Intellectual Output 1:

State of the Art: Pre-Research

Norwegian version

In charge: FHBI FH Bielefeld
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vidumath - creative video for mathematics - VG-SPS-BE-15-24-013795

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Samling av relatert arbeid

Vidumath-prosjektet handler om å bruke video i utdanning og matematikklæring. Det dreier seg om a) bruk av videoer som b) hovedsakelig er produsert av barna selv for c) å eksperimentere med, demonstrere og forstå matematikk. Vi fant et bredt spekter av eksisterende forskning til alle disse tre feltene, men bare få publikasjoner som kombinerer disse områdene.

Dermed inkluderer vår samling av relatert arbeid publikasjoner om mediepedagogikk, matematikkvansker og hvordan man kan overvinne dem, visuell læring, generelle tilnærminger innen IKT-læring, etiske og praktiske problemer når video brukes til læring, og pedagogiske tanker rundt det å fremme læring med nye teknologier. Tabellen «The 20 Most Relevant Academic Papers» (se vedlegg) er et utvalg av publikasjoner som vi anser for å være mest relevante for Vidumath. Tilleggsmateriell (se tabellen i vedlegget) omfatter ikke bare litteratur, men også nettsteder, sosiale medier, programvarer og spill. Vi er overbevist om at spesielt spill støtter tilegnelse av nye konsepter og gir friske pedagogiske tilnærminger.

I samsvar med vidumath-prosjektets særpreg har vi også utarbeidet en liste med 20 videoer (se vedlegg) som presenterer et fargerikt utvalg av hva som kan gjøres med video når det gjelder å lære seg matematikk – uansett videoproduksjonsmåten, aldersgruppen og innholdet. Dette materialet omfatter ideer fra å fremstille en algoritme som en dans, til stop-motion-videoer om symmetri. Produksjonsteknikkene varierer fra enkle one-shot-videoer som krever ingen redigering, til avanserte videoproduksjoner som krever mye arbeid og kunnskap om film.

Videoene passer godt til vårt Vidumath-skjema som deler vanskelighetsgraden inn i begynnernivå, mellomnivå og kreative tilnærminger. Dette kan hjelpe lærere ved å finne ut hva de kan få til uten å gå over sine ressurser. Videoene viser i tillegg i hvor stor grad videoproduksjon kan være kreativt. Materialet inneholder alle slags medier (som stillbilder, levende bilder og lyder), men også svært forskjellige ideer om hva kameraet tar opp: elever som spiller skuespill, objekter som beveger seg, tegninger og malerier, lyder og musikk.

Sammendrag av aktuell forskning

Det finnes flere publikasjoner og prosjekter som på ulike måter har betydning for Vidumath. Under vil vi oppsummere de publikasjonene som vi finner mest interessante og relevante i forhold til vårt prosjekt.

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Prosjektet VITALmaths (Linneweber-Lammerskitten, 2014) fokuserer også på innovativ bruk av videoer i matematikkundervisningen. Andre publikasjoner gir tips til praktiske aktiviteter med barn som skal jobbe med medier (f.eks. Anfang m.fl., 2015), handler om teoribaserte eksperimenter med innovative undervisningsmetoder (f.eks. Boaler, 2016), undersøker barnas og ungdommenes bruk av YouTube når de lager og deler eget video-innhold (Yarosh, 2016), eller viser hvordan man på best måte kan lage gode visuelle forklaringer (se f.eks. LeFever, 2015). Nedenfor oppsummerer vi disse publikasjonene.

Målet med det sveitsisk-sør-afrikanske prosjektet VITALmaths (Linneweber-Lammerskitten, 2014) er å bruke enkle verktøy for å la studenter lage videoer til elever. Videoene viser matematiske prosedyrer i stedet for å bare beskrive dem. Hver video har en varighet på en til tre minutter og viser en situasjon eller en prosess. Elevene skal ikke motta informasjonen passivt. Tvert imot skal videoene oppmuntre barna til å gjenskape, videreutvikle, generalisere, overføre, bevise eller sette spørsmålstegn ved et problem. Videoene bør ikke være belærende, men motiverende, kognitivt aktiverende og veiledende. Linneweber-Lammerskitten skiller mellom svake, gjennomsnittlige og talentfulle elever og tilrettelegger for de forskjellige prestasjonsnivåer ved bruk av matematiske videoklipp. Filmene er stille, slik at hver elev kan se på dem i sitt eget tempo uten å forstyrre andre elever. Det må følges med materiell som setter elevene i stand til å eksperimentere spontant uten å få umiddelbart støtte fra læreren. Videoer av mislykkede forsøk kan vises for å gi elevene en dypere forståelse, for å oppmuntre dem og øke deres selvtillit. En stor forskjell mellom VITALmaths og Vidumath er at det er barna selv og ikke studenter som bør produsere videoer ved Vidumath.

Anfang, Demmler, Lutz og Struckmeyer (2015) gir eksempler på effektiv mediepedagogikk og aktiviteter for barn i alderen to til tolv år. Som disse forfattere understreker, lever barn i dag i et miljø der de møter media hele tiden. Forfatterne presenterer en bred samling av ulike praktiske ideer, for eksempel hvordan barn kan utforske miljøet med et digitalkamera, samle lyder, lage animasjonsfilmer, gjøre nyhetsrapporteringer eller lære med dataspill som f.eks. Minecraft. Det er rettet mot alle som ønsker å jobbe mediepedagogisk med barn.

«YouthTube: Youth Video Authorship on YouTube and Vine» (Yarosh, 2016) er en innholdsanalysestudie som analyserte over 250 videoer produsert av barn og unge. Artikkelen forklarer forskjellene mellom videoplattformene YouTube og Vine når det gjelder alder av produsentene og typer samarbeid. På Vine er det tydelig et større antall videoer med voldelig, seksuelt og uanstendig innhold. Dessuten er det forskjeller på hvordan videoene brukes: mens voksne pleier å bruke videoer som et arkiv for sine minner, bruker tenåringer det heller som en scene for å prestere og presentere seg selv.

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Boaler (2016) refererer til Carol Dwecks definisjon av «tankesett»: et tankesett er et tankemønster, en samling av oppfatninger som en person har om sitt eget læringspotensial. Dweck skiller mellom statisk og dynamisk tankesett. Personer med et statisk tankesett mener at evner og muligheter er fastlåst og talenter er medfødt, mens personer med et dynamisk tankesett mener at alle kan lære alt hvis de bare strever og øver hardt nok. Hjernen fungerer annerledes når en tror på seg selv. Problemer utfordringer og feil utvikler hjernen på grunn av dens evne til å forandre seg. Denne holdningen kan endre måten elevene oppfatter feil på. Boaler fremhever at det ikke finnes «mattemennesker» eller «begavede barn». Alle kan lære seg noe på et høyt nivå hvis det bare undervises på den rette måten. Hun anbefaler å gi åpne komplekse oppgaver med «en lav inngangsterskel og et høyt tak» som åpner for å bruke flere ulike metoder, løsningsmåter og representasjoner. Det bør ikke være tidspress, fordi den blokkerer arbeidshukommelsen som er nødvendig for å forstå matematiske ideer og sammenhenger på en dyp måte. Prestasjonen i matematikk kan forbedres ved å legge til visuelle komponenter, oppfordre elevene til å resonnere med hverandre og jobbe med problemløsning før man underviser standardalgoritmer. Det er også viktig at barn utvikler tallforståelse og erfarer at matematikk ikke bare handler om beregninger og memorering, men om kreativ tenkning og å finne sammenhenger.

LeFever (2015) er grunnleggeren av Common Craft Videos. Hans bok «The Art of Explanation» er rettet mot forretningsfolk, lærere og ledere og viser dem hvordan de kan forbedre sine forklaringer og presentere dem på en bedre måte. Hans teori er at gode forklaringer påvirker publikumets tillit. Utfordringen som en foredragsholder har er å opprettholde publikumets selvtillit og ikke ødelegge den med vanskelige forklaringer på et teknisk språk bare for å føle seg smart og imponere publikumet med sin kunnskap. I tillegg til å legge frem disse grunnleggende tankene tilbyr LeFever mange konkrete forslag til effektive fremstillinger.

Anbefalinger for Vidumath-prosjektet

Med tanken på Boaler (2016) ser det ut til å være mest lovende hvis Vidumath *ikke* holder seg altfor tett til den vanlige matematikklæreplanen (i motsetning til mange av videoene fra VITALmaths-prosjektet nevnt ovenfor). Tvert imot burde Vidumath utprøve og håndtere emner og formater som ikke ligner opplegg fra skolebøker (og kanskje dermed fremkalle den samme matematikkangsten som disse). Likevel burde Vidumath være rettet mot de samme matematiske ideene, konstruksjonene og kompetansene.

Gjennom vår forskning har vi funnet en overflod av dataverktøy og praktiske råd om å lage film (se tabell «Further Material»). Ideene fortjener at vi prøver dem og muligens bruker noen i Vidumaths veiledningsmateriale som skal lages. Kreativiteten i videoene som vi har valgt er veldig inspirerende. Vi ønsker at Vidumath også utvikler seg til et prosjekt som inspirerer

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lærere med sin kreativitet og oppmuntrer andre grupper til å starte egne prosjekter. Vi har også funnet mange matematikkvideoer som vi ikke har nevnt i vårt utvalg fordi de er mindreverdige når det gjelder produksjonskvalitet og – enda verre – didaktikk og kreativitet. Vi tror det er viktig å formidle hvor spennende og lærerike video-matematikk-prosjekter kan være.

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Acronyms Used in the Tables

Acronym	Vidumath Partner
32SOU	32 SOU “Sv. Kliment Ohridski” School, Bulgaria
DMMH	Queen Maud University College for Early Childhood Education, Norway
FHBI	FH Bielefeld (University of Applied Sciences), Germany
KIN	Kindersite Chester, UK
KUL	Kulturring Berlin, Germany
UC	University of Coimbra, Portugal

Acronym	Category
AC	Books, papers, theses
RE	Research projects
NA	Non-academic writings
WE	Web sites, groups, ...
VI	Videos
SO	Software (also web-based), apps, excluding games
G	Games
X	Everything else

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The 20 Most Relevant Academic Papers

Contributor	Category	Reference	URL [Accessed: 23.08.2016]	Description	Language	Main contribution
KUL	AC	Anfang, G., Demmler K., Lutz, K. & Struckmeyer K. (2015). *wischen klicken klipsen: Medienarbeit mit Kindern.* München: kopaed	http://www.ciando.com/ebook/bid-1960879	Book on media education for age 2 to 12	German	Ideas and concepts for media pedagogical work with children and how a meaningful media education with kids between two and twelve years should be.
FHBI	AC	Boaler, J. (2016). *Mathematical Mindesets: Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching.* San Francisco: Jossey-Bass.	http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470894520.html	How to turn the theory of the growth mindset into practical activities and math teaching strategies. How to get from self-doubt to self-confidence, turn mistakes and struggles into valuable learning experiences.	English	Proposes to overcome math anxiety by instilling a growth mindset in the students. Offers a large array of practical ideas for teaching.
DMMH	AC	Borko, H., Jacobs, J., Eiteljorg, E. & Pittman, M. E. (2008). Video as a tool for fostering productive discussions in mathematics professional development. In N. Gage (ed.), *Teaching and Teacher Education: An International Journal of Research and Studies. Volume 24 Issue 2 (p. 417-436)* Boulder: Elsevier.	http://www.sciencedirect.com/science/article/pii/S0742051X0600179X	The use of classroom video as a tool for fostering productive discussions about math teaching and learning in a professional development program.	English	Suggestions on how to use classroom video as a tool for fostering productive discussions about teaching and learning.

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DMMH	AC	Derry, S. J. (Ed.) (2007). *Guidelines for Video Research in Education: Recommendations from an Expert Panel.* Chicago: Data Research and Development Center.	http://drdc.uchicago.edu/what/video-research-guidelines.pdf	When and how can videos be used to produce data on learning in informal settings. How to produce and index video recordings and select segments of video recordings for analyses.	English	Examples of informed consent forms
FHBI	AC	Gallenbacher, J. (2007). *Abenteuer Informatik: IT zum Anfassen - von Routenplaner bis Online-Banking.* Heidelberg: Spektrum.	http://www.abenteuer-informatik.de/dasbuch.html	Simple explanations for the basics of computer science.	German	Information and experiments on computer science.
DMMH	AC	Goldman, R., Pea, R., Barron, B., & Derry, S. J. (2014). *Video Research in the Learning Sciences.* New York: Taylor & Francis.	http://www.tandfebooks.com/isbn/9780203877258	Key theoretical, methodological, and technological advances concerning uses of digital video-as-data in the learning sciences as a way of knowing about learning, teaching, and educational processes.	English	Help in video scholarship and supportive technologies.
DMMH	AC	Heath, C., Hindmarsh, J., & Luff, P. (2010). *Video in Qualitative Research.* London: Sage.	https://uk.sagepub.com/en-gb/eur/video-in-qualitative-research/book229882	Provides practical guidance for students and academics on how to use video in qualitative research, how to address problems and how to subject video recordings to detailed analysis.	English	Ethical and practical issues in recording and gathering data.

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DMMH	AC	Jewitt, C. (2012). *An Introduction to Using Video for Research National Centre for Research Methods Working Paper.* London: Institute of Education.	http://eprints.ncrm.ac.uk/2259/4/NCRM_workingpaper_0312.pdf	The scope and use of video for data collection, the qualities and features of video as a research tool. Considerations that it raises for social research.	English	Information about using video as a research tool.
FHBI	AC	Lange, P. G. (2014). *Kids on YouTube: Technical Identities and Digital Literacies.* Walnut Creek: Left Coast Press.	http://www.lcoastpress.com/book.php?id=500	Long-term ethnographic studies on how children negotiate identity and develop digital literacy on YouTube. Peer-based and family-driven video-making dynamics, girl geeks, civic engagement, and representational ethics.	English	An ethnographic sociology of children and their parents as producers and consumers of videos. Covers in particular how children gain media literacy.
FHBI	AC	LeFever, Lee (2015). *The Art of Explanation: Are you ready to rethink how you communicate?*.Hoboken: John Wiley & Sons.	http://artofexplanation.com/	How to explain your ideas in business and education, by the founder of Common Craft.	English	Techniques for comprehensible and motivating explanations
DMMH	AC	Linneweber-Lammerskitten, H. (2009). Der Einsatz von Kurzfilmen als Einstieg in Experimentier- und Explorationsphasen. In M. Neubrand (Hrsg.), *Beiträge zum Mathematikunterricht,* Ausgabe 2009 (S. 743-746), Münster: Verlag für wissenschaftliche Texte und Medien.	http://www.vitalmaths.com/research	Fostering "research and explore" activities with short videos.	German	Ideas for the utilisation of short films as introduction in experimenting and exploration stages.

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DMMH	AC	Linneweber-Lammerskitten, H. (2011). VITALmaths: ein gemeinsames Forschungs- und Entwicklungsprojekt der Schweiz und Südafrika. In R. Haug & L. Holzäpfel (Hrsg.), *Beiträge zum Mathematikunterricht,* Ausgabe 2011 (S. 555-558), Münster: Verlag für wissenschaftliche Texte und Medien.	http://www.vitalmaths.com/research	Introduction of the VITALmaths project, that uses video clips as teaching tools.	German	Teaching, learning support and materials
DMMH	AC	Linneweber-Lammerskitten, H. (2014). Der Einsatz mathematischer Kurzfilme als Mittel der Binnendifferenzierung. In I. Bausch, G. Pinkernell & O. Schmitt (Hrsg.), *Unterrichtsentwicklung und Kompetenzorientierung: Festschrift für Regina Bruder,* Ausgabe 1 (S. 257-266), Münster: Verlag für wissenschaftliche Texte und Medien.	http://www.vitalmaths.com/research	Article about the assignment of mathematical short films to support individual learning processes.	German	Ideas how to individually support children with the help of educational short films
DMMH	AC	Linneweber-Lammerskitten, H., Schäfer, M. & Samson, D. (2013). VITALmaths Learning in Context: VITALmathsLIC. In G. Greefrath, F. Käpnick & M. Stein (Hrsg.). *Beiträge zum Mathematikunterricht*, Ausgabe 2013 (S. 620-623), Münster: Verlag für wissenschaftliche Texte und Medien.	http://www.vitalmaths.com/research	The learning process that the mobile use of short video clips on mathematics can support and enhance.	English	How learning can take place in different learning and contextual spaces. How to use worksheets and manipulatives.

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DMMH	AC	Linneweber-Lammerskitten, H., Schäfer, M., & Samson, D. (2010). Visual technology for the autonomous learning of mathematics. *Pythagoras: Journal of the Association for Mathematics Education of South Africa,* 72, 27-35	http://www.pythagoras.org.za/index.php/pythagoras/article/view/18	The efficacy and use of short video clips designed specifically for the autonomous learning of mathematics on mobile phones. Design, production and use of these video clips in South Africa and Switzerland.	English	Ideas and information about visual technology
KUL	AC	Ring, R. (2013). Stop-Motion-Technik im Mathematikunterricht: Lösungswege mit digitalen Medien veranschaulichen. In R. Rasch (Hrsg.), *Grundschulunterricht Mathematik.* 3/2013 (S.32-34). Berlin: Cornelsen Verlag GmbH.	http://www.oldenbourg-klick.de/zeitschriften/grundschulunterricht-mathematik/2013-3/stop-motion-technik-im-mathematikunterricht	The use of stop motion in primary school.	German	Possible interesting contact for us https://www.tu-braunschweig.de/idm/mitarbeiter/wissmit/rink
DMMH	AC	Samson, D., Linneweber-Lammerskitten, H., & Schäfer, M. (2011). VITALmaths. In P. De Wet, *Learning and Teaching Mathematics,*special Issue 9 (p. 14-16). Centurion: Sabinet Online Limited.	http://www.vitalmaths.com/research	Publication about the VITALmaths project, that uses video clips as teaching tools.	English	Teaching, learning support and materials
FHBI	AC	Schön, S., Ebner, M. & Narr K. (2016). *Making-Aktivitäten mit Kindern und Jugendlichen: Handbuch zum kreativen digitalen Gestalten.* Nordersted: Books on Demand GmbH.	http://www.bimsev.de/n/?Freie_Lernmaterialien___Making-Aktivitaeten_mit_Kindern_und_Jugendlichen._Handbuch_zum_kreativen_digitalen_Gestalten	Manual on project ideas for makerspace-like activites with children.	German	Techniques and ideas for makerspace-like activities.

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DMMH	AC	Seago, N. (2003). Using video as an object of inquiry for mathematics teaching and learning. In J. Brophy (ed.), *Using Video in Teacher Education: Advances in Research on Teaching*, *Volume 10* (p. 259-286). Bingley: Emerald Group Publishing Limited.	http://www.emeraldinsight.com/doi/abs/10.1016/S1479-3687%2803%2910010-7	An attempt to create a professional development curriculum using video to help teachers improve mathematics teaching and learning.	English	Principles, lessons learned, and needs for more research.
FHBI	AC	Yarosh, S., Bonsignore, E., McRoberts, S. & Peyton, T. (2016). YouthTube: Youth Video Authorship on YouTube and Vine. In D. Gergle & M. R. Morris (ed.), *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*, Issue 1 (p.1423-1437). New York: Association for Computing Machinery.	http://lanayarosh.com/wp-content/uploads/2015/11/cscw-2016-youthtube.pdf	Ethnographic study on children's use of YouTube as a publication medium.	English	Differences between adults and teenagers in sharing and creating video content on social platforms.

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The 20 Most Relevant Videos

Contributor	Category	Reference	URL [Accessed: 23.08.2016]	Description	Language	Main contribution
KUL	VI	AlgoRythmics: Quick-sort dance	https://www.youtube.com/watch?v=ywWBy6J5qz8	A choreography that demonstrates a sorting algorithm.	English	Example of a creative video that is presenting a sorting algorithm
DMMH	VI	Christian Sandum Pedersen: Five small monkeys	https://youtu.be/z6NSblg8YPs	Video made by preschool teacher students about counting, a Norwegian number song.	Norwegian	Video example about counting using a song
KUL	VI	DorFuchs: Math on vacation!?	https://www.youtube.com/watch?v=nmtq7MvYLE4	Math turned into a rap song. Proportionality and units.	German	Video example for mathematics in everyday life presented in form of a song
KUL	VI	j0190: Math with the stop motion technique	https://www.youtube.com/watch?v=p9bEW4MQDqE	Solving a problem from algebra with stop motion.	German	Example for stop-motion about algebra
KUL	VI	Katie Steckles: Mathematical present wrapping	https://www.youtube.com/watch?v=NwmHHLdDBSA	The geometry of paper and boxes. Very few cuts.	English	Educational Video example about wrapping, that teaches geometry.
32SOU	VI	Knowledge Channel: Multiplication of mixed forms by a fraction	https://www.youtube.com/watch?v=ah2F0OyGXT4	Explanation with graphics, plus acting sequences.	English	Example for a video lesson in form of a role play
DMMH	VI	Linnemath: A quarter plus a third	https://youtu.be/xMskzrWcE0U	A model of a rectangle is used to visualise the sum of two fractions.	English	Example for stop motion.
DMMH	VI	Linnemath: What's in the box? #1	https://youtu.be/tXSTOyUED-A	Matches and matchboxes of various colours are used to model the concept of variable.	German	Example for stop motion.

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DMMH	VI	Linnemath: What's in the box? #2	https://youtu.be/pwyH9r2sFQs	Solving simultaneous equations through a process of logical reasoning without the introduction of algebra.	German	Example for stop motion.
DMMH	VI	Linnemath: What's in the box? #3	https://youtu.be/Gvw3AMyB-To	Building on from previous "What's in the box?" clips, variables are introduced to represent unknown quantities.	German	Example for stop motion.
32SOU	VI	MathTV: Video lessons by teachers	http://www.mathtv.com/	Khan-style-like but very brief presentations on basic and more advanced math.	English	Video lesson examples
KUL	VI	mediaeducation.net: Camera tutorial	https://www.youtube.com/watch?v=-KpMhH3jjeo	A general tutorial produced by Kulturring on how to use the camera in different ways.	German	filming tutorial
KUL	VI	mediaeducation.net: vidusign stop motion tutorial	https://www.youtube.com/watch?v=hEUjAxlZtpU	Video tutorial to create stop motion videos	German	The vidusign stop motion tutorial as a model of techniques that can be applied in vidumath.
KUL	VI	swampieandgreenie: Rotational symmetry	https://www.youtube.com/watch?v=ARg9JhwSmDo	A good example of what you can do with a one shot: no editing.	English	One-Shot-Video example about symmetry
DMMH	VI	Thor Gjermund Eriksen: Kosinus. Episode 9:19	https://tv.nrk.no/serie/kosinus/DMPV76000813/sesong-4/episode-9	Film for children about fractions made by the Norwegian Broadcasting Company NRK.	Norwegian	Film example about mathematics made by children
32SOU	VI	Turtlediary.com: Math videos for second grade	http://www.turtlediary.com/videos/second-grade/math.html	Khan-style-like explanations, but not hand-drawn.	English	Video lesson examples

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DMMH	VI	VITALmaths: A third minus a fifth	https://youtu.be/BfP4GQ2JoLE	A visual approach is used for the subtraction of a smaller fraction from a larger one.	English	Example for stop motion.
DMMH	VI	VITALmaths: A third plus a quarter	https://youtu.be/sVnvyQdI6js	A visual approach is used for the subtraction of a smaller fraction from a larger one.	English	Example for stop motion.
DMMH	VI	VITALmaths: Hubcap geometry	https://youtu.be/rArr7q2ZaIQ	Hubcaps are investigated in terms of their rotational and reflectional symmetry.	English	Short-film example about symmetry in everyday life
KUL	VI	Τα Μαθηματικά είναι το πρόσχημα: Symmetry	https://www.youtube.com/watch?v=gY2A51ZS4dc	Very artful but low-budget stop motion production.	Greek	Example for stop-motion

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Further Material

Contributor	Category	Reference	URL [Accessed: 23.08.2016]	Description	Language	Main contribution
DMMH	AC	Linneweber-Lammerskitten, H. (2011). Der Lernstick als Hilfe zur Binnendifferenzierung im Mathematikunterricht. In H.-U. Grunder (Hrsg.), *mLearning in der Schule: Der Lernstick als Lerninstrument.*Ausgabe 1 (S. 75-84). Baltmannsweiler: Schneider Verlag Hohengehren.	http://www.vitalmaths.com/research	mathematical and didactical project that uses private storage sticks during lessons	German	Ideas about using a private storage medium during math lessons
KIN	G	Arcademics (2016): Tractor multiplication	http://www.arcademics.com/games/tractor-multiplication/tractor-multiplication.html	Multiplication game	English	Example for educational math games
KIN	G	Bart Bonte	http://www.bartbonte.com/	Logic games for mobile devices	English	Example for educational games
KIN	G	Colin Northway: Fantastic contraption	http://fantasticcontraption.com/original/	Online physics puzzle game	English	Example for educational games
KIN	G	Intel Education Maths	http://inteleducationresources.intel.co.uk/primary_maths.aspx	Curricular support	English	Useful resources for interactive math lessons
KIN	G	Joel Gaspard: Toy Theatre	http://www.toytheater.com/math.php	Collection of math games	English	Examples for educational math games

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FHBI	G	Mojang Synergies AB: Minecraft	https://minecraft.net/	Minecraft is a game about breaking and placing blocks. But players can also work together to create wonderful, imaginative things.	many	Highly popular virtual lego bricks; could be used for machinima-style videos
KIN	G	Peter Lee: Math lines	http://www.novelgames.com/en/mathlines/	Counting game	English	Example for educational math games
KIN	G	Peter Lee: Number balls	http://www.novelgames.com/en/numberballs/	Number game	English	Example for educational math games
32SOU	G	prongo.com Inc.: prongo-games	http://www.prongo.com/	Prongo is an educational website, which offers fun, interactive and educational games.	English	Examples for educational games
KUL	RE	Christoph Selter (TU Dortmund): Pik AS maths project Germany	http://pikas.dzlm.de/index.html	The project PIK AS acquires materials to refine math class in the primary stage.	German	Possibility for us to connect - developing materials to develp maths learning
DMMH	RE	University of Applied Sciences Northwestern Switzerland & Rhodes University in South Africa: VITALmaths	http://www.vitalmaths.com/	A Swiss university of applied sciences and a university in South Africa research into short video clips specifically designed for autonomous learning in mathematics that make use of natural materials to animate and develop a variety of concepts and processes.	English, German	Ideas for short video clips designed for the autonomous learning of mathematics

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FHBI	SO	Heber Sheffield & Lance Harris: Puppet Pals	http://www.polishedplay.com/apps/puppet-pals-2.html	Puppet Pals is an App to create animated movies on a mobile device.	English	Creative movie making tool
FHBI	SO	International GeoGebra Institute: GeoGebra	http://www.geogebra.org/	Free mathematics software for learning and teaching. Interactive graphics, algebra, spreadsheets and free learning materials from elementary school to university level.	many	Tool to make mathematics tangible
32SOU	SO	Kevin Stone: Brain Bashers	http://www.brainbashers.com/	Includes an interesting collection of math, logic, and language puzzles, games, and illusions, separated into easy, medium and hard categories.	English	Examples for educational games
FHBI	SO	Ralph Damiano: Stick Nodes - Stickman Animator	https://itunes.apple.com/us/app/stick-nodes-stickman-animator/id932127902?mt=8	Stick Nodes is a powerful stick figure animation program which allows users to create their own animated .gifs on mobile devices.	English	Extraordinarily simple creation of animations
FHBI	SO	Sparkol Limited: VideoScribe	http://www.videoscribe.co/	Animated clipart and simulated writing/drawing hand for Khan-style videos	English	Tool for making whiteboard style animation videos
FHBI	SO	University of Bayreuth: Sketchometry	http://sketchometry.org/	sketchometry can convert your hand drawings into geometric constructions, which can be modified and dragged around.	German, English	Tool to convert hand drawings into geometric constructions which can be useful in geometry lessons.

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FHBI	WE	Alexander Altendorfer e.U.: Stop-Motion Tutorials	http://www.stopmotiontutorials.com/	A range of stop motion tutorials for beginners and experts.	German	Examples for stop motion
KIN	WE	Andrei Radulescu-Banu, Stefan de Kok, Mihai Ionescu & Marina Shalmon: LinkedIn The Math Connection	https://www.linkedin.com/groups/1872005/profile	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
32SOU	WE	Asia Citro: 50+Creative Math Activities for Kids	http://www.funathomewithkids.com/2015/03/guest-post-50-creative-math-activities.html	Collection of creative math activities for kids	English	Ideas on using a wide range of simple props for experiments and demonstrations in math
32SOU	WE	Borough of Telford & Wrekin: Mathematics resourses	http://www.taw.org.uk/demo/mathematics/	Resource modules	English	digital mathematics resources
KIN	WE	Catharine Alvarez: Facebook Math Wizard	https://www.facebook.com/groups/themathwizard/	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
32SOU	WE	Cilenia: Math exercises	http://math.cilenia.com/bg	interactive math exercises	many	Example for interactive math exercises
32SOU	WE	Coolmath.com LLC: Cool math 4 kids	http://www.coolmath4kids.com/	An amusement park of maths games and activities.	English	Examples for educational games
KIN	WE	Dean McGee, Eric Tramel, Anna Ruhs and others: Google+ STEM Educators	https://plus.google.com/communities/112904336188381403474	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KIN	WE	Dennis Kostac: LinkedIn Common Core State Standards - Mathematics	https://www.linkedin.com/groups/4204066/profile	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.

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KUL	WE	Eduversum GmbH: Medienkompetenzprojekte in Deutschland	http://www.lehrer-online.de/film.php	German website about integrating productive work with a video camera in school lessons and projects.	German	Background information for German teachers
KIN	WE	Rossana: Facebook Math images	https://www.facebook.com/colorsgeom	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KUL	WE	Deutsches Institut für Internationale Pädagogische Forschung: Fachportal Pädagogik - Referenzen Video (pedagogy portal, references on video)	http://fachportal-paedagogik.de/fis_bildung/fis_list.html?&ckd=yes&mtz=50&facets=y&maxg=5&ohneSynonyme=y&sort=jahrAb&feldname1=Schlagw%F6rter&feldinhalt1=VIDEO&bool1=or&nHits=2385	Overview of resources in the area of math and video with a focus on video consumption rather than production by children.	German	Overview of resources
32SOU	WE	Fila, LLC: Math Game Time	http://www.mathgametime.com/	Math Game Time provides visitors with a great selection of fun online math games worksheets and videos for Pre-Kindergarden to 7th Grade students.	English	Example for educational games
KIN	WE	Jane Seemann & Bel Jensen: Facebook STEM Teaching Ideas	https://www.facebook.com/groups/996547003735577	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.

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32SOU	WE	Johnnie's Math Page: Fun math for kids	http://jmathpage.com/index.html	Over one-thousand math learning and teaching resources have been categorized and set out for you.	English	Math learning and teaching resources
KIN	WE	Kennedy Musenga, Mwila Fumpa and others: Facebook MATHEMATICS ONLY	https://www.facebook.com/groups/1404326146475054	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
32SOU	WE	Krimsten Publishing: Multiplication games	http://www.multiplication.com/	Multiplication techniques, tips, and secrets used by master teachers.	English	Examples for educational games
KIN	WE	Manny Lorenzo: Facebook Math+Art	https://www.facebook.com/groups/1426296177668017/	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KIN	WE	Michael Weiss & Josh Hertel: Facebook Mathematics Education Research	https://www.facebook.com/groups/mathedresearchers/	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
FHBI	WE	Brendon Grunewald: Moovly	https://www.moovly.com/	Professional Free Online Video Animation Software and Video Maker.	English	Tool to animate videos and presentations
KIN	WE	Opher Liba, Marie Joubert & Rebecca Hanson: LinkedIn Math, Math Education, Math Culture	https://www.linkedin.com/groups/33207/profile	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.

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KIN	WE	Prashant Joshi: LinkedIn Science Math Primary/Secondary Education	https://www.linkedin.com/groups/69765/profile	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KIN	WE	Rakiya Chester: Facebook Math Problem Solving	https://www.facebook.com/mathproblemsolving	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KIN	WE	Roberto Natalini: Facebook MaddMaths!	https://www.facebook.com/groups/maddmaths	Social networking group	Italian, English, Others	Information about teaching mathematics and social interaction with other people to gain ideas and data.
KIN	WE	Ronald Buelow: Google+ Mathematics	https://plus.google.com/collection/0q1AQ	Social networking group		Information about teaching mathematics and social interaction with other people to gain ideas and data.
32SOU	WE	Sandbox Networks, Inc.: Math games from Funbrain	http://www.funbrain.com/brain/MathBrain/MathBrain.html	Funbrain is a website that offers free educational games, online books and comics.	English	Example for educational games
FHBI	WE	Sandra Schön & Martin Ebner: "Making" - Kreatives digitales Gestalten mit Kindern	http://imoox.at/wbtmaster/startseite/maker.html	"Making" is an open online course (MOOC) for creative digital design and experiments with children.	mostly German	Information about creative digital design and experiments

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FHBI	WE	Stanford University: Youcubed	https://www.youcubed.org/	Youcubed has the main goal is to inspire, educate and empower teachers of mathematics, transforming the latest research on math learning into accessible and practical forms.	English	Information about the latest research on math learning
FHBI	WE	STEM Learning Ltd.	https://www.stem.org.uk/resources	Website with STEM related programmes and projects designed to have a positive impact on participants. All activities are grounded in appropriate education and scientific research supported by clear evidence of impact.	English	Information about STEM related programmes and projects
KIN	WE	STEMschool.com: Facebook STEM Education	https://www.facebook.com/STEMSchools	Social networking group	English	Information about teaching mathematics and social interaction with other people to gain ideas and data.
32SOU	WE	The Math Forum at NCTM: Ask Dr Math	http://mathforum.org/dr.math/	A forum to ask Dr Math any maths question and search for answers.	English	Example for a forum to learn math together
FHBI	WE	University of Canterbury: CS unplugged - Computer Science without a computer	http://csunplugged.org/	Paper-and-pencil activities for children to get insights into foundational ideas of computer science.	many	Examples for paper-and-pencil activities to teach computer science

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32SOU	WE	Wendy A. Petti: Math cats	http://www.mathcats.com/index.html#contents	Join the Math Cats is a website with creative, open-ended math explorations, games and riddles.	English	Examples for educational games and riddles
FHBI	X	LEGO Group: Lego MoreToMath	https://education.lego.com/en-us/elementary/shop/moretomath	LEGO Education MoreToMath includes guided lessons, student worksheets, assessment and helps teachers make abstract math tangible.	many	Concept to make math tangible using LEGO bricks and software
KIN	X	National Center for Education Statistics: Kids zone- create a graph	http://nces.ed.gov/nceskids/createagraph/default.aspx	Visualising graphs	English	Example for a tool for kids to easily create graphs

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