



Intellectual Output 1:
State of the Art: Pre-Research
Portuguese

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vidumath - creative video for mathematics - VG-SPS-BE-15-24-013795

The project vidumath has been funded with support from the European Commission. This document reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Lista de trabalhos afins

O projeto vidumath visa explorar aspetos relacionados com educação e aprendizagem através de vídeo considerando: a) uso de vídeos b) que na sua maioria são produzidos pelas próprias crianças c) para experimentar, demonstrar e compreender a matemática. Foi encontrada uma ampla variedade de investigação existente em todos os três campos, embora os trabalhos abordando a sua combinação sejam em muito menor número.

Consequentemente, a compilação feita sobre o tema inclui trabalhos desenvolvidos sobre educação através de *media*, dificuldades de aprendizagem em matemática e como ultrapassá-las, aprendizagem visual, abordagens gerais na aprendizagem através das TIC, problemas éticos e práticos na aprendizagem por vídeo e preocupações pedagógicas relativas à aprendizagem com recurso às novas tecnologias. A tabela "Os 20 trabalhos académicos mais relevantes" (ver anexo) é uma lista de obras que consideramos de maior importância para vidumath. Material adicional (consulte a tabela em anexo) inclui não só a literatura, mas também sites, mídias sociais, *software* e jogos. Considera-se que jogos específicos podem apoiar a aquisição de conceitos e proporcionam abordagens pedagógicas inovadoras.

Tendo em conta as características do projeto *vidumath*, compilámos uma lista de 20 vídeos (ver anexo) que apresentam uma seleção expressiva do que pode ser feito sobre o tópico "vídeo e aprendizagem da matemática" - usando diferentes abordagens de produção de vídeo, faixas etárias e conteúdos. Este material compreende ideias que vão desde transformar um algoritmo numa dança de vídeos *stop motion* sobre simetrias. O estilo de produção varia de vídeos simples *one-shot* (em que não é necessária qualquer edição) até à produção de um "bom" vídeo onde o material é cuidadosamente registado e pós-produzido.

Os vídeos encaixam-se bem na matriz *vidumath* que visa apresentar ideias vídeo-matemáticas nos níveis inicial, intermédio e explorações criativas. Isto pode ajudar os professores a identificar mais facilmente o que será possível fazer sem sobrecarregar a sua produção de recursos. Os vídeos também mostram até que ponto a produção de vídeos pode ser criativa. O material inclui todo o tipo de mídia (como imagens estáticas, imagens em movimento e sons), mas também ideias diferentes do que pode ser registado em frente da camera: estudantes atuando, objetos em movimento, desenhos e pinturas, sons e música.

Resumo do Estado da Arte

O projeto *VITALmaths* (Linneweber-Lammerskitten et al., 2014) aproxima-se das finalidades de *vidumath*, incidindo em utilizações inovadoras de vídeos nas aulas de matemática. Outros trabalhos recomendam atividades práticas com crianças, no sentido da produção (cf., e.g.,

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Anfang et al., 2015), apresentam experiências teoricamente fundamentadas sobre estratégias de ensino inovadoras (cf., e.g., Boaler, 2016), uso do YouTube pelas crianças para criar e compartilhar seus próprios conteúdos de vídeo (Yarosh, 2016), ou exploram a melhor forma de criar explicações visuais (vide, por exemplo, LeFever, 2015). Os trabalhos referidos são a seguir resumidos.

O objetivo do projeto suíço/sul africano *VITALmaths* / (Linneweber-Lammerskitten et al., 2014) consiste na utilização de ferramentas simples que permitam a estudantes universitários criar, para alunos mais jovens, vídeos que demonstram procedimentos matemáticos em vez de apenas descrevê-los. Cada vídeo tem a duração de um a três minutos, mostra uma situação ou um processo e tenta reencenar, desenvolver, generalizar, transferência, provar, ou questionar o problema em vez de apoiar um comportamento passivo-recetivo. Os vídeos não são instrutivos, mas sim motivadores, ativando a cognição e fornecendo orientação.

Linneweber-Lammerskitten diferencia entre alunos fracos, médios, e talentosos e propõe as respectivas metas de realização com a ajuda de *clips* de vídeo sobre matemática. Os vídeos curtos não têm som, de modo que podem ser vistos em sala de aula por cada aluno em seu próprio ritmo, sem perturbar os outros alunos. Os filmes têm de ser acompanhados por materiais que permitam a experimentação espontânea por parte dos alunos sem apoio imediato do professor. Vídeos de tentativas malsucedidas podem também ser mostrados para incentivar os alunos e aumentar a sua autoconfiança. A principal diferença entre *VITALmaths* e *vidumath* é que os vídeos *vidumath* devem ser produzidos pela própria criança e não por estudantes universitários.

Anfang, Demmler, Lutz e Struckmeyer (2015) dão exemplos de educação eficaz para os media e de atividades para crianças de dois a doze anos. Como estes autores enfatizam, as crianças hoje em dia vivem num ambiente que engloba meios versáteis. Os autores apresentam uma ampla coleção de vários conceitos práticos, tais como a forma de explorar o ambiente com uma camera digital para recolher ruídos, animar filmes, fazer reportagens, ou aprender com videogames como *Minecraft*. Esta coleção é dirigida a todos os que desejam trabalhar media, de forma pedagógica, com crianças.

"*YouthTube: Youth Video Authorship*" no *YouTube* e *Vine*" (Yarosh, 2016) é um estudo de análise de conteúdo, que incidiu em mais de 250 vídeos de autoria de crianças e adolescentes. Explica as diferenças entre as plataformas de vídeo *YouTube* e *Vine* em termos de idade dos autores e tipos de colaborações. Aparentemente há uma maior quantidade de conteúdo violento, sexual e obsceno. Além disso, existem diferenças na abordagem de compartilhar vídeos: os adultos tendem a usar vídeos como um arquivo para as suas memórias, os adolescentes a usá-lo como um palco para produzirem e se apresentarem.

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Boaler (2016) refere a definição de "mentalidade" (*mindset*) de Carol Dweck: a mentalidade é um conjunto de crenças sobre o potencial da própria aprendizagem. Dweck postula que os indivíduos com uma mentalidade fixa acreditam que inteligência é fixa, enquanto que os indivíduos com uma mentalidade de crescimento acreditam que qualquer pessoa pode aprender tudo, desde que dediquem o trabalho necessário. O cérebro funciona de forma diferente quando se acredita em si mesmo e que as lutas, desafios e erros fazem crescer o cérebro, devido à sua plasticidade. Esta atitude pode mudar a forma como os estudantes percebem erros. Boaler afirma que não existem "pessoas de matemática" ou "crianças com altas capacidades" e que com um método adequado de ensino qualquer pessoa pode atingir níveis elevados de aprendizagem. Recomenda também tarefas complexas abertas com "um ponto de entrada baixo e um teto alto", as quais pela sua abertura permitem vários métodos, vias e representações. Não deve haver pressão de tempo, porque este simplesmente bloqueia a memória de trabalho, que é indispensável para compreender profundamente ideias matemáticas e conexões. O desempenho em matemática pode ser melhorado pela consideração de componentes visuais, pedindo aos alunos para argumentar uns com os outros, e explorar um problema antes de ensinar o método de resolução padrão. Também é importante que as crianças desenvolvam sentido numérico e aprendam que a matemática não incide apenas em cálculos e memorização, mas também sobre pensar de forma criativa e fazer as conexões.

LeFever (2015) é o fundador da *Common Craft videos*. Em "*The Art of Explanation*", aborda empresários, educadores, formadores de opinião sobre como melhorar explicações e como apresentá-las. A sua teoria é a de que boas explicações afetam a confiança da audiência. O desafio do apresentador é manter esta autoconfiança do público e não a destruir com explicações difíceis, usando uma linguagem técnica apenas para o apresentador se sinta inteligente e impressione o público com o seu conhecimento. Além de apresentar tais considerações fundamentais, LeFever dá muito conselhos específicos sobre recursos visuais eficazes.

Recomendações para o Projeto *vidumath*

No espírito de Boaler (2016) parece ser mais promissor o projeto não ficar perto do currículo padrão de matemática (em contraste com muitos dos vídeos visíveis no projeto *VITALmaths* mencionado acima). Em vez disso, *vidumath* deve procurar lidar com temas e formatos que não se assemelhem aos manuais escolares (e podem provocar a mesma ansiedade em relação à matemática que esta própria), mesmo que tenham como alvo as mesmas ideias matemáticas, constructos ou competências,

Na fase de pesquisa, encontrámos uma infinidade de ferramentas de *software* e conselhos práticos sobre produção cinematográfica (ver quadro "material adicional") que merecem ser experimentados e podem ser potencialmente considerados nas orientações *vidumath* a ser

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criadas. A criatividade dos vídeos selecionados é muito inspiradora. Gostaríamos que *vidumath* se desenvolvesse como um projeto cuja criatividade inspira outros grupos e professores individuais. Há muito conteúdo em formato vídeo disponível (e não mencionado na presente seleção) que está abaixo da média em termos de produção e, pior ainda, em termos de didática e criatividade. Acreditamos que é vital evidenciar quão emocionante podem ser projetos de aprendizagem da matemática com base em vídeos.

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Acrónimos Usados

Acrónimos	Parceiro Vidumath
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

Acrónimos	Categoria
AC	Livros, artigos, teses
RE	Projectos de investigação
NA	Artigos não académicos
WE	Web sites, grupos, ...
VI	Vídeos
SO	Software (also web-based), apps, excluindo jogos
G	Jogos
X	Outros

Os 20 trabalhos académicos mais relevantes

Contributor	Category	Reference	URL [Accessed: 23.08.2016]	Description	Language	Main contribution
KUL	AC	Anfang, G., Demmler K., Lutz, K. & Struckmeyer K. (2015). <i>wischen klicken klipfen: Medienarbeit mit Kindern</i> . 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). <i>Mathematical Mindsets: Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching</i> . 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.), <i>Teaching and Teacher Education: An International Journal of Research and Studies</i> . Volume 24 Issue 2 (p. 417-436) Boulder: Elsevier.	http://www.science-direct.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). <i>Guidelines for Video Research in Education: Recommendations from an Expert Panel</i> . 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). <i>Abenteuer Informatik: IT zum Anfassen - von Routenplaner bis Online-Banking</i> . 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). <i>Video Research in the Learning Sciences</i> . New York: Taylor & Francis.	http://www.tandeebooks.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). <i>Video in Qualitative Research</i> . 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.

DMMH	AC	Jewitt, C. (2012). <i>An Introduction to Using Video for Research National Centre for Research Methods Working Paper</i> . 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). <i>Kids on YouTube: Technical Identities and Digital Literacies</i> . 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). <i>The Art of Explanation: Are you ready to rethink how you communicate?</i> . 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.), <i>Beiträge zum Mathematikunterricht</i> , 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.), <i>Beiträge zum Mathematikunterricht</i> , 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.), <i>Unterrichtsentwicklung und Kompetenzorientierung: Festschrift für Regina Bruder</i> , 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.). <i>Beiträge zum Mathematikunterricht</i> , 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. <i>Pythagoras: Journal of the Association for Mathematics Education of South Africa</i> , 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.), <i>Grundschulunterricht Mathematik</i> . 3/2013 (S.32-34). Berlin: Cornelsen Verlag GmbH.	http://www.oldenburg-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, <i>Learning and Teaching Mathematics</i> , 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). <i>Making-Aktivitäten mit Kindern und Jugendlichen: Handbuch zum kreativen digitalen Gestalten</i> . 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 activities 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.), <i>Using Video in Teacher Education: Advances in Research on Teaching, Volume 10</i> (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.), <i>Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing</i> , 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.

Os 20 Videos Mais Relevantes

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=hEUjAxIZtpU	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=ARq9JhwSmDo	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/sVnvyQdl6js	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/rAr7q2ZalQ	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

Outros

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.), <i>mLearning in der Schule: Der Lernstick als Lerninstrument</i> . 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

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 develop 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/quest-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 resources	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/the-mathwizard/	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&felddname1=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.mathgame.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
PT	X	Engaging Students in Video Production and Movie Making in the classroom	http://www.techlearning.com/uploadedfiles/techlearning/common/sony_slides_final.pdf	Video production as a teaching strategy	English	
PT		Lights, Camera . . . Engagement! Three Great Tools for Classroom Video	https://www.edutopia.org/blog/using-video-in-classroom-ron-peck		English	
PT		Theodosakis, Niko Video in the Classroom: How Video Production Promotes Learning Skill	https://www.questia.com/magazine/1G1-129628882/video-in-the-classroom-how-video-production-promotes			

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PT		Hiller A. Spires et al. (2012) Energizing Project-Based Inquiry: Middle Grade Students Read, Write, and Create Videos	http://onlinelibrary.wiley.com/doi/10.1002/JAAL.00058/abstract			
PT		Jill LAZARUS & Geoffrey ROULET (2013). Creating a YouTube-Like Collaborative Environment in Mathematics: Integrating Animated GeoGebra Constructions and Student-Generated Screencast Videos				
PT		Laura Palmgren-Neuvonen Riitta-Liisa Korkeamäki (2015) Teacher as an orchestrator of collaborative planning in learner-generated video production. <i>Learning, Culture and Social Interaction</i> 7 (2015) 1–11				