *Pedagogy of Freedom,* Paulo Freire writes about what he calls epistemological curiosity. He argues that "the more critically one exercises one's capacity for learning, the greater is one's capacity for constructing and developing what I call "epistemological curiosity" without which it is not possible to obtain a complete grasp of the object of our knowledge" (1998, p 32). In her abstract *Being realistic by demanding the Impossible: Beginning the bricolage*, Cassie Earl builds on Freire`s expression and connects it to the bricolage:

> Research carried out under a bricolage approach aims to 'grasp' fully the object of our knowledge by any means of understanding possible. Therefore, epistemological curiosity is an essential ingredient for the bricoleur, the desire to rigorously know and understand. To really, truly, rigorously know and understand, surely, one has to delve into many different academic disciplines and use multiple methods of inquiry, which is the beginning of bricolage" (2013).

As an early career researcher, I can only use an unsophisticated and simple form of bricolage due to my inexperience. I position myself in the tradition of Educational Design Research (EDR). Still, by choosing a retrospective form of EDR and developing circular conjecture maps based on different traditions, I had to walk into unknown territory, leaning on literature and researchers from different fields while at the same time constructing my own framework to build my research on. The same goes for the development of my suggested GSO RMV framework and guidelines. These were built on existing research from different traditions and put together in an attempt to construct a structure specially designed for GSO RMV projects.

3.3 Research design: Educational Design Research

The structure in Educational Design Research (EDR) corresponds well with how I have developed the framework used in the different RMV projects, with continuous evaluation and adjustment of the didactic design as the work process proceeded. Because the project work has been characterized by a lot of testing and adaptation along the way, without a clear strategy of using EDR as a framework, I can perhaps say that an EDR mindset has inspired the work but not set up as a study with this framework as a starting point. EDR is a research design that has become increasingly common to use in research projects where one wishes to research the actual structure of the teaching, i.e., the way one sets up the teaching. According to the literature, EDR can be perceived as a research design and methodological tool (Bakker, 2018; McKenney/Reeves, 2019; Plomp/Nieven, 2013). In the publication *Educational Design Research, Part A: An introduction*, T.Plomp and N. Nieveen write this about design research:

> Design research: to design and develop an intervention (such as programs, teaching-learning strategies and materials, products and systems) as a solution to a complex educational problem as well as to advance our knowledge about the characteristics of these interventions and the processes to design and develop them, or alternatively to design and develop educational interventions (about for

> example, learning processes, learning environments and the like) with the purpose to develop or validate theories (2013, p 15).

In EDR used in a didactic context, the starting point is a problem, i.e., a pedagogical situation or condition that one experiences as fruitless or unsatisfactory. In my case, this will be about the uncertainty associated with developing a creative cross-curricular teaching design for a creative teaching process that will lead to an end product of a rap music video (RMV) in the context of an international online production, GSO. Another challenge is organizing such a process in the best possible way.

3.3.1 Problem definition and suggested solutions

In EDR projects, problem mapping has to be performed in the initial phase. (McKenney/Reeves, 2019, p 114-115). Before implementing the first RMV project, I defined some challenges with myself and my teacher colleagues. These were mapped by correspondence with the GSO coordinator, teacher meetings, and literature reviews, and are listed in the end of chapter 4. Based on literature reviews, the list of challenges, the proposed solutions mentioned at the end of chapter 4, and the data retrieved through the study, I retrospectively formulated suggested design principles for the three EDR phases (Table 5.1, 5.3, 5.8, 5.9) and four different conjecture maps (Fig 5.1, 5.2, 5.19 and 5.21).

3.3.2 The cycles of EDR

In the book by Susan McKenney and Thomas Reeves, *Conducting Educational Design Research*, the three main phases of EDR are presented (McKenney & Reeves, 2019, p. 83). In EDR, three core processes can be repeated several times both at the macro-level (design of the intervention, design of the research project) and at the micro-level (the teacher's action in the classroom): These are (1) Analysis/Exploration, (2) Design/Construction, (3) Evaluation/Reflection according to McKenney/Reeves, 2019. After implementing these three processes, the maturation of the intervention and theoretical understanding leads to new cycles with possible changes in design. In *Educational Design Research: An introduction (2013),* Plomp and Nieveen also present three distinct phases: the preliminary phase, the prototyping phase, and the assessment phase. The names of the three phases slightly differ from McKenney/Reeves. I first

started using the more well-known generic model for conducting design research in education by McKenney/Reeves (2019). Still, I preferred Archer`s model (2019) as presented below (fig 3.1), because more parameters are implemented, which helped me structure my analysis. In the model below, she implements the three phases, the design cycles, the design criteria Relevance, Consistency, Practicality, and Effectiveness (Plomp/Nieven, 2013), and the various evaluator roles involved in the design research process. I have used this model as a framework for my discussion in chapter 6.

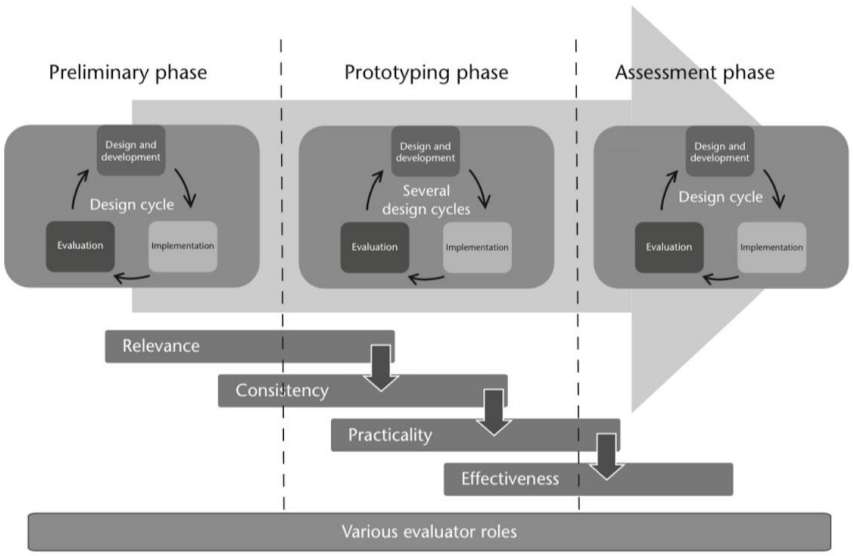


Fig 3 1 The overall Design Research framework (Archer, 2019).

3.3.3 Design Principles

Based on data from the initial phase of our project, inspired by the retrospective EDR work of Wozniak, 2015, I created a table of the original design principles of the first GSO RMV project from 2019 (Table 5.1). These design principles were written down retrospectively based on field notes, conversations, e-mail-correspondences, and minutes of meetings. They are marked by the transition from the old (LK-06)[1] to the new national curriculum (LK-20)[1] and the desire to be able to implement as many of the new curriculum goals as possible. After the first preliminary phase, some changes were made before entering the prototyping phase, and new design principles were created. The same goes for the final assessment phase, which can be seen as a sum up of all the iterations during the two previous phases. When analyzing my data, I created tables of design principles and conjecture maps that reflected the progression through the

different phases. According to McKenney/Reeves, 2019, p 39 the term *design principles* can be defined as follows:

> Although other terms have been introduced, `design principles`is probably the most prevalent term used to characterize the kind of prescriptive theoretical understanding developed through educational design research (e.g Kali, 2008; Kim & Hannfin, 2008; Mishra & Koehler, 2006; van den Akker, 1999). This kind of theory integrates descriptive, explanatory, and predictive understanding to guide the design of interventions.

According to Bakker, 2018 p 52, it can be helpful to distinguish between meta-principles (more normative) and pragmatic principles (more specific and concrete). In my tables, I have both meta- and pragmatic principles. To visualize how the research project changed during the iterations, I created four conjecture maps and four tables of design principles, starting with a table of the original draft design principles based on data from the preliminary phase of our project (Table 5.1). At this time, all the teachers at the school were commissioned to plan a so-called in-depth learning (Gilje et al., 2018) period for their grade levels to explore the new curriculum goals in LK-20. So the team of teachers involved with the GSO project and members of the leader group in the school had some interesting and fruitful discussions about how to connect the national curriculum with the science content criteria from the GSO coordinator. In my first table of design principles (Table 5.1), I have mentioned the principles we, as a team of teachers and researchers, wanted to include to connect the local/national curricula (DP 1) with the criteria from the GSO coordinator (DP 5). The findings listed from the preliminary phase refer to how we assessed the implementation of the RMV teaching design during the different stages of the project, as the work method involving rap/rhyming texts was new to all of us. The findings, therefore, reflect the aspects of the project that we wanted to explore and emphasize during several iterations. Through the implementation of other previous cross-curricular projects, concerts, and shows in our school involving performances on stage, we already had some experience in how to implement the different design specifications (music, dance, recording, editing) of the end product, mentioned in DP 4 of Table 5.1. Therefore, exploring this design principle has not been my first priority in my work on this thesis. Because I felt confident in how I wanted to implement the final production part of the rap video involving my creative field (music, dance, recording, editing) (DP 4), my main focus during the planning and implementation of the project was the part involving the lyrics writing process , and

implementing the cross-curricular topics in this process. This will also be reflected in my analysis.

3.4 Conjecture mapping

In his study *Conjecture mapping to optimize the educational design research process* (2014), Sandoval describes a technique for conceptualizing design research that he calls *conjecture mapping*: "A means of specifying theoretically salient features of a learning environment design and mapping out how they are predicted to work together to produce desired outcomes" (Sandoval, 2014 p 19). In his book *Design Research in Education* in 2018, Arthur Bakker also covers conjecture mapping, where he speaks about its link with methodology as an advantage:

> It provides guidelines for how to approach design research ("method") and the underpinning logic (-"ology"), or in short, the *how* and the *why*. The idea of conjecture mapping stresses the importance of understanding the mechanisms that explain how particular design characteristics can lead to certain effects, processes or outcomes (p 56).

I have used conjecture mapping (Sandoval, 2014, Wijesooriya, et al.,2020, Wozniak, 2015) to present my findings in chapter 5. I started out my mapping process by using the original model of Sandoval (2014). Later I found the circular conjecture mapping model of Wijesooriya et al., (2020) more appropriate for my purpose, as I needed a simplified version of a conjecture map, also covering the cyclical aspect of the design cycle. I will elaborate on this later in this chapter. According to McKenney/Reeves 2019, p 142, conjecture mapping is not a one-time step. Instead, initial maps are further enriched by subsequent processes and are often refined throughout the entire research trajectory. I have chosen an approach where my research is conducted *on* interventions to map why specific design features should work in the context of my study (McKenney/Reeves, 2019, p 141). Conjecture maps were initially developed by Sandoval (2004, p 214). I intended to use the conjecture mapping approach to understand better exactly how the design principles developed during the preliminary phase would need to be adjusted during the prototyping phase. In the conjecture map of the preliminary phase, I identified design elements (Sandoval, 2014; Wozniak, 2015) such as the tools and materials and the expected actions of learners and teachers, the task and participant structures and discursive practices (Sandoval, 2014). When building

my conjecture maps, I tried to identify how I could expect the designed solution to play out by describing an envisioned learning trajectory. *Mediating processes* are by Sandoval 2014, p 24 described as "the type of activity that is anticipated from learners engaging with the designed solution" (Wozniak, 2015, p 600), which "leads to identifying the *intended outcomes* that are expected to emerge from implementing the designed solution. From this information, the *design and theoretical conjectures* can be identified. Sandoval`s approach makes the EDR process more specific:

> Indeed, learning scientists have recently begun to articulate "design principles,"but these are different from embodied conjectures in two ways. First, design principles are articulated at a very general level, such as "make thinking visible." Such a principle must be interpreted for any particular kind of design to be instantiated. Second, due to their generality, these design principles are unassailable and empirically untestable. Embodied conjectures, in contrast, should be articulated at a level of specificity that allows them to be empirically refined or rejected. The second key feature to embodied conjectures is that their empirical refinement can lead not simply to the improvement of a particular learning environment design, but can potentially lead to refinements in learning theory itself (Sandoval, 2004, p 215).

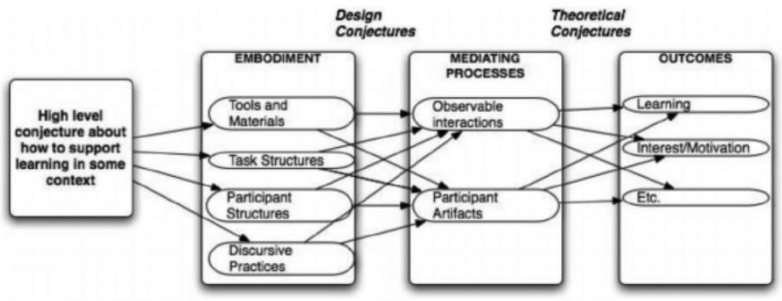


Fig 3 2 Generalized conjecture map for educational design research (Sandoval, 2014)

Design conjectures take the general form of "if learners engage in this activity (task + participant) structure with these tools, through this discursive practice, then this mediating process will emerge" (Sandoval, 2004). I have created four different conjecture maps to visualize the development of the teaching designs implemented in the various RMV projects. These are based on Wijesooriya et al., 2020 and the model circular conjecture maps, with *High-level conjecture, Embodiments, Mediating processes,* and *Outcomes*. According to the three different conjecture maps, one can see the development and changes in teaching design and changes in the following design principles developed due to the lessons learned during the development of the final design principles of the assessment phase.

3.4.1 Using EDR and conjecture mapping retrospectively

Early in my master's study, I considered using EDR as a research design, as mentioned before. Still, I started the process too late to carry out my research work with EDR as a consistent framework from the start. Therefore, it was necessary to choose a procedure where I analyzed already existing material from completed projects in retrospect to develop an RMV framework that could be used in the GSO RMV work in our school in the coming years and hopefully also in other schools in the future. Valderøy Barneskule has been a permanent participant in the GSO for four years, and participation in the production is part of the annual cycle for students in 7th grade in our school. I envisioned that it could be helpful to use EDR as an assessment tool to further develop the didactic design related to rap production in the GSO context in the coming years. Regarding the use of research design and the EDR method, I have chosen this research design as an evaluation/research tool after implementing the four GSO RMV projects and the additional six smaller RMV projects I have analyzed. In her study *Conjecture mapping to optimize the educational design research process* (2015) and her thesis *Investigating university students' transition to online distance learning in the health sciences*, Wozniak, 2016, Helen Wozniak takes conjecture mapping a step further by developing some beneficial models for using retrospective conjecture mapping in EDR projects. She builds on Sandoval`s (2014) article and outlines a retrospective analytical approach used to capture the significant design features of an online educational resource (McKenney/Reeves, 2019, p 142). I have used the models and principles from this article as inspiration for my study. Below is a conjecture map from Wozniak`s study: a retrospective reconstruction using Sandoval 2014`s terminology (fig 3.3).

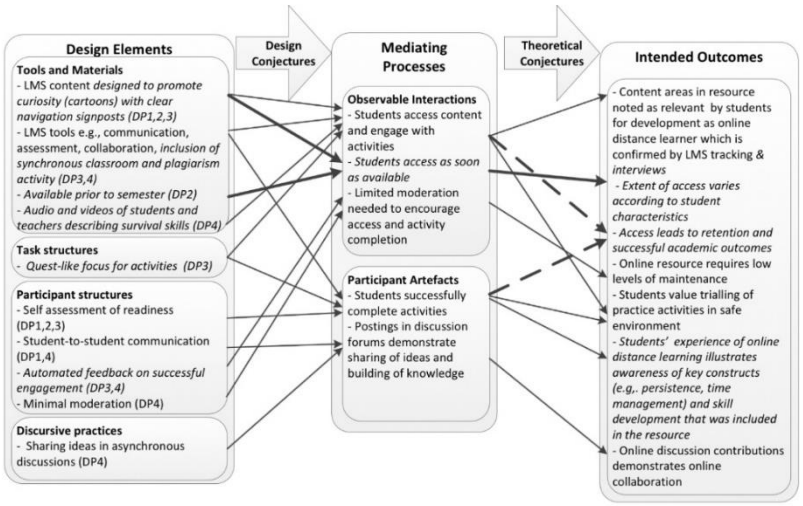


Fig 3 3 Retrospective conjecture map, Wozniak, 2015

As mentioned earlier, I started out by creating conjecture maps using the model from Sandoval 2014, as illustrated by fig 3.4 below, my draft conjecture map from the preliminary phase. This turned out to be too complicated for this study, with all the different sub-categories. I also wanted to include the cyclical nature of the design cycle, so I decided to develop my own version of conjecture maps inspired by the circular conjecture map model of Wijesooriya et al., 2020, to present a simplified conjecture map model designed for this study.

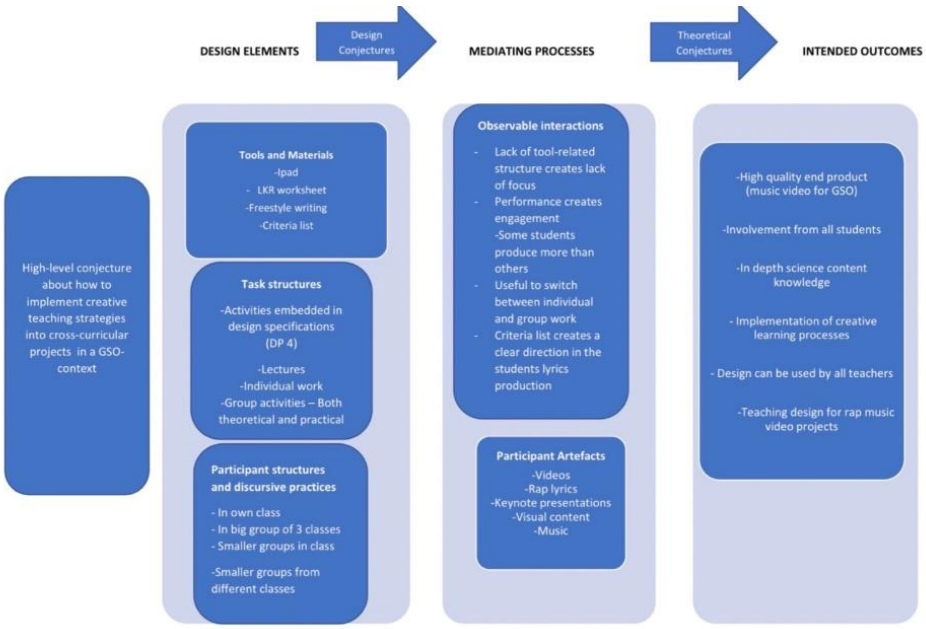


Fig 3 4 Draft conjecture map preliminary phase GSO RMV project 1

3.4.2 Developing circular conjecture maps inspired by Action Research

According to McKenney/Reeves (2020, p 84) both design-based research and action research can be seen as members of the same family of approaches. These similarities are also emphasized by Archer (2019, p 319). Inspired by a figure developed by Wijesooriya et al., 2020, p 61, where reflective action conjecture maps (RACOM) are introduced, based on Lewin`s (1946) action research cycle (fig 3.5), I decided to develop a similar cyclical conjecture map, named Circular conjecture map 1 (fig 3.7) replacing the action research cycle with Archer's (2019) figure *Cyclical nature of Design Research*, p 320 (fig 3.6) in my presentation of preliminary phase and prototyping phase in chapter 5.

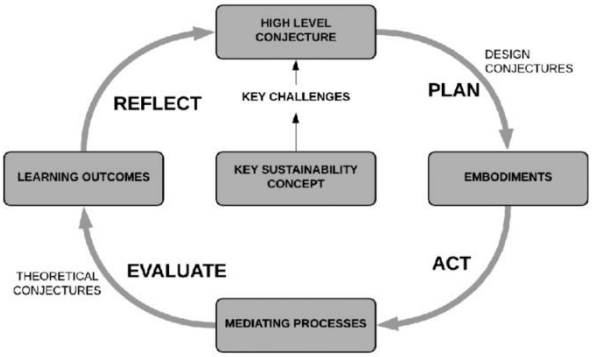


Fig 3 5 Reflective action conjecture map (RACOM), Wijesooriya et al., 2020

My idea was to visualize the different phases of the design process through a cyclical model, illustrating that the process depends on iterations for a design to be developed and improved. Archer`s figure, *Cyclical nature of Design Research*, consists of only three phases, while Lewin`s original action research cycle consists of four phases.

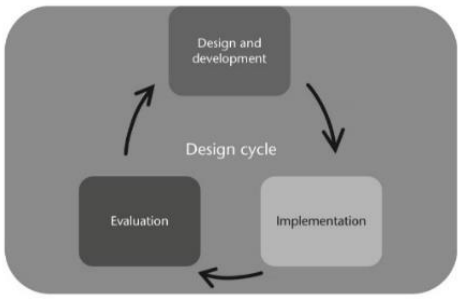


Fig 3 6 Cyclical nature of Design Research, Archer, 2019

As the emphasis on constant evaluation in an EDR process is high, I decided to add "Evaluation" in both the last steps of the Design cycle in my model. The main 4 elements of my circular conjecture maps used to present the findings of preliminary and prototyping phases were a high-level conjecture, followed by embodiments, mediating processes, and outcomes, also mentioning the design conjectures and theoretical conjectures. In addition to this, I simplified Sandoval`s different subcategories, inspired by Wijesooriya 2020, naming them *High-level conjecture*, *Embodiments*, *Mediation processes*, and *Outcomes*, as illustrated in fig 3.7.

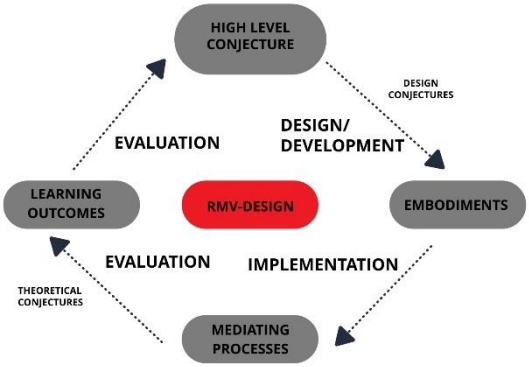


Fig 3 7 Circular conjecture map 1, Sæther, 2022

The circular conjecture map 1-model was used during the preliminary and prototyping phases. In my presentation of the findings from the assessment phase, summing up my suggested framework and the GSO RMV guidelines, I decided to replace Archer`s design cycle with the 4 phases from the FICS model in the GSO pedagogy (fig 3.8). This was done to emphasize the four phases of the GSO pedagogy, as this structure was used in my suggested GSO RMV framework (tab 5.10) and guidelines (tab 5.11).

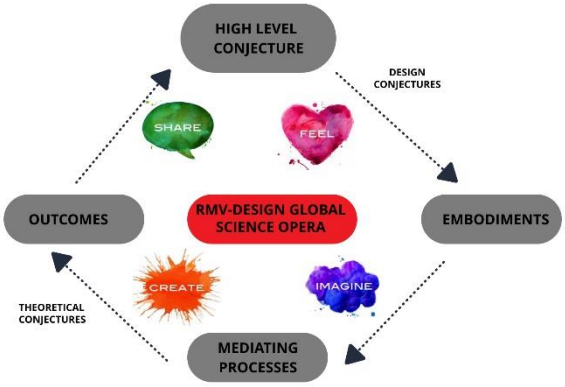


Fig 3 8 Circular conjecture map 2, Sæther, 2022

The development of the circular conjecture maps helped me visualize some of the decisive factors involved in the complex process of developing the GSO RMV design during the three phases of the study (preliminary, prototyping, and assessment phase).

3.5 Tables, figures, and conjecture maps

Because of my project's vast amount of data, I chose to organize some of it into tables and figures. It helped me systemize the iterations, cycles, details, and variables in the different iterations, depending on which research questions I focused on. I created tables with an overview of the different projects, the phases and activities, the different methodological variables, and the design principles. I also created different conjecture maps and models involving conjecture mapping and also added the original models to make the process of developing my conjecture maps clear. I have chosen to implement a high number of tables and figures to visualize the process of developing both the circular conjecture maps and the development of the GSO RMV teaching design itself. To me, the use of conjecture mapping was very helpful in categorizing and organizing my vast and complex amount of data from ten different projects, as presented in the 4 conjecture maps in chapter 5, in addition to the tables and datasheets presented in chapter 4.

3.6 Quality criteria

Nieven (1999) proposes four generic criteria for high-quality interventions. These are 1) Relevance (worth addressing), 2) Consistency (of design features with theory), 3)

Practicality (feasibility), and 4) Effectiveness. It has been crucial to emphasize these criteria during my work of developing a teaching design for rap music video projects. Several aspects must be considered during the process to develop a design that aims to fit its purpose. I have used existing literature on creativity, hip-hop pedagogy, and creative science projects to guide me in the evaluation process. Plomp/Nieven present these criteria as follows in the book *An introduction to educational design research* :

> The components of the intervention should be based on state-of-the-art knowledge (content validity) and all components should be consistently linked to each other (construct validity). If the intervention meets these requirements it is considered to be valid. Another characteristic of high-quality interventions is that end-users (for instance the teachers and learners) consider the intervention to be usable and that it is easy for them to use the materials in a way that is largely compatible with the developers' intentions. If these conditions are met, we call these interventions practical. A third characteristic of high quality interventions is that they result in the desired outcomes, i.e. that the intervention is effective. (Plomp/Nieven, 2010, p 26)

At the end of chapter 5, I summarize my research according to the four quality criteria Relevance, Consistency, Practicality, and Effectiveness (Archer 2019, 2011; Plomp 2013). *The intervention* is the central concept in EDR. The teacher's idea for improvement is the research project's idea. This idea will be further tried to understand and improve through trials in actual teaching situations. After finishing my thesis, I was hoping that the teaching design would be mapped through my analysis in such a way that it would be possible to continue the work I have started during this study, as described in Archer, 2019, p 321, concerning the assessment phase. During the work on my thesis, I, therefore, aimed for clear design principles, a teaching design and RMV guidelines that could fill parts of the evaluative criteria of design research (Archer 2011; Plomp & Nieven 2010; Plomp & Nieven 2013) and be a starting point for future research on the RMV-design. Within the framework of a master`s thesis, developing a teaching design and guidelines is an ambitious project, that will most certainly need more refinement.

3.7 EDR challenges

EDR is described as a challenging research approach according to Bronkhorst/de Kleijn (2016). The complexity of the total picture can be overwhelming, and it can be hard to find good ways of analyzing vast amounts of data. Many times I questioned myself,

asking whether my research questions were too ambitious for the structure of a master`s thesis, having the ambitions of mapping and suggesting an RMV teaching design in the context of GSO. It has also been challenging because this approach demanded both an in-depth perspective and a more superficial one, both concerning my literature searches and concerning the selection and delimitations of the data sources in my daily work environment, being the project coordinator of all the 10 projects. During the implementation of the RMV projects, it was also challenging to have both the role of the teacher and the researcher, as a certain distance is necessary to make a proper analysis. At the same time, in-depth knowledge of the field is required. So finding a good balance can be a challenge that I have felt the weight of several times during this study.

This conflicting role was an important reason why I decided to analyze the projects after they were implemented, as the work as a music teacher in itself was very demanding during the implementation of these projects, with a tight schedule and having the responsibility of 9 classes of students every week. This is also the reason why I did not conduct any interviews with my collegues or students as originally intended, which might have been a weakness in this study. At times I felt overwhelmed by the data collected, and also felt restricted by my role as the project coordinator being the only one with in-depth knowledge about and interest in the GSO pedagogy.

Therefore I chose to rely on my other sources of data, focusing on the artifacts and the material produced, combined with reflection notes and more informal data collection through short but valuable conversations giving me a contextual understanding as a part of my daily interactions at work. The researcher has several possible conflicting roles, acting as a designer, developer, observer, facilitator, and analyzer. Having a critical friend, who was present during the first iteration, was very valuable to me. This researcher provided data from an outside observer to help me see the situation from a different perspective. I also had some very fruitful conversations with the leader group of GSO and my fellow students at HVL. And finally, I appreciated the discussions with my teacher colleagues, the school`s leader group, and the input and insight they provided me with, giving me an understanding of their position, facing the challenges of creative work with little or no previous knowledge about the creative field. A role

described by Chappel et al., 2016[34] from the CREATIONS[14] project is the teacher or facilitator as "the meddler in the middle" (Chappell et al., 2016). During the implementation of the different RMV projects, I did some thinking about the teacher role. Coming from the creative field, I noticed that I might have a more open and flexible approach to the students and their creative ideas than the rest of the teacher group, who sometimes dismissed some of the ideas as "crazy" or "unrealistic" (reflection note, Sept 2019). The term "professional wisdom" (Craft, 2014) is also mentioned as one of the pedagogical principles in the *GSO4SCHOOL Framework and Master Plan* (Sotiriou et al., 2021, p 7). This ties in with Keith Sawyer and his research on creative teaching and the importance of improvisational skills as a teacher (Sawyer, 2004).

Still, even if I believe that I might have a more flexible and open approach to creative project work, because of my background as a music teacher coming from the creative field, I found it challenging to be promotor of new ways of thinking and teaching in a traditional teaching environment. I do not think I could have done this if it wasn`t for the coinciding implementation of the new national curriculum that gave me support in the form of written material supporting a more creative and open approach (LK-20)[1]. Because of this implementation process, I and my colleagues were already in the process of change, both individually and collectively. The GSO project was also promoted as an example of alignment with the new national curriculum by the leader group in the school (Keynote speech, Forskningsdagene NTNU Ålesund, Stavseth, 2019[35])

[34] Chappel et al., 2016 *D2.5 A Framework for identifying creative best practices in inquiry-based science education*, 2016 p 11, retrieved from https://portal.opendiscoveryspace.eu/tr/node/843975

[35] https://www.facebook.com/events/ntnu-i-%C3%A5lesund/einsteins-relativitetsteori-100-%C3%A5r/860423491024547/

4 Context and practice implementation

4.1 Context

Through my master's studies at the University College of Western Norway (HVL), I learned about the Global Science Opera (GSO) project in 2017. One year later, I was invited as a participant in the project. After this, the 7th-grade students and their teachers at Valderøy Barneskule have participated in the annualy GSO production every year since 2018. In the first year, the students participated in a rehearsed song composed by an external composer. In the productions of 2019-22, students from our school composed their own science songs and participated in four different collectively produced science rap music videos (RMV). These videos were the end products of three creative cross-curricular science projects within the genre of rap/hip hop. In total, my students have participated in five productions; *One Ocean*, *Gravity*,[2]*Energize*,[3] *Thrive*,[4] and *Creavolution*,[5] where four of our features are student-produced rap music videos (RMV).

4.2 Choice of research arena

The study of this thesis has taken place in a teaching environment at Valderøy Barneskule, a children's school of 420 students, which is my workplace as a music teacher. All the students have iPad 1-1 as their primary learning tool. The original aim of the study was to conduct research that could map and develop a teaching design for cross-curricular rap music video (RMV) projects through several iterations. As there is no existing pedagogy for RMVs in the framework of GSO and the newly developed pedagogy GSO4SCHOOL (Sotiriou et al., 2019; Straksiene et al., 2022), the main goal was to suggest a pedagogy in this context; however, this goal did not crystallize until the end of the process. In this study, ten projects have been included. During the implementation of these projects, the main goal was to develop a local framework for RMV projects in our school in addition to the GSO projects. However, to make the RMV fit into the GSO production, we had to develop methods for the development of collective text writing and the production of a joint student product, the music video.

4.3 Implementation

Ten RMV projects are included in this study. I have listed them in table 4.1, where details about the projects are presented. Eight of the projects were cross-curricular, with more than two subjects included, while two projects were implemented in music classes only. Projects 1-4 were the most time-demanding, as the emphasis on producing a high-quality full-scale RMV for GSO was high. During the GSO RMV projects, a substantial amount of lessons were scheduled for this work in various subjects over several months. Projects 5-10 had elements from the RMV design, but different aspects of the design were emphasized during the implementation. These were also implemented during a shorter period than the GSO projects. Due to the natural class division with three classes per year, most of the projects have been implemented within groups of three different classes working in their class or in groups mixing three classes. During project 10, a smaller group of students from three different 7th grade classes was invited to participate after school hours based on their English skills and personal interest. This was an international conference[36] and not a part of the ordinary school day.

The emphasis on the end product was high in all the implemented projects. The students were asked to produce and perform a rap music song, record an RMV with live video images or collages of illustrative pictures and effects, write lyrics with subtitles, and perform it with their own choice of music/beat. The students used the apps Imovie, Clips, Puppet Pals, Explain Edu, and CapCut for video editing. Their music was composed with GarageBand or found on youtube. The music for the GSO-RMVs was composed by the students using GarageBand. In projects 1-4, the arena for performance was the GSO global online production (macro format).[37] In projects 5-9, the students shared their videos with the rest of the students through informal class performances (micro format). In projects 7-8, the videos were also shown in concerts for the rest of the school's students. In project 10, the entire process of producing the rap lyrics was shared through an online live performance during a workshop at an international online conference[36], to demonstrate the method of creative circular collaboration songwriting, elaborated on in chapter 5. The written rap lyrics with music were performed live at the

[36] Writing rap in the classroom Presentation and workshop Runa Godø Sæter STEAM Approach to Science EducationConference 2021, retrieved from **https://vimeo.com/658879807**

[37] Macro format is a term from the GSO pedagogy, meaning the project will be a part of the global GSO production, while micro format means the project is not a part of the global production.

end of the workshop session. Below is a data sheet (tab 4.1) giving an overview of the projects and participants involved in the projects.

Nr projects	1	2	3	4	5	6	7	8	9	10
Name	**Gravity GSO**	**Energize GSO**	**Thrive GSO**	**Creavolu-tion GSO**	**Spy-rap**	**Klasserap (Class rap)**	**Rap about UK**	**Læraren min (My teacher)**	**European countries**	**Rap workshop in science conference**
Project type	Rap music video	Rap music video	Rap music video	Rap music video	Rap music video	3 different RMV-projects, 1 per class	3 different RMV-projects 5-8 per class	3 different RMV-projects. Individual assignment	RMV-project	Online workshop with an audience
Organization	Individual and groups, mixing 3 classes	Individual and groups	Individual and groups, mixing 3 classes	Individual and groups, mixing 3 classes	Individual and groups within 1 class	Individual and groups within 1 class	Individual and groups within 1 class	Individual and groups within 1 class	15 groups, mixing 3 classes	4 groups of students from 3 different classes
Language	Eng	Eng	Eng	Eng	Nor	Nor	Eng	Nor	Eng	Eng
Age of participants	7th grade	7th grade	7th grade	7th grade	6th grade	6th grade	6th grade	5th grade	6th grade	7th grade
Subjects involved	Music, Science, English	Music, Science, Norwegian, English	Music, Science, Norwegian English, Arts and crafts, Social studies	Music English Science Norwegian	Music	Music, Norwegian	Music English	Music	Music English Social science	Music Science English
Number of participants	67	48	68	66	67*	68*	66 **	56	53**	12***
Teachers	5	4	5	5	1	4	2	1	5	3
Time span	Aug-Nov-19	April-Nov-19	April-Nov-19	Aug-Nov-22	Dec-20	April-June-20	Aug-Sept-21	Aug-Oct-21	March-April-22	Dec-21
Number of videos produced	1	1	1	1	67	3	66	56	53	1
Arena for performance	GSO online	GSO online	GSO online	GSO online	Informal class performance Music videos showed in class	Informal class performance Music videos showed in class	Informal class performance Music videos showed in class	Informal class performance Music video showed in class and in a concert for the rest of the classes in school	Informal class performance Music video with backing track showed in class and in a concert for the rest of the classes in school, with group of students performing the rap live on stage.	Informal online performance at the end of workshop

* The students involved in project 3 were the same as in 5, 6, and 10

** The students involved in project 4 were also involved in project 7 and 9

*** Group of students from projects 3, 5 and 6

Table 4 1 Projects and participants

4.4 Tools and work methods

During the implementation of the GSO projects in this study, we tested different work methods. Our main goal was to let the students explore the given science topic through lectures, group work, excursions, experiments, and exploration to give them a starting

point for rap lyrics writing about the chosen science topic. The entire schedule was reorganized in some of the projects, and new groups of students were created, mixing different classes. The name in the schedule frequently was "GSO project work." During the most intense weeks, teaching hours could reach 6-10 lessons, each approximately 45 minutes long. The advantages of this form of work are that the teachers can circulate and guide the groups more freely than in the traditional classroom format. If needed, some teachers guided the group work while others held lectures, depending on what creative groups the students had chosen. There was a continuous alternation between group work and lectures with the three classes.

With three classes, one also gets three teachers and other adults belonging to one of the classes, who can collaborate on guiding the students in their work, and the project work intensifies during a defined period. In other smaller non-GSO projects, the organization was class-based, with one teacher in each class. The alternation between group work, individual work, and lectures was the main form of work during all the projects. Later in this chapter the local RMV teaching design of 5 phases is introduced. This design is also integrated in my suggested RMV Guidelines (tab 5.11) chapter 5.

During the first GSO RMV project, we had little experience with forms of work that included songwriting and rhyme production. During the iterations included in this study, tools and work methods like mind maps with keywords and rhyme words, the worksheet from Little Kids Rock[25] (LKR-worksheet)[26], the freestyle method[29], slogan method,[38] and Circular Creative Collaboration (CCC) were included in the teaching design.They simplified the work process and will be elaborated on in chapter 5. I have also presented them in table *4.2 Tools and work methods,* for an overview. In my datasheet, I use the terms macro/microformat,[37] adopted from *GSO4SCHOOL Framework and Master Plan* (Sotiriou et al., 2019). These terms refer to whether a project is a part of the GSO international production or not. In my study, 4 of the projects were implemented in the framework of the macro format, while the rest were implemented locally in a microformat. The lyrics in all the projects were student produced. During the iterations, new micro-designs, work tools, and methods emerged and were implemented. I have listed these in the datasheet to present an overview before

[38] Retrieved from Little Kids Rock: https://www.youtube.com/watch?v=BLTYCdn3wkM

elaborating on them in chapter 5. Mind maps with keywords and rhyming words were used in 9 of 10 projects. The mind maps functioned as a storage document for keywords and technical expressions, while they also functioned as an idea bank for rhyming words used in lyrics production.

Nr projects	1	2	3	4	5	6	7	8	9	10
Name	Gravity GSO	Energize GSO	Thrive GSO	Creavolution GSO	Spy-rap	Klasserap (Class rap)	Rap about UK	Læraren min (My teacher)	European countries	Rap workshop in science conference
Macro format	X	X	X	X	-	-	-	-	-	-
Micro format	-	-	-	-	X	X	X	X	X	X
Mind map	-	X	X	X	X	X	X	X	X	X
LKR worksheet	X	X	X	X	X	X	X	X	X	X
Freestyle	X	X	X	-	X	-	-	-	-	-
Slogan	-	-	-	X	-	-	-	-	X	-
Five line poem	-	X	-	X	-	-	-	-	-	-
Creative Circular collaboration storytelling method	X	-	X	X	-	-	-	-	-	-
Creative Circular collaboration songwriting method	-	-	X	-	-	X	-	X	X	X
No storyline	X	X	-	X	X	X	X	X	X	X
Storyline	-	-	X	-	-	-	-	-		-
Music video with vocals recorded	X	X	X	X	X	X	X	X	X	X
Music video with backing track and no vocals recorded	-	-	-	-	-	-	-	-	X	-

Table 4 2 Tools and work methods

In projects 2, and 4, the five-line poem method was implemented to introduce a simple but engaging way of writing poetry. In projects 4 and 9, the slogan method[38] from Little Kids Rock[25] was implemented to simplify the process of writing the chorus of the songs. The creative circular collaboration songwriting (CCC) method developed during project 6 was used in 5 of the projects, and the lyrics with storyline method was only used in project 3. In 9 of the projects, music videos with vocals were recorded, while some of the videos in project 9, only had a video with a music backing track for a live

performance of the vocals. In project 10, a simple video of a rap performance with music backing track was produced.

4.5 The development of a local RMV model

The process of developing the suggested GSO RMV guidelines presented in chapter 5, has been time-demanding and required a lot of literature searches in addition to the research done in the classroom, involving the 10 projects mentioned in this study. I have tried to build upon the existing tradition of creative pedagogies while at the same time implementing some new theory, related to rap, poetry, and the hip-hop tradition itself. In the work process of the transition from the old to the new curriculum (LK-20)[1], a local draft model was developed by the leader group of the school in 2019 as a guide for the teachers. I decided to use the 5 phases from this model as a starting point in GSO RMV project nr 1. The school`s model presented in tab 4.3 below (Stavseth, 2019)[39] was meant as a proposal of a draft framework for so-called in-depth projects for the teachers in the school to implement the new national curriculum in the local curriculum. As I was looking for models to build an RMV on, I also found the suggested framework of five IBSE (Inquiry-Based Science Education) phases from CREAT-IT[13] (Craft et al., 2016) and WASO guidelines (Ben-Horin, 2014 p 11-15), originally used in the COSMOS project (Clements et al., 2008). These two models inspired me to start developing my own RMV teaching design.

1)	Question eliciting activities/Exhibiting curiosity
2)	Active investigation
3)	Creation
4)	Discussion
5)	Reflection

Table 4 4 The 5 IBSE phases of CREAT-IT/WASO (Ben-Horin, 2014)

1)	Knowledge phase/basis
2)	Student participation
3)	Wonder/exploration
4)	Learning product/demonstrate competence
5)	Evaluate/dual circuit learning

Table 4 3 A local model of cross-curricular in-depth learning projects (Stavseth, 2019)

[39] See attached in the appendices

I decided to use them both as a starting point for defining the different phases of GSO RMV project 1, and they were implemented in the design principles of the preliminary phase (tab 5.1), chapter 5. As the GSO RMV project took shape, the 5 elements from the school's model (Stavseth, 2019) were concretized in a local rap methodology that contained learning goals and activities. I developed a structure consisting of six phases, as shown below (tab 4.5) A similar design to the one found in project 1 was also evident in projects 2 and 3. So after completing project 1, the model was simplified to five phases by combining phases 1 and 2, as shown in table 4.6 and table 5.10.

1)	Introductions
2)	Exploration of science topic
3)	Processing of topical rhyme production
4)	Artistic processing of rhyme texts
5)	Performance and sharing
6)	Evaluation/reflection

Table 4 5 Local RMV model of 6 phases (Sæther, 2020)

1)	Introductions/exploration of science topic
2)	Processing of topical rhyme production
3)	Artistic processing of rhyme texts
4)	Performance and sharing
5)	Evaluation/reflection

Table 4 6 Local RMV model of 5 phases (Sæther, 2021)

This was also done as a natural development of the knowledge about the new curriculum LK-20, where the emphasis on exploration is high. In the development of the GSO RMV framework and suggested guidelines, the local RMV-model was combined with the WASO-model and integrated in the four design thinking phases, as presented in chapter 5.

4.6 The 5-phase IBSE WASO-model

According to Straksiene et al., 2022, p 6, IBSE (Inquiry Based Science Education) is emphasized in the proposed GSO signature pedagogy as an approach to arts and science-based education (Ben-Horin, 2014), and is, according to Straksiene et al., "one of the 4 underlying theories that GSO has relied on" (2022, p 6).This strengthened my decision to let my suggested GSO RMV guidelines (tab 5.8) be inspired of the 5-phase IBSE model from WASO[11] (Ben-Horin, 2014), and combine it with the FICS phases

from the GSO model (fig 2.1) and my own suggested 5-phase RMV-model (tab 4.6). This framework will be presented in chapter 5. As mentioned before, in my suggested framework and guidelines, I will use the different phases of the GSO pedagogy to separate the different stages of the creative work process, concretizing through examples from the RMV projects in this study.

In the tradition of creativity pedagogies concerning GSO, where I consider myself positioned, two IBSE models are the most prominent. These are the 5-phase COSMOS-model (Clements et al., 2008), used in WASO and CREAT-IT (Ben-Horin, 2014; Ben-Horin et al., 2017;), and the 7- phase-model used in CREATIONS (Craft et al., 2016, p 22) and CASE (Sotiriou et al., 2019, p 14). The reason why I decided to combine the COSMOS/WASO model and the four phase-model (FICS) from the GSO pedagogy (Robberstad et al., 2019; Sotiriou et al., 2019: Straksiene et al., 2022) in my suggested framework (tab 5.10) and guidelines (tab 5.11) is that both of them have a rather flexible approach to the different phases focusing on a learning product in the end, while the 7-phase model from CREATIONS and CASE has a more process-oriented perspective that is not compatible with the suggested RMV-design in its present form.

4.6 Transition from the old to the new national curriculum

One topic that came up quite early in my conversation with the GSO coordinators was the tight framework we had in the Norwegian school at that time, both in terms of time and resources. When the first GSO RMV project was implemented, the teacher group at our school was in a transition phase from an old (LK-06)[1] to a new (LK-20)[1] curriculum. In-depth learning and transdisciplinary collaboration were perhaps the most critical areas in which we focused on investing more during the transition phase. We searched for new tools and work methods to implement in our teaching. Developing the teaching design of the RMV projects was an important part of this work. After the transition to the new national curriculum of Norway, LK-20, the timetable work required much more cross curricular collaboration and focus on other curriculum goals than before the transition. This means that I was utterly dependent on including the teaching team at the various participating stages in the planning and implementation of the GSO RMV projects. In my opinion, one of the challenges in the old national curriculum, LK-06, before implementing the new national curriculum, LK-20, was the

level of detail in the curriculum goals. The launch of interdisciplinary projects often tended to be met with reluctance by teachers because one imagined that it would be in addition to the existing plans and schedule, which would make the total workload too heavy. As I saw in our school, this mindset and fear of overload was probably the most painful part of the process associated with transitioning from the old to the new curriculum, trying to keep the best from two worlds, both a high level of detail and interdisciplinary collaboration.

The core curriculum in LK-20 is built on the three interdisciplinary topics of health and life skills, democracy and citizenship, and sustainable development. Interdisciplinary collaboration is the new norm, which has called for new forms of work and teaching designs than Norwegian teachers were used to with the old curriculum. Finding ways to collaborate where one sees the synergy effect of several subjects in teams has become essential. The process of developing the RMV teaching design over four years has been marked by the transition from the old to the new curriculum. It has taken time to get used to a different way of defining learning goals and the overall meaning in interdisciplinary and transdisciplinary projects.

4.7 Problem definition and suggested solutions

Before the implementation of the first GSO RMV project, some challenges and proposed solutions were discussed in the teacher group:

1) Our school was invited to participate in the Global Science Opera without having guidelines for producing an RMV music video. The literature did not have specific step-by-step procedures for RMV projects, as the WASO literature focused mainly on developing science music theater, not songwriting and rhyme production (Ben-Horin, 2014; Craft et al., 2016, Ben-Horin et al., 2017).

2) The science topic in the first GSO-RMV-production implemented in our school was not a part of the existing curriculum of our school (LK-06).

3) Teachers did not have experience implementing cross-curricular creative projects in their teaching and were unfamiliar with the Global Science Opera.

The suggested solutions were based on the problems mentioned above and suggested solutions proposed when the project was implemented. My analysis will later reveal the details of the challenges that arose during the implementation of this first project. Based on the existing digital practice in our school, I felt confident that the students would be fully capable of producing a high-quality music video with song and dance, as the school had already implemented the use of iPad apps involving music and video editing several years ago. I also knew that some of the students were skilled dancers and singers. I was also optimistic about the lyrics production, even if the students were not trained in writing rhymes and poetry, much less rhyming texts with science content. But the other teachers and I were confident that from a student group of three classes, some quality material would be developed, tweaked, and put together in the final GSO RMV for project 1. Our team of teachers was encouraged by the leader group in our school to start implementing elements from the new national curriculum that would be launched the year after our first GSO RMV project was implemented.

The new curriculum was very different from the existing one, and it took some time and a change of mind to learn how to implement it into our project. Still, later on, we realized that the new national curriculum coincided better with the GSO science topic than anticipated, as shown in the design principles of the preliminary phase (DP1, table 5.1 in chapter 5). As I was the only teacher with some knowledge about Global Science Opera, I was appointed project leader. I was highly motivated to implement the project. Still, I was also a bit hesitant, as I knew the creative teaching methods would be very different from what traditional science teaching in our school looked like. My team and I had some very interesting discussions about the differences between the old and the new curriculum, which were mainly concerning the details of the science content and worries that the students would miss crucial parts of the old curriculum because of the implementation of the GSO-project and elements from the new curriculum. Our project coincided with the local test run of the new curriculum in the entire school, so we were not alone in the process of experimenting. I believe this collective process and determination from the school`s leader group was an important success factor for our project, as all the teacher teams in our school were expected to implement elements from the new curriculum through suggestions of cross-curricular projects defined and carried out by the teams themselves (Reflection note, September 2019).

5 Analysis and findings

5.1 Introduction

As mentioned in chapter 3, I have chosen to use EDR as an evaluation/research tool after implementing four GSO RMV projects and six additional other RMV projects. In retrospect, I have analyzed the data and organized them into three main phases: *Preliminary phase*, *prototyping phase*, and *assessment phase*, inspired by Archer, 2019. In this chapter, I will present the findings using tables of design principles and conjecture maps, showing how the GSO RMV design developed during the iterations. At the end of the chapter, I will propose a suggested future GSO RMV framework (tab 5.10) and guidelines (tab 5.11) based on my research, as a part of the assessment phase. I will refer to this design during the presentation of my findings.

5.2 The preliminary phase

Archer (2019) defines the preliminary phase like this:

> This phase is concerned with examining the context and determining the tentative global design elements and principles. It thus includes consultations with practicioners, literature and document reviews (as well as possible exemplary case analyses) to determine the underpinnings for the study and focuses on the relevance to the context (p.320).

According to table 4.1, a total of 1 projects is part of what we retrospectively could define as the preliminary phase. This was GSO RMV project 1, where the students produced the RMV *Gravity.2* The design principles (DP) for the preliminary phase have been constructed in retrospect (McKenney&Reeves, 2019, p 142; Wozniak, 2015) based on data and experiences from the implementation of GSO RMV project 1. The details of the process of the implementation of the different RMV projects are described in chapter 4. In the design principles of the preliminary phase, the national curriculum was integrated into DP 1, followed by the 3 different structural frameworks chosen in DP 2, as described in chapter 4. DP 3 includes theories about creativity and WASO[11] methods, DP4 presents the main features of the design specifications and how the project is

organized, and in DP5, the science content criteria list is mentioned. The design principles for the preliminary phase are listed in table 5.1 below.

Design principle	Description	Source
DP1	**Implementing science content in several classes** **Core curriculum** 1.3 Critical thinking and ethical awareness 1.4 The joy of creating, engagement and the urge to explore 2.2 Competence in the subjects (and in-depth learning) 2.3 The basic skills: Oral skills, Reading, Writing, Digital skills, Numeracy 2.4 Learning to learn 2.5 Interdiciplinary topics: Public health and life skills, Democracy and citizenship, Sustainable development, Identity development and community 3.2 Teaching and differentiated instruction **Curriculum core elements** **Music:** Practicing music, Making music, Experiencing music, Cultural understanding **Science:** Scientific practices and ways of thinking, technology, Energy and matter, Earth and life on earth **English:** Language learning, Meeting with English language texts, Communication	LK-20 (Core curriculum) Planning documents teachers UDIR planning tool: https://www.udir.no/lk20/lk20-pil-innstillinger-og-spraktekster/Planleggingsverktoy-i-lareplanvisningen/
DP2	**Frameworks inspiring teaching design:** Local model of 5 phases Stavseth, 2019 (tab 4.3) WASO guidelines Ben-Horin 2014 (tab 4.4) Local RMV model of 6 phases Sæther, 2020 (tab 4.5)	Locally developed models Communication with observers and teachers involved in project Minutes from meetings
DP3	Implementation of WASO-methods and theories about creativity: • Inquiry based teaching • Implementation of the ideas behind the 12 CREAT-IT principles	www.creatit.project.eu
DP4	**GSO design specifications:** End product: • Production of a 3 minute long science content **rap music video** that involves 60 students • Original rhyming lyrics • Original music • Original dance • Original video that supports content defined by GSO coordinator **Organisation:** • Lectures • Excursions • Group tasks • Individual tasks	GSO-coordinator, e-mail correspondences and minutes
DP5	Science content criteria list to guide the final product	GSO-coordinator, e-mail correspondences and minutes

Table 5 1 Design principles of the preliminary phase

The design principles of the preliminary phase clearly reflect the complexity and multidisciplinary nature of GSO RMV project 1, both when it comes to the suggested

teaching design itself but also concerning the theoretical foundation and local/national curriculum. These design principles were the starting point of the teaching design implemented during the preliminary phase.

5.2.1 Findings from the preliminary phase

Based on the design principles and the findings from the preliminary phase, a high-level conjecture (Sandoval, 2014) about implementing creative teaching strategies into crosscurricular RMV projects in a GSO context was implemented in a conjecture map (fig 5.1). In this circular conjecture map the main 6 elements are: *high level conjecture*, *design conjectures, theoretical conjectures, embodiments*, and *mediating processes* leading to *intended outcomes*, inspired by Wijesooriya et al., 2020.

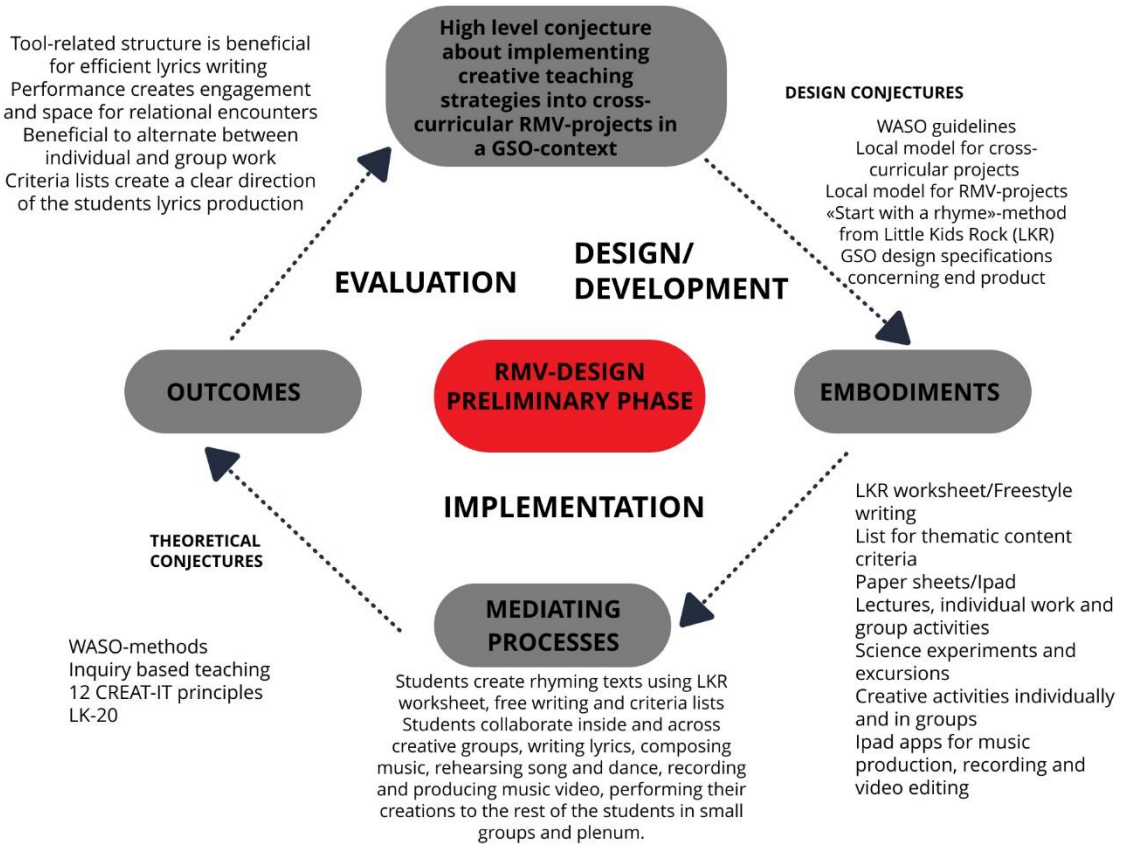


Figure 5 1 Conjecture map preliminary phase

The WASO guidelines, the local model for cross-curricular projects, and the local model for RMV projects were the most prominent design conjectures (Sandoval, 2014; Wijesooriya et al., 2020; Wozniak, 2015), in combination with the more specific *Start*

with a rhyme [26] method from Little Kids Rock[25] and the GSO design specifications concerning the end product, the 3-minute science rap video (See DP in table 5.1 and conjecture map figure 5.1). All of these are mentioned in the table of DP as well as in the conjecture map. The embodied elements included tools and materials (Sandoval, 2014) like the different worksheets, criteria lists, paper sheets, iPads, and iPad apps, and task structures (Sandoval, 2014) like lectures, individual work, group activities, science experiments, excursions, and creative activities.

In the conjecture map, the activities mentioned as the mediating processes are the main activities and interactions (Sandoval, 2014) that led to the development of the final video of GSO RMV project 1. The theoretical conjectures are also mentioned in DP 1 and 3 and comprise the theoretical foundation of GSO project 1 during the preliminary phase. Finally, the main findings from the preliminary phase are summed up in the outcomes section of the conjecture map. These will be elaborated on in the next section. At the end of the preliminary phase, we found that the most critical stage of the project was DP 2: Creation (of the rap lyrics), which is found in phase 3 of the CREAT-IT/WASO guidelines (tab 4.4). Some patterns emerged that had to do with the organization of the project. It became evident that the most demanding part of the project was the process of lyrics ideation and production. These findings are both listed in the conjecture map above, figure 5.1, under Outcomes and in table 5.2 below, and will be presented in the next part:

1)	Tool-related structure is beneficial for efficient lyrics writing
2)	Performance creates engagement and space for relational encounters
3)	Beneficial to alternate between individual and group work
4)	Criteria lists create a clear direction of the student's lyrics production

Table 5 2 Findings preliminary phase

5.2.2 Tool-related structure is beneficial for efficient lyrics writing

One of the clearest findings after the implementation of GSO RMV project nr 1 was the importance of having a concretization and a good structure in the methods and tools used in the teaching where the production of rhyming texts is the goal, even if the project was defined as creative. This is not a new phenomenon, but the importance of

structure can sometimes tend to be forgotten when implementing creative work methods in education (Henriksen & Mishra, 2016; Sawyer, 2004; Sawyer, 2011) According to Sawyer, 2011, p 1-24, one of the main challenges in teaching is finding a good balance between open spaces for creative work and at the same time doing it within the existing structures.

We used the "*Start with a rhyme*" [26]-worksheet from Little Kids Rock[25], referred to as LKR worksheet, throughout this project to improve the text production process, as mentioned as one of the embodied elements in the conjecture map. This turned out to be too little concrete on its own. Surprisingly many students groped and lacked the necessary vocabulary to work effectively on the lyrics writing. Prior to GSO RMV project nr 1, the students had not worked much with the procedure of using the LKR worksheet. Many were a little overwhelmed by the very structure of the worksheet and spent some energy on this frustration. Therefore, an important finding from GSO RMV project nr 1 is that the students should know the form and structure of the work and have the necessary tools to support them in the writing process before starting such an ambitious project as creating an RMV for an international online production. One of the external participants in GSO RMV project nr 1, a university professor, made this observation:

> ”The main challenge for many seemed to be to create lyrics that rhymed. The pursuit of rhyme trumped the content; the production of functional text became the primary, and the content came easily in the background. The question "how should we tell?" trumped “what shall we tell?” (Reflection note 7 October-19).

During GSO RMV project nr 1, it was our impression that the LKR worksheet was overwhelming for the students and that the rap genre itself seemed more demanding and “boring” for students to master as a form than other art forms used in WASO, such as dance, crafts, and drama activities, that might seem more “fun” and effortless than writing, according to both teachers and students. This observation is also supported by Adjapong, 2021 and his emphasis on bringing the creative elements of hip-hop into the science classroom (fig 2.2). It also ties in with finding nr 2, about bringing in the performative dimension more often into the RMV project work. The process of rhyming itself seemed more demanding than we had anticipated during the planning of the project. After the evaluation of GSO RMV project nr 1, this interesting observation led

me to introduce a period of rap writing in the 6th grade in parallel with the implementation of GSO RMV project nr 2 with the 7th-grade students. I did this to prepare them for the rap project they would participate in the following year (GSO RMV project nr 3). Later, this choice turned out to be effective during the implementation of their project the next year because they already had some experience in the rhyme writing method.

5.2.3 Performance creates engagement and space for relational encounters

The importance of the performative dimension was an element I did not fully anticipate the power of before I started to implement rap/rhyme in my teaching. The students performing their lyrics to fellow students/class and giving presentations to an audience seemed to have a motivational positive effect on the student group. There is something about the performative element in the performance of rap lyrics that makes it appealing and inspiring, both to those who perform and to those who listen or participate in other hip-hop activities during a performance. (Adjapong, 2021; Emdin, 2013). This is also supported by one of the four hip-hop principles, Make some noise, as already mentioned in chapter 2: “It might seem obvious, but I suggest that hip-hop classrooms would actually produce some noise” (Kruse, 2016b, p 55).

The same performative effect was evident in GSO RMV project 1. I realized that performing the written lyrics at the end of each lesson was important for the students to get the feeling of the music, rhythm, and “vibe” instead of just theoretically working on improving the rhymes and reading the lyrics as poems, sitting at their desks. Therefore, we decided early on to implement the performative element as a repetitive routine in the text production phase. As the text production phase is cyclical in its nature, moving back and forth while improving lyrics, there will be several performances before the student group can agree on the final lyrics chosen for the music video used in the GSO production. One could argue that rap as an art form is relational in its nature (Bourriaud, 2007; Gilmore, 2018). Beyond the relational in performative encounters with fellow students and teachers, it seemed that some of the performing rap groups also experienced a sense of community and unity within the groups. This strengthened the project in its relational nature, and I gained a better understanding of what Tony Valberg (2012, p 177) writes about when he refers to what the French art critic and

curator Nicolas Bourriaud calls ‘collaborative impulses’ and how these impulses affect the actors with their presence. In the early stages of GSO RMV project nr 1, our students attended a WASO (Ben-Horin et al., 2017) method workshop. They were divided into groups, and the instructor gave them tasks that involved inquiry-based (Ben-Horin, 2014) questions and created different story plots with main characters developed through the method of creative circular collaboration mentioned in *GSO4SCHOOL Teachers guidelines* (Robberstad et al., 2019).

The session ended in a performance, where each group presented their story in a small theater play. This was my first encounter with the importance of the performative element in the GSO context, even though the content produced during this workshop was not implemented during the following rhyme writing process due to a lack of science theory substance in the stories produced. Still, my fellow teachers and I were surprised by the level of commitment and engagement we saw in our students after a rather messy process of creating the stories. Messy in the sense that some of the students were not fully participating, some were bored, and it was hard getting all of the students involved. But it seemed like this dynamic changed when the students got up on the stage. More of the students were active in the rehearsing and performing phase than in the more theoretical workshop phase.“It seems as if the performative dimension can strengthen a group of students, bringing them together in a joint effort to present their material to an audience of peers and teachers” (Reflection note, 2019).

During the implementation phase, we were surprised to see that the element of students performing their own rap lyrics seemed to have a high motivational factor to it. This also ties in with Adjapong, 2021, and his findings on hip hop pedagogies as a culturally relevant approach “to empower students to maintain an appreciation of their cultures” (p 846). This is also supported by Kruse, 2016b, p 53, when he writes about the four hip-hop principles: “Adopting these principles would ideally keep music classrooms relevant to students’ interests, focus on connections to both local and global contexts.” We saw that the performative element could be implemented more often during the writing process to empower and motivate the students to keep going and encourage each other in their writing process. This was done during the prototyping phase and assessment phase.

5.2.4 Beneficial to alternate between individual and group work

In the tradition of creativity research, where I consider myself positioned, group work is often implemented to promote creativity, collaboration, and learning among students in the form of group collaboration that resembles what Sawyer calls "Improvisational Peer Collaboration" (2004, p 15-16). "Student discussion must be allowed to take its own course, so that group learning can emerge from the interaction of the group" (Sawyer, 2004, p 16). Another example of a collaborative group dynamic relevant to my context is Oded Ben-Horin, 2021 and his description of the process of creating a science opera (p 33):

> The task of creating a science opera demands collaborative group work, constant dialogue between pupils, peers and teachers, and the perpetual merging of individual pupils' ideas with those of others (Chappell et al., 2012). That merging typically entails friction as it requires engagement with the values of others (ibid).

Ben-Horin is referring to the theory of Wise Humanizing Creativity (WHC) (Chappel et al., 2012). I believe the group activities implemented in our GSO RMV projects are comparable to what both Sawyer and Ben-Horin describe because of the collaborative nature of the group tasks. Still, some challenges with creative group work emerged during our implementation of GSO RMV project 1. One of the findings during the implementation phase of this study is the importance of alternating between individual and group work. During his observation of the work process of the students during the first project, one of the researchers involved in the project commented that it seemed to be an advantage to alternate between individual work and group work, cf. observation note from October 2019: "Challenging to write rap as group work. It seems as if individual students lead or the groups divide and distribute tasks. Idea: Switch between work in pairs and groups". This observation is also supported by the research of Beebe & Masterson (2016), where the authors discuss the advantages and disadvantages of group work and also write about finding the balance between individual and collective goals and interests. Burke (2011) writes about how it can be challenging for teachers to design and implement group work effectively and about the responsibility teachers have to be good facilitators for practical group activities. The challenges of facilitating group work were evident during the implementation of GSO RMV project nr 1. We chose to use group work as the primary form of work, as WASO relies extensively on group work (Ben-Horin et al., 2017, p 5) in alignment with the theoretical tradition of WHC,

which is also presently one of the pillars of the GSO pedagogy (Straksiene et al., 2022). This is the main reason for our choice of group work as the primary work form in the projects of this study. Still, my findings suggest that the text production phase could have been organized differently. For example, the students could alternate between individual work, work in pairs, and then bring with them into the group what they had already produced. Because of finding number 1 from the preliminary phase (Tool-related structure is beneficial for efficient lyrics writing), and 3 (Beneficial to alternate between individual and group work), we chose to facilitate more individual text production work throughout the project period of GSO RMV project nr 2, in combination with group work. Based on the submitted material, it may seem as if this prioritization led to more students taking an active part in the text production than we experienced during GSO RMV project nr 1 (reflection note, 2020).

It may seem as if having time and peace to work with the material individually before bringing the produced material into a group gives both ownership of the written text and the scientific material involved in the text production. Another aspect of this finding has to do with the individual creative process. Kruse 2016b, emphasizes the hip-hop principle *Keep it real,* the importance of personal authenticity in the rhyming process, and the other creative processes involved in hip-hop pedagogies. To strengthen this individual process, during GSO project nr 2, we chose to work very concretely with the establishment of a topic-related vocabulary through work with mind maps with subject expressions and rhyming words, as already mentioned in chapter 4. During GSO RMV project 2, according to observation notes, more students were actively participating in the group collaboration, as they had also written their own suggested lyrics to bring with them into the groups. This was done to give the students tools to produce rhyming lyrics, both individually and in groups. The mind maps were also implemented during GSO RMV projects nr 3 and 4 and will be elaborated on later in this chapter.

5.2.5 Criteria lists create a clear direction for the students' lyrics production

During the planning of GSO RMV project 1, we had several discussions in the teacher group concerning criteria. Did we want criteria lists? How many criteria? How detailed? The topic of our project, Gravity and the relativity theory of Einstein, was rather complicated, and we agreed on creating a list of science content criteria that were put

together as a combination of historical facts and scientific facts. This decision ties in with finding number 3 about the alternation between individual work and group work to secure the science content on an individual level. We gave the students some specific bullet points to guide their writing process in a clear direction, and it was possible for the teachers to assign different criteria to different students or groups of students in order to cover all the criteria for the entire rap lyrics collectively. These criteria lists also made it easier for the teachers and supervisors to give constructive feedback and helped the students with their self-assessment during the project work, in addition to the peer assessment and group collaboration. According to Sawyer 2004 "Disciplined improvisation acknowledges the need for a curriculum—there must be some structure to the classroom performance" (p 16).

The importance of criteria is also supported by the findings of McFadden (2012, p 69) on the scientific accuracy of student-produced rap songs, as mentioned in chapter 3. McFadden emphasizes the importance of scientific accuracy when working on student-produced science songs in his Science Idol project (2012, p 70-71). Another of McFadden`s findings was that students participating in the Science Idol program were often nervous about the scientific accuracy of their songs (p 86). To me, the findings of McFadden support my finding number 1 from the preliminary phase of a clear structure, also when it comes to teachers being present and clearly defining scientific content, criteria, and expectations in dialogue with the students. They also support finding number 4 regarding the importance of criteria lists. I will elaborate on the topic of criteria lists during the next section about the prototyping phase, as this finding was even clearer during one of the later projects, where we developed different types of criteria lists.

5.3 The prototyping phase

Archer (2019) defines the prototyping phase like this:

> This phase focuses on iterative cycles of the intervention approximation, foregrounding development, evaluation and reflection (similar to action research). These cycles usually focus on subcomponents or various elements of the intervention and not necessarily on the complete intervention. The phase should result in a developed intervention or product, along with an implementation plan (p 320).

According to table 4.1, a total of 9 projects are part of what we retrospectively could define as the prototyping phase. Of these projects, 4 were the GSO RMV projects Gravity,[2] Energize,[3] Thrive,[4] and Creavolution.[5] The rest of them were shorter RMV projects with no science topics. These shorter projects did not have any strict criteria lists concerning theoretical content, and the aim was to let the students experiment with the art of writing rhyming lyrics. Individually and group-wise, they would create music videos (RMV) featuring their rap lyrics. In my study, based on the findings from the preliminary phase, new design principles were created, this time only focusing on the process of lyrics writing**,** including elements that supported the interventions implemented because of the findings from the preliminary phase.

5.3.1 Design principles prototyping phase

In the design principles of the prototyping phase, I only implemented those directly related to the lyrics writing process, according to Archer, 2019, p 320: "focus on subcomponents or various elements of the intervention and not necessarily on the complete intervention."

During this phase, we developed a prototype of the teaching design suggested in my proposed final GSO RMV framework and guidelines (tab 5.10 and 5.11) based on the following design principles (tab 5.3): DP1: The tools and organization, DP2: The design specifications, DP3: The science content criteria, defined by the GSO coordinator and teachers. During projects 2-10 of the prototyping phase, these were the guiding principles.The last part of the RMV-production process, has not been emphasized much in this study as mentioned in chapter 1. The main focus of the prototyping phase was the lyrics production. Therefore the design principles developed for the prototyping phase could be defined like this in table 5.3:

Design principle	Description	Source
DP1	Developing teaching design for RMV lyrics production that is specific and easy to use for all teachers involved **Tools:** - Mind maps with keywords and rhyming words - LKR worksheet/Five line poems/Slogan method/Freestyle writing - AABB-rhyme pattern **Organization**: - Lectures - Excursions - Group tasks - Individual tasks - Alternating between individual and group activities - Performative encounters as a part of the lyrics writing process	GSO coordinator, e-mail correspondences, and minutes from teacher meetings
DP2	**Design specifications:** <u>End product</u>: - Production of a 3-minute-long science content rap music video that involves 3 classes of students - Original rhyming lyrics - Original music - Original dance - Original rap music video that supports content defined by GSO	GSO coordinator, e-mail correspondences, and minutes from teacher meetings
DP3	Science content *criteria list*	GSO coordinator, e-mail correspondences, and minutes

Table 5 3 Design principles for the prototyping phase

5.3.2 Findings from the prototyping phase: (Projects 2-10)

The main findings from the prototyping phase can be divided into 2 main categories: A & B:

A)	**Findings concerning the overall teaching design of the lyrics production process**
	- Implementation of GSO phases in teaching design
B)	**Findings concerning tools and strategies for the lyrics production process**
	1) Implementation of mind maps with fact words and rhyming words 2) Development of 2 different teaching designs for writing lyrics 3) Development of 2 different teaching-designs content-wise 4) Development of 2 different types of criteria lists 5) Development of the circular collaboration songwriting method 6) Implementation of of the GSO storytelling method

Table 5 4 Overview of the findings prototyping phase

Based on the findings from the prototyping phase, I created a new circular conjecture map, this time with a high-level conjecture about how to develop an effective and relevant (Archer, 2011, 2019; Plomp & Nieven, 2010) teaching design for lyrics production in RMV projects in a GSO context (fig 5.2). Compared to the conjecture map from the preliminary phase (fig 5.1), this conjecture map is even more specific when it comes to the embodiments, the mediating processes where the emphasis on the observable interactions is high, and the outcomes. The findings of A) are presented in table 5.4 and mentioned in the outcomes section of the conjecture map in fig 5.2, along with the.findings of B). Both will be elaborated on below. As the newly developed GSO4SCHOOL material was published during this phase, some of the design conjectures and theoretical conjectures did also reflect this, particularly the implementation of the 4 GSO phases in the teaching design of the lyrics production process and the development of the creative circular collaboration (CCC) songwriting method, inspired by the storytelling method described in the *GSO4SCHOOL Teacher's guidelines* (Robberstad et al., 2019). These elements will be elaborated on in the next section, where my main focus is on the findings presented in the outcomes section of the circular conjecture map, also elaborating on the embodiments and mediating processes.

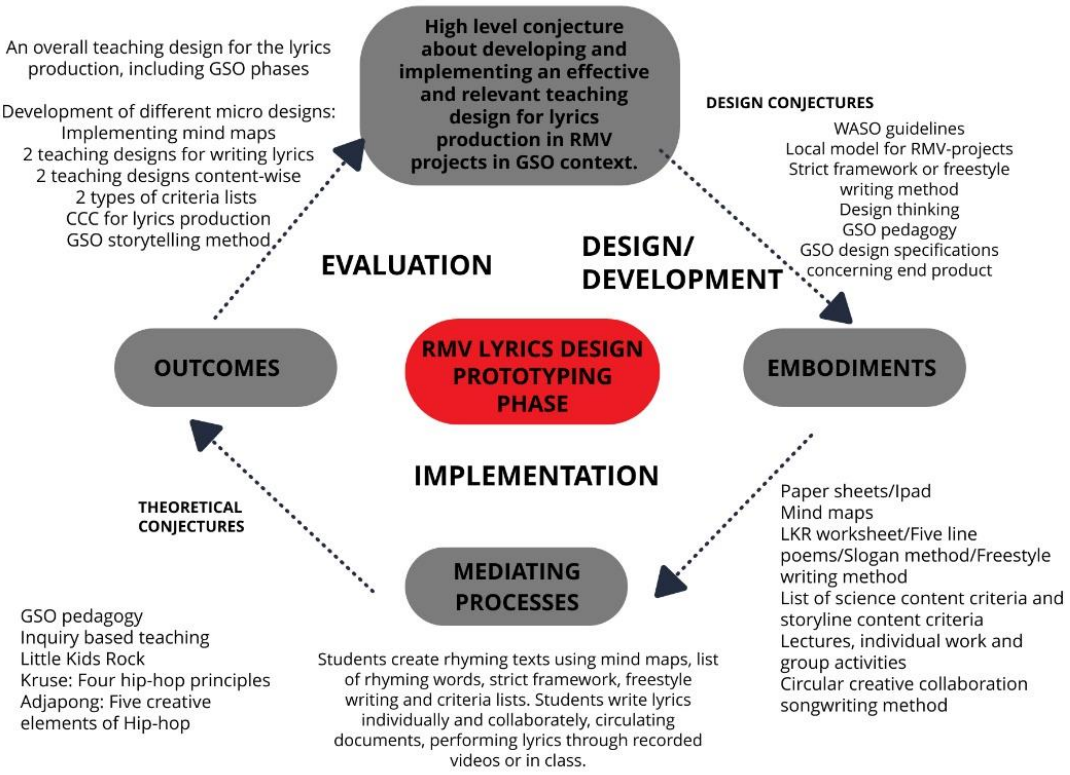


Figure 5 2 Conjecture map from the prototyping phase

A) Findings concerning the overall teaching design of the lyrics production process

At the end of the preliminary phase, we found that the most critical stage of the project was the details of phase 3 of the CREAT-IT/WASO guidelines (tab 4.4), according to DP2, preliminary phase: Creation (of the rap lyrics) (Tab 5.1). Our goal was to develop a teaching design that would help more students get involved than those who already were skilled writers. During GSO RMV project 1, we did not have any established RMV teaching design, but we had some suggestions for design principles. During the prototyping phase, we discovered that implementing mind maps combined with the strict framework and freestyle writing method increased the total text production. I, therefore, chose to adjust the design principles for the prototyping phase, focusing on refining the specific teaching design for rap lyrics production.

During the first iteration, I realized that some of my colleagues found it hard to give advice on the creative process of the songwriting/rhyme production. So I found it necessary to create a procedure that could be more self-explanatory. During the prototyping phase, this procedure was refined as a suggested teaching design for the assessment phase. During the implementation of GSO RMV project 4, we combined the different micro designs developed through the preliminary and prototyping phases and further developed a new step-by-step design for the lyrics writing process, also connecting it to the four design thinking phases of GSO. I will elaborate on these micro designs in section B. According to my suggested GSO RMV guidelines (tab 5.11), presented in the next section, a suggested teaching design of lyrics production in GSO RMV projects is also proposed in table 5.5 below, implementing the GSO phases FEEL and IMAGINE as a structure:

FEEL	1) Storytelling, circular creative collaboration method 2) Mind maps with fact words and rhyme words
IMAGINE	3) Writing five-line poems for each of the fact words from the mind map 4) Writing chorus by using the slogan method, with fact words from the mind map 5) Writing verses using the LKR worksheet, individually and through the circular creative collaboration songwriting method

Table 5 5 Suggested teaching design of lyrics production GSO RMV

B) Findings concerning tools and strategies for the lyrics production process

During the implementation of the 9 projects of the prototyping phase, different micro-designs and teaching strategies concerning the process of lyrics production emerged through the iterations. I will elaborate on these in the following section.

1) Implementation of mind maps with fact words and rhyming words

After implementing GSO RMV project nr 1, we wanted to give the students more specific work tools in GSO RMV project nr 2. We experienced that the text production at the individual level in the first year was not as high as expected, as mentioned already. In GSO RMV projects nr 2, 3, and 4, we, therefore, decided to use mind maps aiming for two purposes: Produce a text document that could function as a database to retrieve both science words/concepts and rhyming words from. Before the start of GSO RMV project nr 2, one of the interventions was to build a topic-related vocabulary of expressions, words, and rhyming words that the students could pick from when they started their rap lyrics production. A shared mind map was created in the classroom, where the teachers wrote down suggestions from the students. Later, this mind map was shared with the students on their Ipads. The work with mind maps was carried out in several lessons and by several teachers. We organized the fact words and rhyming words in one mind map per GSO RMV project. These mind maps were living documents, expanding throughout the project. The result was a fairly comprehensive document that was built and stored on the student Ipads, as well as printed in A-3 format and used during the text production phase. The same was done during GSO RMV projects 3 and 4. Below is an excerpt from a mind map in GSO-project nr 3, A Dog in a Bog in the Fog:

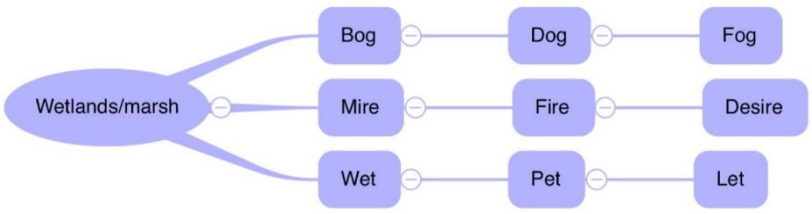


Figure 5 3 Mind map GSO RMV project 3

This process was also repeated during the shorter RMV projects to build a resource to use during the songwriting process. Below is an example from project nr 6, Rap about the UK:

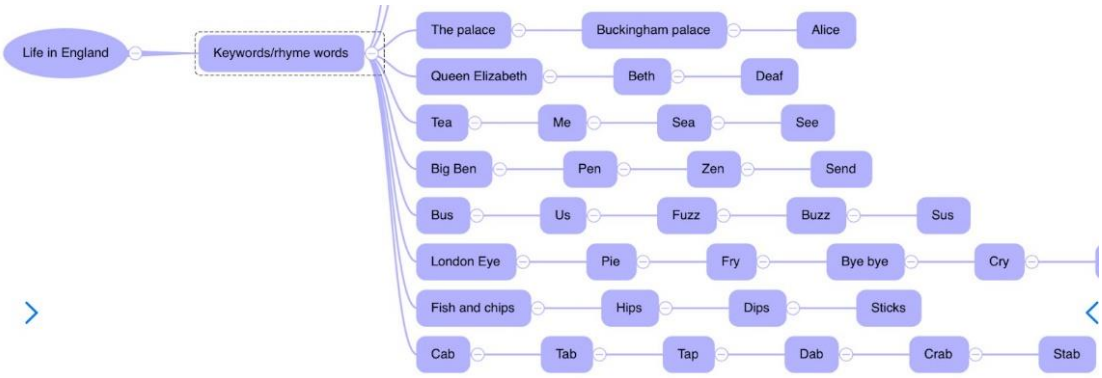


Figure 5 4Mind map RMV project 6

During most of the projects in the prototyping phase, the mind maps were created by teachers and students in class, without the teachers deciding the fact words beforehand. Before creating the mind maps of GSO RMV project 4, however, the teachers decided to change this procedure slightly by giving the students a short list of fact words relevant to the topic: Mind, Brain, Evolution, Think, Head, Amygdala, Create. The teachers then asked them to complete the mind map by finding the Norwegian word, defining the meaning of the word, and finding as many rhyme words as possible. This was done to limit the number of words to see if this changed the rhyme texts later in the process. Below is an example of a template (Fig 5.5) created by the teachers in science and English.

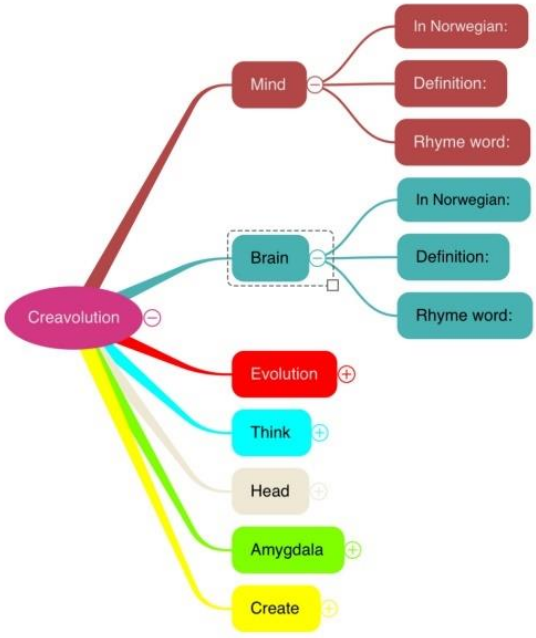


Figure 5 5Mind map teacher GSO RMV project 4

When analyzing the written rhyme texts the students produced in GSO RMV project nr 4, one could clearly see the connection between the words chosen by the teachers and the words used in the student material, compared to the mind maps and lyrics produced during GSO

RMV project nr 2 and 3. In these two projects, the list of fact words was longer, and the lydiversity of the produced material also reflected this, while some of the lyrics did not reflect the science topic but were more off-topic. There are benefits and disadvantages to both approaches.

Figure 5 6 Mind map student GSO RMV project 4

By choosing a more limited group of facts- or keywords, the teachers can make sure that the students really learn the meaning and context of these words, compared to a wider collection of words, which can give the students a more superficial learning outcome. Above is an excerpt of a mind map created by a student from GSO RMV project 4 (fig 5.6). As mentioned above, we saw an increase in submitted material during the projects of the prototyping phase, which could imply that the combination of work forms and tools available made it easier for the students to be confident in their lyrics production, a key tool being the implementation of mind maps. Research done on the use of mind mapping (Goodnough & Long, 2002) support my findings concerning mind mapping used in the classroom. The particular mind mapping method developed during the implementation of the projects in this study only involved fact words and rhyming words. I have not been able to find any literature on this method. In GSO RMV project nr 2, we started with two different mind maps, one in Norwegian and one in English. In GSO RMV project nr 3, we decided to prompt the students to write in English from the

start, as some students found it confusing to write in two different languages. We, therefore, chose to only produce mind maps in English in GSO RMV projects nr 3 and 4. This seemed to be a good decision, as the lyrics of the final GSO RMV were also expected to be written in English. Combined with the circular collaboration method mentioned below, we secured active participation from more students and an increased speed in the lyrics production. We noticed this change as more material was produced during the lessons of GSO RMV projects 3 and 4 than during GSO RMV projects 1 and 2.

2) The development of 2 different teaching designs for writing lyrics

In our RMV projects, we chose to stick to a strict form structure when it came to the lyrics production, combined with a more so-called freestyle structure in some of the projects. During the prototyping phase, 2 different designs of lyrics-writing collaboratively emerged through the teaching of the different teachers involved in the projects. They can be called Lyrics writing A) Design 1 "strict framework," and B) Design 2 "freestyle method" and are mentioned as "2 teaching designs for writing lyrics" in fig 5.2 under Outcomes.

A) Design 1 strict framework

To avoid confusion and to introduce the poetry basics to the students, we chose to implement only 3 different methods of strict frameworks:

1) The framework of Five-line poems from Stairs 5
2) The slogan method from Little Kids Rock.
3) A simple AABB pattern: LKR worksheet

Table 5 6 Overview of the 3 strict frameworks used in RMV lyrics production

1) Five-line poem

During the prototyping phase, five-line poems were introduced as part of GSO RMV project nr 2. During this project, we focused on poetry and different poetry styles. One of them was writing five-line poems, based on Thorsen&Unnerud, 2006. In the English lessons, the students wrote five-line poems about hydropower. Below is a photo of some five-line poems written by the students on the topic of hydropower.

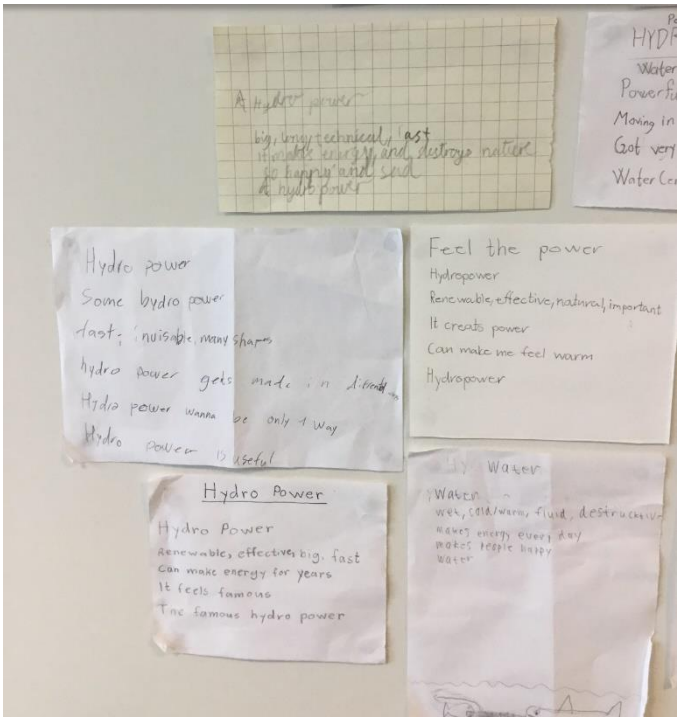


Figure 5 7Examples of five-line poems GSO RMV project 2

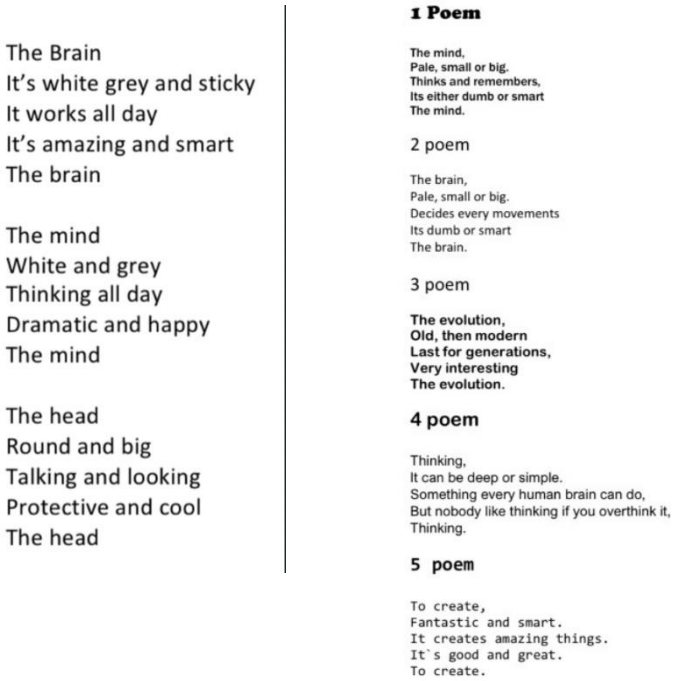
Below is a poem that was used in the final Hydropower music video, where the rap soloists selected an example from their five-line poems associated with hydropower and read this poem at the end of the music video:

Hydropower
Water, dam
Eternal, renewable
Clean energy
Hydropower

Figure 5 8 Five line poem used in GSO RMV 2

During GSO RMV project 2 the five-line poem method was not used specifically as the first step of the lyrics-writing process, but as a parallel task, in addition to the LKR worksheet/AABB pattern. During GSO RMV-project 4, we wanted to connect the different lyric writing methods to each other. The assignment of writing five-line poems

was introduced during a whole day of project work and was given as an individual assignment after the students first created mind maps with fact words and rhyming words. The mind maps were meant to be supporting the students later in the writing process. During the work on the five-line poems, the teacher group was satisfied with the material the students delivered. The assignment of writing five-line poems seemed more effortless to perform for the student than the GSO story-writing method (Robberstad et al., 2019, p 16) mentioned earlier. Below are examples of five-line poems from GSO RMV 4.



The Brain
It's white grey and sticky
It works all day
It's amazing and smart
The brain

The mind
White and grey
Thinking all day
Dramatic and happy
The mind

The head
Round and big
Talking and looking
Protective and cool
The head

1 Poem

The mind,
Pale, small or big.
Thinks and remembers,
Its either dumb or smart
The mind.

2 poem

The brain,
Pale, small or big.
Decides every movements
Its dumb or smart
The brain.

3 poem

The evolution,
Old, then modern
Last for generations,
Very interesting
The evolution.

4 poem

Thinking,
It can be deep or simple.
Something every human brain can do,
But nobody like thinking if you overthink it,
Thinking.

5 poem

To create,
Fantastic and smart.
It creates amazing things.
It`s good and great.
To create.

Figure 5 9 Examples of five-line poems GSO RMV project 4.

2) Slogan method

The slogan method is explained in a tutorial video from the youtube channel of *Little Kids Rock.*[38]This method was used in several of the shorter projects in this study and in GSO RMV project nr 4 and was effective for writing the chorus parts, as one word is repeated, and the rest of the sentences are built around this word, like a slogan. Below is an example from project nr 8, European countries:

If you want to ski, go to Switzerland
If you like cheese, go to Switzerland
Switzerland, Switzerland, go to Switzerland
Switzerland, Switzerland, go to Switzerland

Figure 5 10 Example of slogan rap RMV project 8

During GSO RMV project 4, we chose to combine the five-line poem method and the slogan method. After the students finished writing their five-line poems, these poems were rewritten into choruses using the slogan method from Little Kids Rock[25]. The students used the main word of the five-line poem as their slogan and then filled in some of the lines from their five-line poem to back up that slogan word chosen or create new lines. After first having written the five-line poems, the process of writing slogan rap lyrics seemed like an easy task to most of the students. They could make the lyrics sound more catchy and chorus-like by re-arranging the already-written poems. By developing this method, we had a very specific method of writing lyrics for choruses. During the previous projects, we did not have any suitable method to work as purposefully with the chorus of the rap. The idea during GSO RMV project 4 was to combine these slogans with the verses produced through the LKR worksheet AABB method. Below are some examples of student-produced slogan raps from GSO RMV project nr 4.

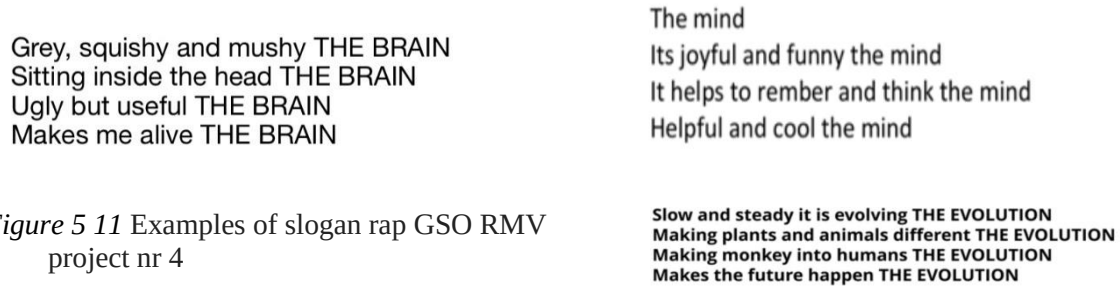


Figure 5 11 Examples of slogan rap GSO RMV project nr 4

3) LKR worksheet.

This method was developed by Little Kids Rock, and the "Start with a rhyme worksheet" is already mentioned in the theory chapter in this thesis and referred to as the "LKR worksheet." Students wrote simple rap lyrics with a rhyme scheme of AABB, using a strict methodological framework in a worksheet, by first creating a mind map with keywords/rhyming words, then adding chosen AABB-rhyme words into the LKR worksheet before writing whole sentences ending with the AABB-rhyme words.

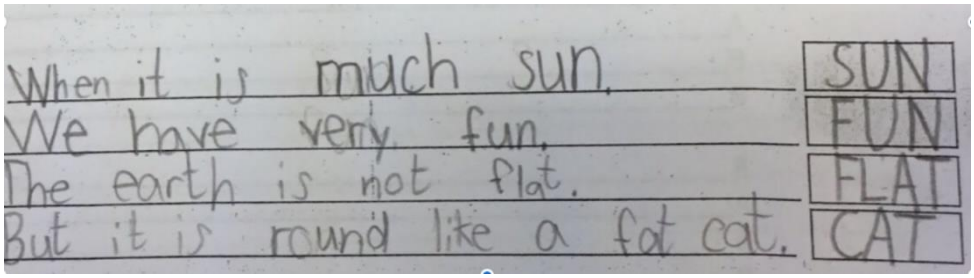
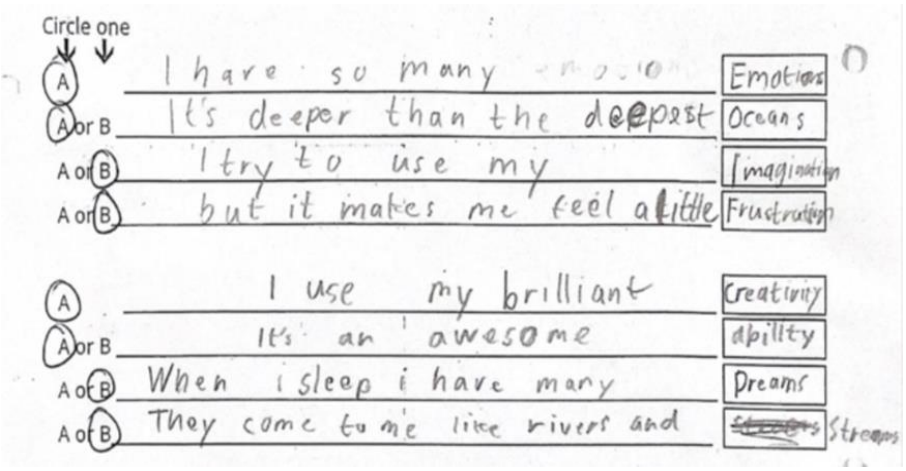


Figure 5 12 Example of AABB-rap GSO RMV project 1

This method seemed suitable for beginners and students who struggled to get started in their writing process. It was used in 10 of the projects in my study, with 4 as the only method (Tab 4.2). In this design, students started by choosing one A-rhyme and one B-rhyme, writing these words in the boxes at the end of each line. Then rhyming words for the A and B-rhymes were chosen from the mind map. Finally, the students wrote sentences on the worksheet that ended with these four words.

During the process of writing slogan raps in GSO RMV project 4, many suggestions of choruses were proposed by the students. In order to make the process of writing verses as effortless as the five-line poems and slogan raps, we decided to let the students focus on the mind maps again. The students were given 4 new fact words: Creativity, Emotions, Imagination, and Dreams. They put these words into their mind map and followed the same procedure as described above, finding the meaning of the words, Norwegian translation, and rhyming words. They filled in fact words and rhyming words in the LKR worksheet first and then wrote sentences that ended with these words. We expected the AABB scheme to be the most challenging rhyme form compared to the five-line poems and slogan raps and were surprised when the AABB- scheme seemed to be an engaging way of processing the fact words and rhyme words, judging by the amount of material that was handed in by the students, and the level of enthusiasm recorded in the classroom during the writing process. During the end of this session, the students performed their lyrics to each other with enthusiasm before they were given new assignments of video recording their rap verses, slogans, and five-line poems.



Below is an example written by one of the students.

Figure 5 13 Example of AABB-rap from GSO RMV project 4

A different method considered but not implemented during GSO RMV project 4 would be to encourage the students to rewrite their five-line poems once more. This time, the students would focus on the fact words and rhyming words first, using the LKR

worksheet, followed by sentences rewritten from the five-line poems. If some of the content from the five-line poems could not be used, the students still had a starting point for the further rewriting of the lyrics. This option was not tested in this study but would be interesting to investigate in a different study, in line with the reuse of five-line poems for slogans (p 61).

B) Design 2 Freestyle.

According to Pence, 2011, several different patterns and forms can be used in poetry, some of them even with no rhyme at all. In this design, students wrote more advanced rap lyrics using a chosen rhyme scheme (AABB) or without any rhyme, writing sentences freely after first creating mind maps with keywords/rhyming words. This method seemed suitable for creative students who were confident in their writing and felt that the strict framework in Design 1 gave them too many restrictions. This method also seemed beneficial for the students who found it hard to participate in the collaborative writing processes. In my study, this design was used in 4 projects as an option for those who wanted to use it instead of or in addition to Design 1 (Data sheet 4.2) A similar method is also mentioned in one of the Science Idol tutorials of Tom McFadden in his Youtube channel *Science with Tom*[40] Below is an example from GSO RMV project 2:

When you build a hydropower plant you have to think smart
It`s good for the environment, it`s good for the heart
But when we build it, it causes pollution
We have to find a good solution

Figure 5 14 Freestyle rap, GSO RMV 2

In both the designs mentioned in finding number 2 of the prototyping phase (The development of 2 different teaching designs for writing lyrics), the lyrics could be written as a creative circular collaboration, alternating between different groups of students, where all groups ideally participated in the collective production of lyrics. Students could also use both designs individually for those who found it hard to participate in the collaborative writing processes.

[40] Science with Tom: https://www.youtube.com/watch?v=tjoLyScqESc

5.3.3 Development of two different teaching designs content-wise

During prototyping-phase two different teaching designs content-wise were developed in GSO RMV project nr 3. This happened because of the implementation of the storytelling technique (group tasks) from *GSO4SCHOOl Teachers guidelines* (Robberstad, 2019, p 16), mentioned in the section about the preliminary phase. While the end product from GSO RMV projects 1 and 2 were facts-based poems with no storyline, a different teaching design emerged during project 3; A narrative from the first to last verse, where the students decided to tell the story about a dog in the bog in the fog in the RMV from GSO project 3. After implementing this new design, our three different GSO videos could be separated into two categories contentwise:

A)	Non-narrative poems	Facts-based poems with no storyline
B)	Narrative poems	Facts-based poems with a clear storyline

Table 5 7 The two content-wise categories of poems used in GSO RMV

In traditional poetry writing, these two categories of poems can also be found (Görey, 2017; Pence, 2011).

A) Non-narrative poems: Facts-based poems with no storyline

The rap lyrics produced in all projects except for GSO RMV project 3 were facts-based poems with no storyline. Below is an example of a non-narrative poem from GSO RMV project 2:

Water can make electricity.
Yeah, it has the ability
To light up a whole planet.
That`s really cool, can you believe it?
Do you wanna learn how to make energy?
You can see my hydropower documentary
Do you know what I`m talking about?
I`m talking about HYDROPOWER!!

Figure 5 15 Non-narrative poem, GSO RMV 2

The design of non-narrative poems was relatively straightforward, connecting the fact words and rhyme words from the mind maps into short sentences that could describe the scientific phenomena that the students were learning about. The rhyme pattern was free of choice.

B) Narrative poems: Facts-based poems with a clear storyline

The second design content-wise used in GSO RMV project 3 consisted of writing a facts-based poem with a clear storyline, where students produced lyrics about the dog in a bog in the fog. In GSO RMV project 3, we decided to implement elements from the group tasks and story-developing process described in the *GSO4SCHOOL teacher`s guidelines* (Robberstad et al., 2019, p 15). The teacher group wrote a short storyline based on the ideas from the circular creative collaboration story writing process with the students early in the project to test if writing a rap with a clear storyline was realizable. Writing rap lyrics with a clear storyline seemed to be more challenging and more time-consuming than just writing simple facts-based rhymes. The way I see it, narrative rap lyrics can be seen as a part of a narrative poetry tradition (Görey, 2017; McHale, 2009).

In GSO RMV project number 3, students had to balance two different criteria parameters simultaneously, both the list of science content criteria and the list of criteria for the storyline itself, mentioned in the next section about the development of two different types of criteria lists. But it might have given the final product an extra dimension and made it easier to implement the main characters and the storyline in the music video. It also provided the rap lyrics with some main characters and made it easier to implement costume work and role-play within the framework of an RMV. In the RMV from GSO project nr 3, Thrive (2021),[4] all the participating students have defined roles with costumes. The students who wanted to be exposed on-screen participated in the video. In this project, the emphasis on costumes was higher than in the two previous projects, as arts and crafts were implemented as one of the subjects involved in this cross-curricular project. So all the students were given the assignment of creating their own costumes, which also came as a consequence of the choice of a storyline. They were making drawings of their role figures and developed their own costume design for use in the final music rap video. Using art in an RMV project ties in with what Adjapong, 2021 calls Graffiti art (p 850). Drawing was implemented in GSO

RMV 1, 3, and 4 as part of the creative process. Below is an example from the lyrics in GSO RMV project 3, where the storyline is evident:

Two scientists decided to analyze the dog
For a 1000 years it had been laying in the bog
It looked the same as when it passed
The accident must have happened really fast

Figure 5 16 Narrative poem, GSO RMV 3

This design needs more exploration and research, but it can be a suggested method for RMVs implemented in the so-called macro format (Robberstad et al., 2019, p 7) of GSO, as suggested in my final proposal of RMV-guidelines (Table 5.11). It connects the storyline with scientific facts without creating a full roleplay, which is often more time-demanding in creative scenic projects. Writing narrative poems can also be time-consuming and challenging for some student groups to master, so future research is needed to develop this method further, to make it more practical and effective (Plomp & Nieven, 2013, p 28). Concerning the GSO storytelling method itself, there are also some challenges that I address later in this chapter.

5.3.4 Criteria lists of both science content and storyline content were developed

When implementing RMV projects with 12-year-old students, the definition of criteria in our local context is specified as a list of elements that the students should include in their lyrics, as opposed to having no guidelines at all content-wise. When working on the rap lyrics, in all the 3 GSO RMV projects during the prototyping phase, we gave the students very specific criteria to cover, content-wise. They were handed out to different groups or individuals to cover all the criteria. In GSO RMV projects 1 and 3, different groups wrote about different sub-topics. In GSO RMV project 2, all the students wrote the rap lyrics from the same criteria list, choosing which criteria they would focus on. Later on, the sentences and verses were put together by students and teachers, choosing from the produced material. Sometimes only bits and pieces were used in the final product. Other times, entire verses were implemented. During GSO RMV project 3, as mentioned above, a new parameter emerged from the process: A storyline for the rap lyrics to follow. We developed two sets of criteria lists, one for the science content (fig

5.14) and another one for the storyline content (fig 5.15). They were created in dialogue with the students. An example of the criteria list for science content from GSO project 3 is shown below.

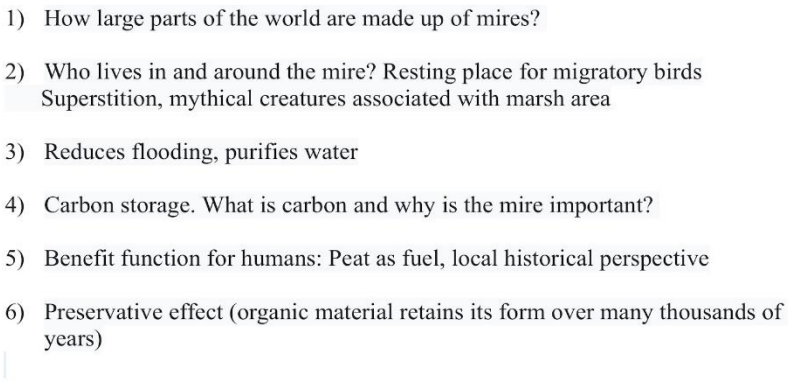
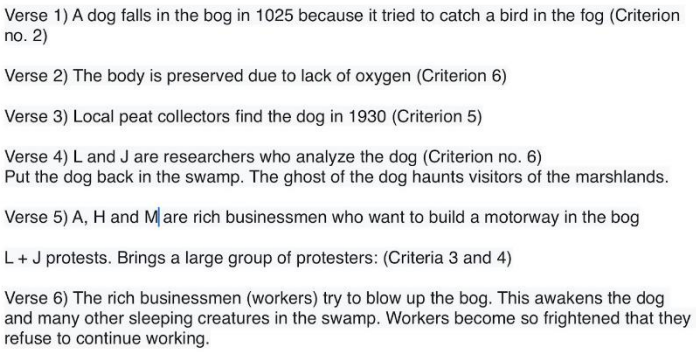

1) How large parts of the world are made up of mires?
2) Who lives in and around the mire? Resting place for migratory birds
Superstition, mythical creatures associated with marsh area
3) Reduces flooding, purifies water
4) Carbon storage. What is carbon and why is the mire important?
5) Benefit function for humans: Peat as fuel, local historical perspective
6) Preservative effect (organic material retains its form over many thousands of years)

Figure 5 17 Example of the criteria list for GSO RMV 3

An example of a working document containing criteria for storyline content from GSO RMV project 3, referring to the science content criteria list, is shown on the next page. The choice of developing criteria lists ties in with the already mentioned research on structure in the classroom (Henriksen & Mishra, 2016; Sawyer, 2004, Sawyer, 2011) and helped both students and teachers stay focused during the process of lyrics production. They also helped us cover the criteria given by the GSO coordinator concerning the science content criteria of the overall GSO production.


Verse 1) A dog falls in the bog in 1025 because it tried to catch a bird in the fog (Criterion no. 2)

Verse 2) The body is preserved due to lack of oxygen (Criterion 6)

Verse 3) Local peat collectors find the dog in 1930 (Criterion 5)

Verse 4) L and J are researchers who analyze the dog (Criterion no. 6)
Put the dog back in the swamp. The ghost of the dog haunts visitors of the marshlands.

Verse 5) A, H and M are rich businessmen who want to build a motorway in the bog

L + J protests. Brings a large group of protesters: (Criteria 3 and 4)

Verse 6) The rich businessmen (workers) try to blow up the bog. This awakens the dog and many other sleeping creatures in the swamp. Workers become so frightened that they refuse to continue working.

Figure 5 18 Example of the criteria list for storyline content, GSO RMV project 3

5.3.5 Development of the CCC songwriting method for lyrics production

To secure the collective ownership of the lyrics produced, we decided to create a system of circular creative collaboration as mentioned in model 5.2 under Outcomes. The circular creative collaboration (CCC) songwriting method was inspired by the circular creative collaboration storywriting method in the GSO pedagogy (Robberstad et al., 2019, p 15-16). It was implemented in projects 3, 6, 8, 9, and 10, where multiple students worked on the same verses simultaneously, using the same procedure of

circulating documents as explained in *GSO4SCHOOL Teachers`guidelines* (Robberstad et al., 2019). These documents were circulating rap worksheets (projects 3, 8, 9) or shared online documents, like google docs or padlet in projects 6 and 10. To make the final music video fit into the international GSO production, we had to develop methods for the implementation of collective text writing and the production of a joint student product, even with a high number of students (3 classes each year). As pointed out earlier, one of the challenges during the text-writing exercises was to get all the students involved. Already in GSO RMV project nr 1, it was evident that the most resourceful students took the responsibility of writing the lyrics, while other students were rather passive. Some of these issues were solved in GSO RMV project nr 2 by creating mind maps where the students could find both fact words and rhyme words for their text production. In this project, we saw an improvement in the process of text production because of the extensive use of mind maps. Still, the problem of single students/groups "owning" their contribution (verse, sentence) was not solved until we introduced the method of CCC songwriting in GSO RMV project nr 3.

Using this method combined with the mind maps made it easier to involve students in productive group work and, at the same time, ensure that the final text was secured through a collaborative process which made it hard to decipher ownership of a group/individual level. At first, it seemed as if some of the students found it challenging to share their work with other student groups, which meant handing over their sheet to the next group after writing a word or a sentence, but this seemed to solve itself after the writing process proceeded. As mentioned earlier, the speed of students' ability to produce texts under pressure increased considerably during GSO RMV project nr 3, and the rap lyrics produced in project nr 10[36] clearly showed this.

The development of the CCC songwriting method was considered a breakthrough during the projects implemented in the prototyping phase. I, therefore, created a conjecture map specifically for this method (see fig 5.19 below) where the four GSO phases are integrated into the map, suggesting that this method could be used as a key method in a GSO RMV project if collective ownership of the end result is the goal.

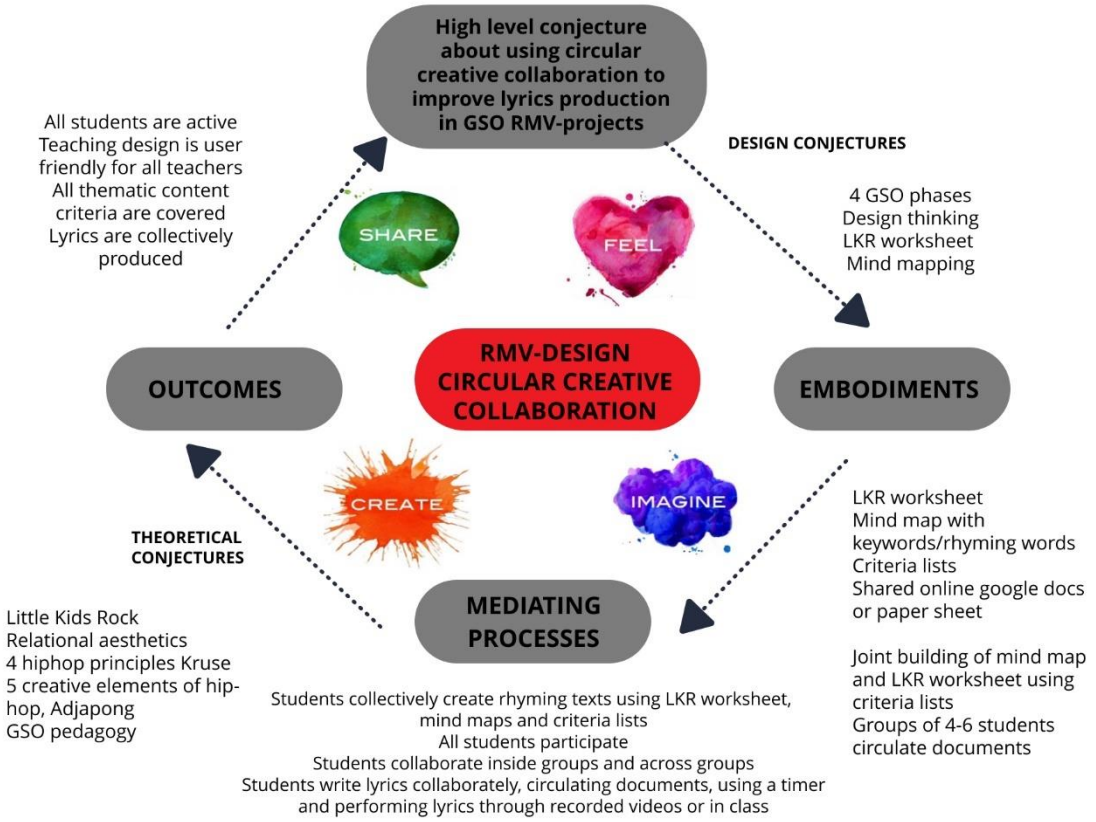


Figure 5 19 Circular conjecture map CCC songwriting method

An essential part of the creative collaboration sessions was to bring in a microphone, either a real microphone that the different teams passed on for each verse or an imaginative microphone like a bottle, roll of paper, etc. As mentioned earlier, the performative and relational (Bourriaud, 2007; Gilmore, 2018; Valberg, 2012) dimension turned out to be an important part of the process. It seemed to inspire the students to participate more actively, as opposed to just ending the lesson after the students were done writing their rhymes. This ties in with finding number 2) in the preliminary phase (Performance creates engagement and space for relational encounters). Using a timer was a tool that helped both students and teachers be more effective during a writing session of the circular collaboration songwriting method. It seemed that the timer inspired competitiveness in the different groups and created a game-like atmosphere in the classroom, where the different teams put in considerable effort to come up with good ideas and suggestions to pass on to the next group. At the end of each session, all the groups rehearsed and performed one of the verses while the teacher put on a music beat. One of the challenges to this form of collaborative lyrics writing is that it demands a very firm classroom management, with a teacher that leads the students through every

step of the process. This can be demanding in groups of students with tendencies of challenging behavior. It can also be demanding in big groups of students because the tempo is high, and the method demands full focus from every student in order to make it work efficiently.

5.3.6 Implementation of the GSO storytelling method

As the method that gave me the idea of a narrative rap-writing design was the circular creative collaboration storytelling method described in the *GSO4SCHOOL teacher's guidelines* (Robberstad et al., 2019), p 15-16, I find it necessary to comment more in-depth on this. During GSO RMV projects 1, 3, and 4, this method was implemented during the early phase of the project to help the students explore the science topic through creative storytelling. This implementation was only partially successful, according to the teachers involved in the projects, because the high-achieving students and some of the teachers had to complete the stories as most of the students were not taking part in the final part of this story writing process. After the first implementation of a storyline in GSO RMV project 3, developed by high-achieving students and the teacher group, we decided to implement the GSO storytelling method in the early phase of GSO RMV project 4. Even though the storytelling method was introduced in several subjects over a period of time, the process of producing stories that contained relevant science content was heavy and difficult to implement, according to the teachers implementing this method in their lessons.

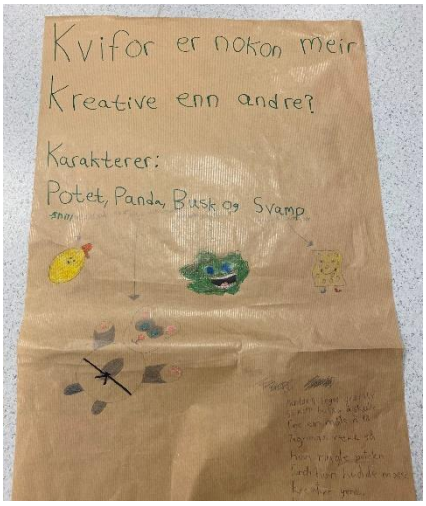


Figure 5 20 Sheet of storytelling assignment from GSO RMV 4

The students found the process and activities fun, but according to their teachers, they struggled to connect the creative parts of the story to the science part of the topic. They also struggled with the story writing itself. During GSO RMV project 4, we aimed to produce stories that could be used in the lyrics writing during the first phase for exploring the science topic. To many students, the circular work method was demanding, especially at the point of the process where the plot and story were written, as there were too many parameters to handle and implement in the story writing process

(Main characters, drawings, characteristics, etc.). Very few students were able to connect the original science question to the final plot. This observation was also made during the story writing exercise in GSO RMV project 1, mentioned on p 46. During evaluation meetings with the teachers, there seemed to be a consensus that only the high-achieving students were able to master this assignment, while the rest of the students were uncritically suggesting storylines that had nothing to do with the actual science topic or question. In order to finish the story-writing process, the teachers of GSO RMV project 4 found it necessary to give this assignment to a group of high-achieving students.

The story-writing process was also time-demanding, and it turned out to be more difficult to create a meaningful and relevant storyline for the rap lyrics. At the end of the story-writing process during GSO RMV project 4, the teachers, therefore, decided to use the design of non-narrative poems mentioned above in order to finish the RMV project according to the time schedule and left the stories to be used for a different project later. It seemed as if it was easier for the students to produce stories about topics that were more handfast than the topic of GSO project 4 (The creative mind) compared to the topic of GSO production of 2021 (marshlands/mires). In the end, it all comes down to the question of how much time can be set aside for the RMV GSO project in the total schedule. Including the storytelling method in the early phase of the project work, combined with the writing of rap lyrics in the next phase, can be too time-demanding, according to the findings from my study. Despite this finding concerning the challenges of using the GSO storytelling method, I have implemented this method in my suggested GSO RMV guidelines, as there is no other method of storytelling than this in the present GSO pedagogy.

Based on the findings during the prototyping phase, in DP 8 of the design principles for lyrics production in the assessment phase (Tab 5.9), I have suggested two options for the content-wise design: a) Fact-based poems with no storyline and b) Fact-based poems with a clear storyline. I believe the choice of options a) or b) will depend on the time frame of the total project and the actual science topic. As mentioned before, the combination of the storytelling method and production of rap lyrics needs further research to find more time-effective and content-effective ways of developing the

teaching design, which can also include weak writers and not only high-achieving students.

5.4 Assessment phase

According to Archer, 2019, assessment phase could be defined like this:

> This is the final phase but, particularly for a thesis or a dissertation, does not have to result in a completed product that requires no further development. In the master`s and doctoral spheres, the results are often accompanied by the delimitations of this study and a disclaimer that further development and refinement may be required. This is then accompanied by suggestions for future foci for improvement. The phase may thus focus on perceived practicality and effectiveness and not require a full-scale implementation to evaluate if the desired outcomes were achieved entirely. It is, however, essential that both an intervention/product and design principles (relating to both the product and process) be delivered so that contributions are made to both academe and practitioners (p.321).

To sum up the findings from the preliminary and prototyping phases, I created two tables of design principles for the assessment phase, one for lyrics production and one for the entire RMV design. These design principles would act as guiding principles for GSO RMV project 4, Creavolution, during the final part of the prototyping phase, together with my suggested RMV guidelines. This project was implemented during the final work on this master`s thesis.

During GSO RMV project 4, we emphasized combining the storytelling method from GSO4SCHOOL with the different micro designs developed during the prototyping phase, aiming to create rap lyrics with a storyline. I have summed up the findings from the preliminary and prototyping phases in two tables of design principles (Tab 5.8 and 5.9), one for lyrics production and one for the entire RMV design. These will be the suggested design principles for the assessment phase and future GSO RMV projects. The table has two categories, Product and Process, as I found this necessary to differentiate the two according to Archer, 2019.

Design principle	Description	Source
DP1 Product	Short Rap Music Video with science content Duration: 3 minutes	GSO criteria from coordinator
DP2 Product	a. Original rhyming lyrics b. Original music c. Original choreography d. Original video effects, pictures and images e. Optional: Original costumes, props and scenography (digital/filters or analog)	GSO coordinator/teacher team/students
DP3 Process	Implementing creative teaching strategies into cross-curricular science projects	GSO coordinator Leader group school Teacher group Literature review
DP4 Process	Implementing elements from new national curriculum	LK-20 UDIR planning tool Planning documents
DP5 Process	Implementing 4 phases from GSO4SCHOOL	Sæther, teacher team, 2021 GSO4SCHOOL framework and master plan (2021) GSO4SCHOOL teacher`s guidelines (2021)
DP7 Process	Implementing updated local draft framework (5 RMV-phases)	Sæther, 2022
DP8 Process/product	Implementing 4 hip-hop principles and the 5 creative elements of hip hop	Kruse, 2016 Adjapong, 2021
DP9 Process	Implementing elements from WASO/CREAT-IT-guidelines	Ben-Horin, 2014

Table 5 8 Design principles product/process GSO RMV-projects assessment phase

Some of the design principles and findings from the preliminary and prototyping phases are mentioned in table 5.8. In addition to these, I also chose to add the four hip-hop principles (Kruse, 2016) and the five creative elements of hip-hop (tab 5.8 DP8), as these principles and elements emphasize the core elements of hip-hop as a genre, which is essential for both students and teachers who want to be true to the genre. As the main focus during the prototyping phase was developing an effective and relevant teaching design for lyrics production, the table of design principles below sums up the findings from this process (Table 5.9).

Design principle	**Description**	**Source**
DP1 Product	Lyrics are written in English	Criteria GSO-coordinator
DP2 Product	Rap lyrics consisting of • 5 line poems • Slogan (chorus) • AABB-pattern, 4 lines (verses)	Planning documents, teaching material
DP 3 Product	Verses: Minimum 5 words in each line	Planning documents, teaching material
DP4 Product	Criteria lists: • Storyline content • Science content	Planning documents, teaching material
DP5 Process	Mind maps with keywords and rhyming words	Planning documents, teaching material. Datasheet 1
DP6 Process	Lyrics production: a. Individually b. Collaborative writing c. Circular collaboration	Datasheet 1
DP7 Process	Lyrics selection: a. Voting b. Group of students c. Teachers	Datasheet 1
DP8 Process	2 designs content-wise: a. Facts-based poems with no storyline b. Facts-based poems with a clear storyline	Datasheet 1
DP9 Process	2 designs for lyrics writing: a. Strict framework (LKR-worksheet, Five line poems, Slogan method) b Freestyle writing	Datasheet 1

Table 5 9 Design principles lyrics production RMV-projects

Based on these design principles I created a suggested RMV table of guidelines (Tab 5.11) and used this design throughout the implementation of GSO RMV project 4. These guidelines will be presented during the findings section of the assessment phase and are also reflected in the conjecture map of the assessment phase.

5.4.1 Findings from the assessment phase: GSO RMV framework and suggested guidelines

The findings from the assessment phase are mainly related to the suggested GSO RMV framework (tab 5.10) and my suggested RMV guidelines (tab 5.11), as the findings concerning the lyrics production process have already been elaborated on earlier in my thesis. When creating a conjecture map for the assessment phase, I wanted to let this map give an overview of the entire RMV design, pointing towards the suggested RMV guidelines. As my main emphasis in this thesis has been on the part of the RMV process concerning the lyrics production, I have not gone into details concerning some of the other phases of the RMV projects, according to my suggested GSO RMV framework (tab 5.10). Still, I find it appropriate and relevant to connect the lyrics process to the rest of the suggested RMV design to give an overview of the entire process from start to end of a typical GSO RMV project and to sum up my findings in the context of the entire RMV design.

As the four most prominent RMV projects in this study are implemented in the context of GSO, I have chosen to also integrate the 4 phases from the GSO framework in the conjecture map of the assessment phase, suggesting that the RMV design can be implemented within the framework of the existing GSO methodology. The conjecture map on the next page can be seen as a refined version of the conjecture map presented for the preliminary phase. Some of the elements of this conjecture map are also listed in the suggested RMV guidelines.

Compared to the first conjecture map from the preliminary phase, the conjecture map of the assessment phase referring to the suggested GSO RMV framework and guidelines (tab 5.10 and 5.11) contains more elements and details concretising the embodiments and the mediating processes of the different RMV phases, when it comes to brainstorming, idea development, lyrics production, and the final creative video recording process, covered in the suggested RMV framework and guidelines. The design conjectures and theoretical conjectures are also more specific and can be a starting point for further research on the future development of GSO RMV projects.

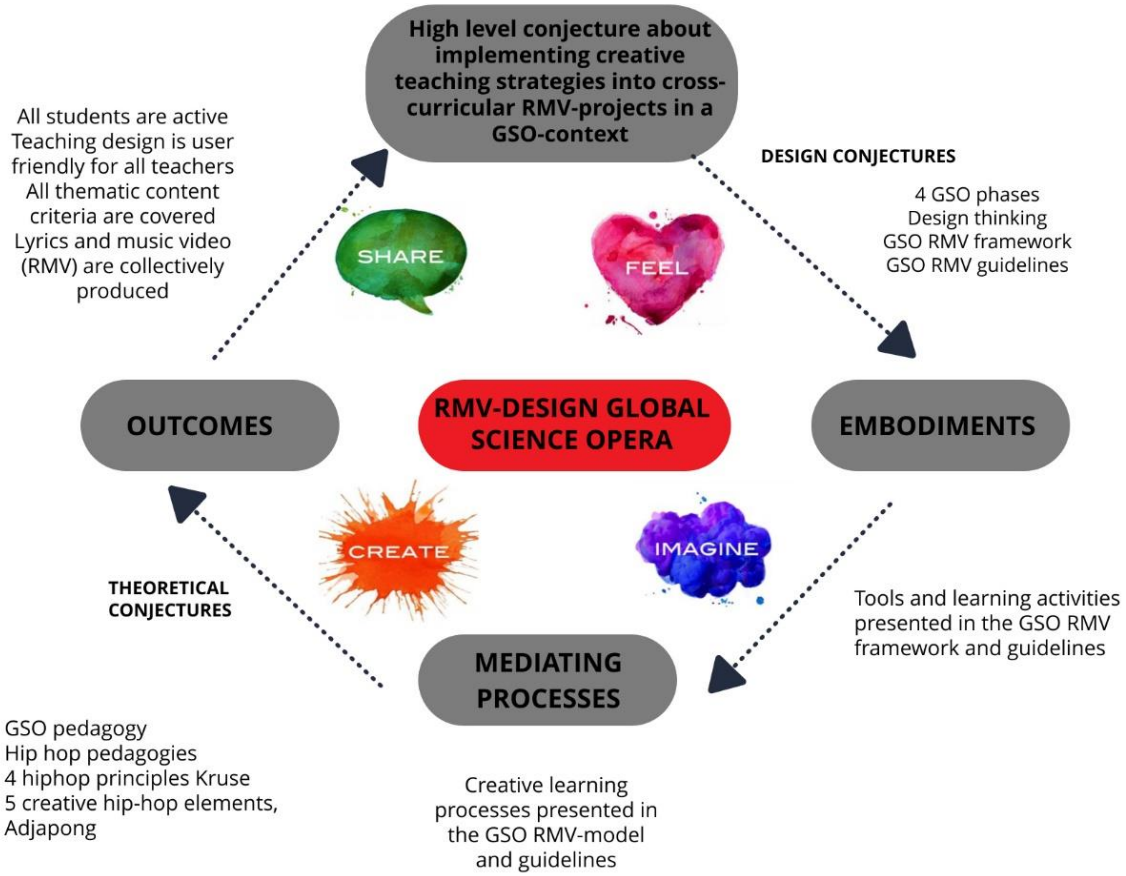


Figure 5 21 Circular conjecture map GSO RMV design

5.4.2 Suggested GSO RMV framework

As explained in chapter 4, through the iterations documented in this study, a locally developed teaching design or framework for RMV projects took shape based on the experiences from the different projects.

Based on the findings in the preliminary and prototyping phases, I suggest an RMV framework for projects in the context of GSO as presented below (tab 5.10), where the 5 phases of our local RMV model (tab 4.5) can be adjusted to fit into the 4 phases of the GSO framework. My suggested GSO RMV framework would then be as follows:

GSO phases		RMV model
FEEL	**Question, evidence**	1) Introductions and Exploration of the science topic
IMAGINE	**Analyse, explain**	2) Processing of topical rhyme production
CREATE	**Connect, develop**	3) Artistic processing of rhyme texts
SHARE	**Communicate, disseminate**	4) Performance and sharing 5) Evaluation/reflection/celebration

Table 5 10 Suggested GSO RMV framework

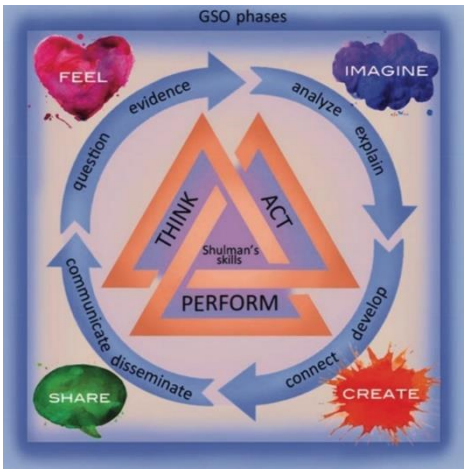


Figure 5 22 GSO phases (Straksiene et al., 2022)

An advantage of the 4-phase GSO model is the cyclical flexibility that comes with the design thinking approach, where the idea is to move back and forth between the different phases. I I have chosen to implement parts of the framework from Straksiene et al., 2022, p.7-8, where each of the four phases mentioned above is presented as follows as the model in Fig 5.22 above: Feel (question, evidence), Imagine (analyze, explain), Create (connect, develop), Share (communicate, disseminate). Still, I will comment this model further in chapter 6, as it might be contradictory in its present form.

5.4.3 Suggested GSO RMV guidelines

Based on the findings of this study, I have created a simplified table of my suggested future RMV guidelines (tab 5.11) to be presented in my thesis. The complete version of my suggested guidelines can be found in the appendices section (Appendix 1). I decided to combine the IBSE perspective with the phases of GSO (Straksiene et al., 2022) to be more specific about the IBSE questions for students during the different phases, as the IBSE perspective is not as highly emphasized in the GSO4SCHOOL-framework (Sotiriou et al., 2019) as in the WASO-model (Ben-Horin, 2014), the way I interpret it.

For future RMV projects in the context of GSO, my suggested framework would be the four phases of GSO adapted for a rap production as presented in the suggested GSO RMV framework (tab 5.10) above. The table of my suggested GSO RMV guidelines (tab 5.11) sums up the most relevant findings from this study, concerning the teaching design of RMV projects. The four GSO phases are used as the overall framework, with the same color codes as in the original *GSO4SCHOOL Teacher`s guidelines* (Robberstad et al., 2019). The terms macro format and microformat are also used within the GSO4SCHOOL context, referring to whether the project will be a part of the international online GSO production or not. In the suggested extended version of the RMV guidelines attached in the appendices, I have also implemented other categories to make the guidelines more specific, such as Students (their roles and activities), IBSE Questions for students, Tools, and Teacher (teacher`s role and responsibilities). The draft of the suggested GSO RMV guidelines was used as a manual during the implementation of GSO RMV project 4, but I have chosen to let project 4 be a part of the prototyping phase in this study, as the guidelines were not completed until after the implementation of this project. In my suggested framework and guidelines I have emphasized the IBSE perspective, as this is an important teaching strategy in our school, which has been implemented in the four GSO RMV projects of this study.The details of the complete guidelines are based on the experiences from the 10 projects. They are mainly inspired by the *Write a Science Opera (WASO) "Introductory Workshop" Guidelines* (Ben-Borin, 2014) and *GSO4SCHOOL Teacher`s Guidelines* (Robberstad et al., 2019). It is my hope that these guidelines can be a starting point for future research on RMV in a GSO context, as well as an inspiration for other RMV projects. The suggested guidelines refer to several elements already introduced in the GSO4SCHOOL and GSO literature (Robberstad et al., 2021; Sotiriou et al., 2021; Straksiene et al., 2022) and are also mentioned in the circular conjecture map of the assessment phase (fig 5.19). These guidelines need further exploration and refinement in another context than this master`s thesis. The suggested GSO RMV design is meant as a scaffold and a framework to build more details into. It can also be seen as a framework that can be used as a starting point for future RMV projects and further research, at the intersection of the WASO guidelines (Ben-Horin, 2014), the 4 hip-hop principles (Kruse, 2016), the 5 creative elements of hip-hop (Adjapong, 2021) and the GSO literature (Robberstad et al.,, 2021; Sotiriou et al., 2021; Straksiene et al., 2022).

Phases GSO4SCHOOL	Phases RMV model	IBSE Activity	Learning activities
FEEL **Question Evidence**	**Introductions and explorations of science topic**	**Question eliciting activities/** **Exhibiting curiosity**	Brainstorm about first ideas for the final RMV Define topic of rap music video based on scientific questions and current knowledge Science experiments, excursions, lectures Building **mind maps** with keywords and rhyming words
IMAGINE **Analyze Explain**	**Processing of topical rhyme production**	**Active investigation**	Generating creative ideas for the final RMV, in class and subgroups Storytelling. Exploring science topic through **circular creative collaboration** Writing joint lists of content criteria Writing rap lyrics individually, in groups and in class, based on criteria lists Selection of final rap lyrics (Voting or smaller appointed group)
CREATE **Connect Develop**	**Artistic processing of rhyme texts**	**Creation /Discussion**	**Micro format:** Individual and group video productions **Macro format:** Video production with all the creative sub-groups 1) Creative work in groups Dance Drama/Role play Music/composition Costumes/props/scenography Photo/video effects 2) Performance/recording /editing Soloists/rappers/choir Music recording/editing Video recording/editing Several meeting points to align all the creative ideas with each other. At the end of this creative process the GSO-RMV will be completed
SHARE **Communicate Disseminate**	**Performance and sharing** **Evaluation /reflection /celebration**	**Reflection**	**Micro format:** Live rap performance in class Sharing of student produced videos in class **Macro format:** The video is shared online during the Global Science Opera premiere. Sharing the video with local community (school/parents) Hosting a watch party with drinks and red carpet Group and class discussions

Table 5 11 Suggested GSO RMV guidelines

6 Discussion and summary

6.1 Introduction

Based on the findings of this study, I argue that it can be possible to integrate the different phases of an RMV design into the four phases of the GSO pedagogy, with a clear IBSE perspective, as presented in tab 5.10 and 5.11. Still, there are some challenges that need to be addressed concerning the GSO pedagogy as it appears today. In this chapter, I will start by raising a couple of questions concerning the GSO pedagogy in general, followed by a discussion of the quality of the suggested GSO RMV design according to the four criteria of *relevance*, *consistency* (construct validity*)*, *practicality*, and *effectiveness* (Archer, 2019).

6.2 GSO pedagogy challenges

As a 5 year-participant in the Global Science Opera, I have some concerns regarding the GSO pedagogy as it appears today. One of them is the challenge of finding a balance between the conflicting interests of a process-oriented versus a product-oriented perspective in creative science education. Another is the challenge of finding the balance between the quality concerns from a science perspective versus the perspective of the arts. While science educators traditionally emphasize the facts and details of a topic, arts educators emphasize the more exploring and creative side of a project. In our GSO RMV projects, these conflicting interests were, to a certain extent, balanced by developing educational tools and strategies to concretize the science material and the structure of the writing process.

As I see it, the GSO pedagogy suffers from a lack of more time-effective concrete strategies and tools for educators and students to use in their daily work of creative science projects. In three of our GSO projects, we chose to implement one of the methods from the GSO pedagogy, the story writing method. In chapter 5, I addressed the challenges we faced during the process of implementing this method in our projects. The other GSO pedagogy concerns mentioned above, I will elaborate on later in this chapter. In my opinion, the GSO storytelling method itself also needs to be refined, in line with the suggested general revision of the GSO pedagogy as a whole, according to

Straksiene et al., 2022, p 12. More parameters than exploration and creativity alone need to be taken into consideration to make the teaching design more relevant, consistent, practical, and effective, according to Archer, 2019, p 321 and her table of evaluative criteria.

6.3 Quality criteria

To sum up my suggested teaching design of RMV projects in a GSO context, I find Archer`s figure, *The overall Design Research framework* (2019), helpful, as she puts evaluative criteria and evaluators in the same model as the three EDR phases and their design cycles, as mentioned in chapter 4. This makes the process of discussing and assessing more specific. In EDR, assessment, evaluation and reflection are essential parts of the retrospective analysis (Bakker, 2018; McKenney/Reeves, 2019). I will use the four criteria, *relevance*, *consistency* (construct validity*), practicality*, and *effectiveness* (Archer, 2019, p 321*),* in an attempt to evaluate my own suggested teaching design of GSO RMV projects, although it is a challenging exercise.

6.3.1 Evaluators and the issue of student levels

In Archer`s study, she elaborates on the roles and importance of evaluators in a design study (2019, p 322). In my study, I have been the main evaluator, together with my co-teachers and students. One of my evaluators was also the GSO coordinator, who provided me with valuable feedback during the implementation of the 4 GSO RMV projects. Testing a teaching design in different contexts and getting constant feedback from different evaluators is probably the best way to secure that the design covers the different quality criteria.

For me, the only external sources of evaluators have been the project coordinator of GSO and other participants of GSO, who have given us valuable feedback and a positive response on what the teachers and our students have created, My critical friend who participated in GSO RMV project 1, was also an important external evaluator. During the last part of the prototyping phase, in project 10, as earlier mentioned, a micro design, the circular collaboration songwriting method (fig 5.19), was also tested in an international online workshop with a group of students and teachers. The feedback from the students, teachers, observers, and the GSO coordinator, indicated that this

particular part of the design was working as expected. During this workshop, the group of participating students from our school collectively produced and performed four rap verses about the creative mind during a short session of only 30 minutes, using some of the methods developed during the prototype phase of this study. The feedback we received from both the participating students and the online audience was positive, and this experience for us at that point in time was a confirmation that our RMV design in that particular GSO context could be seen as both relevant, consistent, practical, and effective, according to the quality criteria mentioned by Plomp, 2013, in a superficial perspective.

Still, it has to be pointed out that the students participating in this online conference were skilled writers and good English speakers. This group of students would probably also produce high-quality material if we asked them to perform the creative storytelling method from the GSO pedagogy (Robberstad et al., 2021 p 15-16) to an audience. This method is already mentioned in this study as an example of a student assignment that was challenging for many of our students to perform and time demanding for the teachers to implement. In my opinion, the aspect of difference in the students' skills and levels has to be taken into consideration in the discussion of the quality of a teaching design, also when it comes to creative pedagogies used in different teaching environments. When it comes to my evaluators, I have not had the chance to test my teaching design in different educational contexts with students on different levels. This has to be done in another context than this study, but I believe that it is an essential part of the reality of the life of a teacher trying to implement new teaching designs. Students come in different levels, not only ages. This parameter must not be forgotten in the research tradition of creative pedagogies. An increasing challenge in today`s school is the lack of interest in writing. Introducing poetry and rap through RMV projects can be a way of motivating young students to produce written material in school, but the students will respond differently to the assignments given because of their different backgrounds and levels.

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6.3.2 Relevance

Regarding the first criterion, *relevance*, according to Archer 2019, this criterion is hierarchically found during the preliminary phase. This is also the case in my study. I

spent a significant amount of time searching for relevant literature about rap as an educational tool, both in general and in a GSO context. The RMV design might be seen as relevant in a GSO context, according to literature about rap music and the benefits of using science songs in educational contexts (Ben-Horin/Gershon, 2014; Emdin et al., 2021, McFadden, 2013). Concerning the relevance in the tradition of creative pedagogies, rap is mentioned as one of nine art forms suggested for use in creative science education in the model *CREATIONS WHEEL* (Chappel, 2017) and in the document from the same project: *D2.5 A framework for identifying creative best practices in inquiry-based science education* (Chappel et al., 2016). Both these documents have a strong emphasis on creative learning processes and creativity pedagogy. The CREATIONS[14] project was built on some of the same theoretical frameworks as GSO, mentioned in my theory chapter, but does not have the same emphasis on an end product intended for an audience as the RMVs produced for the macro format of GSO have had in this study.

Finding the balance between a process-oriented and a product-oriented perspective in creative science education is, as already mentioned, one of the main challenges in the future development of the GSO RMV teaching design in a GSO context, as I see it. Nevertheless, I would argue that the work methods involved in the RMV projects included in this study are supported by the theoretical foundation of GSO (Straksiene et al., 2022) and GSO4SCHOOL Framework and Master Plan (Sotiriou et al., 2021), although there is a weakness in the pedagogy, as pointed out by Straksiene et al., 2022, concerning finding the balance between a process-oriented and a product-oriented perspective, the aesthetic quality and balancing the concerns from both a science and arts perspective. This needs to be investigated more deeply in future studies.

Another aspect of the first criterion points to the relevance of the GSO RMV teaching design according to the hip-hop genre itself, the presence of the four hip-hop principles (Kruse, 2016), and the five creative elements of hip-hop (Adjapong, 2021), found in parts of my suggested GSO RMV design. In future GSO RMV projects, I would argue that it would be imperative to emphasize these principles and creative elements, to integrate them with the existing theory developed for the GSO pedagogy, to strengthen the connection between the traditions of the creative pedagogies and the hip hop pedagogies. Rap/hip-hop is considered culturally relevant as a genre communicating to

young students, according to several researchers in the field of hip-hop pedagogies (Adjapong et al., 2016; Adjapong, 2017; Adjapong, 2021; Emdin et al., 2021; Petchauer, 2015). I believe future research could reveal more interesting and relevant connections between the GSO pedagogy and hip-hop pedagogies that have barely been touched upon in this study.

According to Archer, 2019, the first evaluative criterion overlaps with the second criterion, *consistency* (construct validity*),* and the third and fourth criterion, *practicality* and *effectiveness,* which oftentimes coincide with the prototyping phase.

6.3.3 Consistency

Concerning the second criterion, consistency, according to Archer 2019:

> the product/intervention must be well designed and integrated. The elements/ components must be well defined, with explicit connections between the various elements. The final product must be free of any internal contradictions, showing a clear chain of reasoning and consistent approach with regard to design and implementation.

Developing a consistent teaching design must, in my opinion, be one of the most demanding of all exercises one, as a researcher and teacher, can perform. It takes time, and many iterations are needed to be able to map certain patterns of what is perceived as successful and less successful parts of the design. This also changes with different student groups, a parameter that is always changing and needs constant adaptation and attention. The journey I have been embarking on during the four years of developing a GSO RMV teaching design so far has still a lot to be explored in the future, and more research is needed to secure criterion 2, consistency. Through the iterations of preliminary and prototyping phases, the intervention in this study turned out to be the focus on lyrics production. At the end of the prototyping phase, the micro designs and teaching strategies were tested through several iterations, and the different elements crystallized and were systemized in the different phases detailed in tables 5.10 and 5.11. I would therefore argue that the second criterion in the framework of this study has partially been covered, although future research is needed further to develop parts of the

GSO RMV teaching design, to make the connection with the existing GSO methodology even more precise and more integrated.

As mentioned in chapter 5, there seems to be some internal contradictions in the GSO pedagogy, as it appears today. Straksiene et al., 2022, also mentions the need of a revision of the four phases (p 12). In my opinion putting Feel together with 'question and evidence', and Imagine with 'analysis and explain' seems a bit contradictory, even though the idea is to move back and forth between the different phases of the model. To me as a school teacher with limited time to implement the GSO projects in a tight schedule, I hope these contradictions will be resolved in the future, as there is a need of very clear, concrete and specific work tools and methods in the future GSO pedagogy as I see it. This also ties in with my paragraph on the GSO pedagogy challenges and the need of more time-effective strategies and tools, which is also reflected in my suggested framework and guidelines for GSO RMV projects. The need of concrete work methods is also one of the reasons why we chose to implement mind maps in the GSO RMV projects, in order to make the scientific part of the process more specific and not just based on creativity and brainstorm alone.

6.3.4 Practicality and effectiveness

Concerning the criterion of practicality, there is a need for more research concerning the teachers and learners in different contexts and their experience of the GSO RMV teaching design, as this study has focused on mapping the different micro designs involved in developing the teaching design as a whole, to be able to present a suggested overall framework and guidelines. This part of future research will hopefully uncover whether the interventions are considered practical or not, according to Plomp/Nieven, 2013, p 26:

> Another characteristic of high-quality interventions is that end-users (for instance the teachers and learners) consider the intervention to be usable and that it is easy for them to use the materials in a way that is largely compatible with the developers' intentions. If these conditions are met, we call these interventions practical.

Nevertheless, based on the data from my study, it seems that the two last quality criteria were partially met during the prototyping phase in our context, where both teachers and students found the design gradually more easy to use, practical, and "that they (high

quality interventions) result in the desired outcomes, i.e., that the intervention is effective" (Plomp, 2013, p 26). This is judged by the informal conversations with teachers and learners in my everyday teaching environment as the different micro designs were tested in class and also through feedback from the GSO coordinator. I would argue that the teaching design developed during the iterations and the suggested GSO RMV guidelines presented as a part of the assessment phase can be seen as a summary of the parts of the design that have been tested repeatedly during the iterations.

So, according to the two last quality criteria, I would argue that the suggested GSO RMV framework (tab 5.10) and guidelines (tab 5.11) from the assessment phase represent a more practical and effective teaching design than the one I started with during the preliminary phase of my study. At the beginning of the preliminary phase, all I had was the framework listed in the design principles of the preliminary phase, based on existing literature about the GSO pedagogy and literature searches to find existing methodologies in the field (tab 5.1). Still, some of the findings from my study indicate that the GSO pedagogy and its emphasis on creative collective processes may be challenging for some groups of students because of the differences in levels, skills, and interests in students, as group activities have been the primary work form in the GSO pedagogy so far. (Ben-Horin, 2017; Robberstad et al., 2021; Straksiene et al., 2022).

I strongly believe that this is something that needs to be addressed in future research on both GSO pedagogy in general and in particular, the GSO RMV teaching design.
Our locally developed GSO RMV teaching design obviously needs more research before it is possible to conclude when it comes to the quality of the different phases and elements involved. However, I believe that we have developed a design skeleton that can be built on in the future.

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Appendices

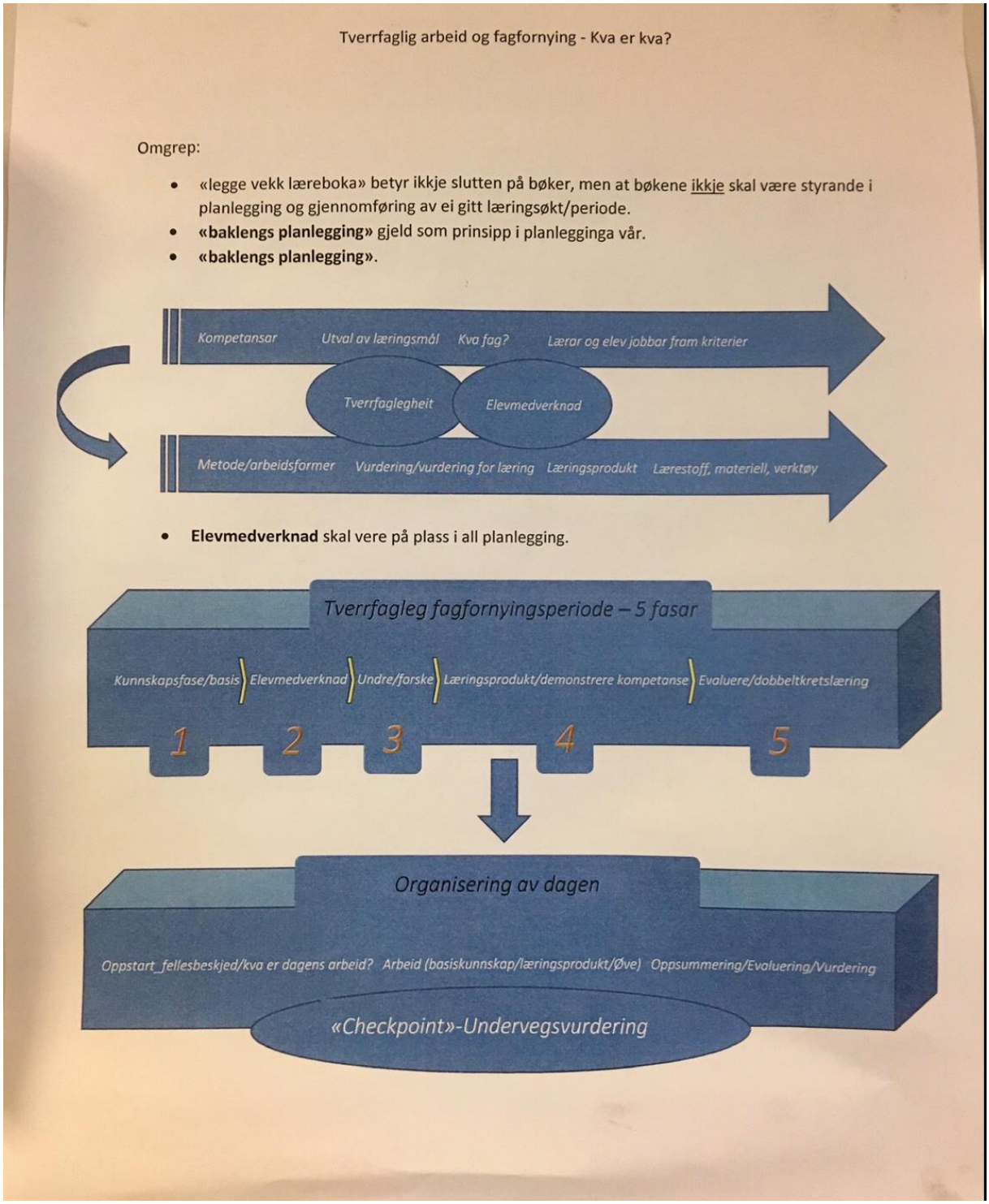
Appendix 1: The complete suggested GSO RMV guidelines (Sæther, 2022)

Phases GSO4SCHOOL	Phases RMV-model	IBSE Activity	Learning activities	Students	IBSE Questions for students	Tools	Teacher
FEEL	Introductions and explorations of science topic	**Question eliciting activities/**	Brainstorm about first ideas for the final RMV	Students think about questions they have regarding the scientific theme	What would you like to know about…?	Mind maps	Brainstorm with students to generate ideas for the final result and lead students in the process of exploring the science topic
			Define topic of rap music video based on scientific questions and current knowledge		What would you like to find out about…?	Keynote	
		Exhibiting curiosity	Science experiments, excursions, lectures	Students and teacher build mind maps together, during discussions about the science topic	What science content criteria would be interesting to implement in the project?	Word	
			Building **mind maps** with keywords and rhyming words		What are relevant keywords for the chosen topic?	Padlet	
				Students participate in the criteria list-making process	What are relevant rhyming words for the chosen topic?		Take the lead in defining final science content criteria to be covered in the RMV
IMAGINE	Processing of lyrical rhyme production	**Active investigation**	Generating creative ideas for the final RMV, in class and subgroups	Students suggest creative ideas for the final rap music video	Will the RMV be with or without a storyline?	Criteria lists	Define science content criteria with GSO coordinator
			Storytelling. Exploring science topic through **circular creative collaboration**	Students use their imagination to write **stories** about the chosen topic (Use GSO4SCHOOL group tasks-method)	**If storyline:** • Main characters? • Problem/challenge/struggle? • Solution	Mind maps	
			Writing joint lists of content criteria.		What parts of the story will be featured in the final lyrics?	Keynote	Define content criteria lists with the students
			Writing rap lyrics individually, in groups and in class based on criteria lists	Students write rap lyrics and choose final lyrics	**If no storyline**: What parts of the scientific content do we want to write about?	LKR -worksheet	
			Selection of final rap lyrics (Voting or smaller appointed group)	Students sign up for creative subgroups		Google docs	Define creative framework with the students. What ideas will be acted upon?
						Word	
						Padlet	Assist students in process of writing lyrics and choosing final lyrics for the RMV

CREATE	**Artistic processing of rhyme texts**	**Creation /Discussion**	**Micro format:** Individual and group video productions **Macro format:** Video production with all the creative sub-groups <u>1)Creative work in groups</u> Dance Drama/Role play Music/composition Costumes/props/ scenography Photo/video effects <u>2)Performance/recording /editing</u> Soloists/rappers/choir Music recording/editing Video recording/editing Several meeting points to align all the creative ideas with each other At the end of this creative process the GSO-RMV will be completed	Students create videos with rap lyrics subtitles and visual content, individually or in groups Students use their knowledge about the topic to produce their part of the RMV in subgroups, with a focus on the criteria for the science content and/or storyline and rap lyrics Subgroups prepare presentations to each other and receive feedback from students and teachers	How can we express what we have learned about the science topic creatively? How can the criteria be covered in our end product? Have the criteria been covered in all the subgroups? If storyline: How can the story be told and made clear to an audience? If no storyline: How can the science content be presented in different ways? (text, drama, dance, effects etc) Do you agree with the different creative proposals that are presented? Vote if there are disagreements on certain ideas	Mind maps CapCut Puppet Pals Explain Edu Clips GarageBand Word Google docs Keynote Craft tools and materials	Coordinating all the subgroups with each other Arrange meeting points for sharing and exchange Guide the creative work in the subgroups Arrange additional activities for the groups that finish early Distribute lyric parts for soloists Lead the choir rehearsals and soloist rehearsal Lead the soloist recording and video editing process Lead the plenum presentations and discussions Make sure all criteria are covered in end product Teacher shares the video proposal with GSO coordinator and waits for approval

SHARE	**Performance and sharing** **Evaluation /reflection /celebration**	**Reflection**	**Micro format:** Live rap performance in class Sharing of student produced videos in class **Macro format:** The video is shared online during the Global Science Opera premiere Sharing the video with local community (school/parents) Hosting a watch party with drinks and red carpet Group and class discussions	Students watch the GSO premiere Students receive feedback from their local community Students share their experiences in class discussions and through written evaluation	How did you come up with the different ideas shown in performances and videos? How is the end result compared to the original ideas? What did you learn during the process, about the science topic, about creative collaboration, about project work? Other things? Is there something you would change if you could?	Screen/digital board Showbie	Teacher leads the session and class discussion Teacher leads the class discussions and prepares the written evaluation assignment

Appendix 2: Local model of cross-curricular in-depth-projects (Stavseth, 2019)



Appendix 3 Norwegian Social Science Data Services (NSD) Approval

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD sin vurdering

Prosjekttittel

Utvikling av didaktisk design for bruk av tverrfagleg rapprosjekt som arbeidsform i grunnskulen

Referansenummer

430138

Registrert

12.02.2021 av Runa Godø Sæther - [redacted]

Behandlingsansvarlig institusjon

Høgskulen på Vestlandet / Fakultet for lærerutdanning, kultur og idrett / Institutt for kunstfag

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Magne Espeland, [redacted]

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Runa Godø Sæther, [redacted]

Prosjektperiode

01.03.2021 - 31.12.2021

Status

16.03.2021 - Vurdert

Vurdering (1)

16.03.2021 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet 16.03.2021 med vedlegg, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:

https://nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 31.12.2021

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte / de foresatte til de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som registrerte/foresatte kan trekke tilbake. Også barna vil samtykke til deltagelse.

Lovlig grunnlag for behandlingen vil dermed være den registrere/registrertes foresattes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen som de registrerte og deforesatte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert/foresatt tar kontakt om sine/barnets rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET
NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Kajsa Amundsen

Meldeskjema / Utvikling av didaktisk design for bruk av... / Vurdering

Vurdering

Skriv ut 04.02.2022

Referansenummer	Type	Dato
430138	Standard	04.02.2022

Prosjekttittel
Utvikling av didaktisk design for bruk av tverrfagleg rapprosjekt som arbeidsform i grunnskulen

Behandlingsansvarlig institusjon
Høgskulen på Vestlandet / Fakultet for lærerutdanning, kultur og idrett / Institutt for kunstfag

Prosjektansvarlig
Magne Espeland

Student
Runa Godø Sæther

Prosjektperiode
01.03.2021 - 31.12.2022

Kategorier personopplysninger
Alminnelige

Rettslig grunnlag
Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)

Behandlingen av personopplysningene kan starte så fremt den gjennomføres som oppgitt i meldeskjemaet. Det rettslige grunnlaget gjelder til 31.12.2022.

Meldeskjema

Kommentar
Personverntjenester har vurdert endringen registrert 10.1.2022.

Vi har nå registrert 31.12.2022 som ny sluttdato for behandling av personopplysninger.

Vi gjør oppmerksom på at ytterligere forlengelse ikke kan påregnes uten at utvalget informeres om forlengelsen.

Vi vil følge opp ved ny planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til videre med prosjektet!