GEOMETRIX

Thematic Line of the Center for Research & Development in Mathematics and Applications (CIDMA)



Achieved Goals and Overcoming Challenges

Outputs 2013-2015













Geometrix is a research and development thematic line of the **Center for Research and Development in Mathematics** and Applications (CIDMA) of the University of Aveiro. It integrates a multidisciplinary team, bringing together mathematicians, computer programmers, educators and graphic designers around a common goal, the study, creation, development and use of inclusive teaching and learning environments, crisscrossing all levels of education, guaranteeing their access to vulnerable groups such as children with special needs and the elderly. Geometrix relies in research on mathematics, technology and mathematics education for the

development of (computational) tools to support and empower students with knowledge and skills in mathematics, from



Board game CMAT Lousada for primary school children. Connecting cultural heritage and mathematics in a simple, natural and harmonious way

Outputs 2016





CMAT for Ovar Council





1st version of a prototype for a digital Learning Environment on Mathematics for Autistic Children (LEMA) – 1st assessment with end-users



LEMA 2nd version – refinement based on data analysis linked NIM GAME – combinatorial and geometric game for secondary/higher education. Android mobile application available in Google Play Store

NIM



Habash constructions for the determination of al-qibla with GeoGebra

Stereographic projection and Mobius transformations with GeoGebra



Spherical tilings as orbits by rotations of an equilateral

ORIESPA

Calouste Gulbenkian founded project LEMA within the program: Special Education 2016

01/07/2016		Formulários							
Vista	a de Impressão		Pomeckla por:						
Constanting of the second	FUNDAÇÃO CALOUSTE GULBENKIAN QUALIFICAÇÃO DAS NOV	AS GERAÇÕES							
TERMO DE ACEITAÇÃO									
Condições para a concessão de subsidios									
1 - A Entidade Beneficiária e o Coordenador responsável designados no projeto submetido à Fundação Calouste Gulbenkian (FCG) e por esta aprovado e financiado, comprometem-se a:									
1. A te	plicar o financiamento concedido exclusi rmos, condições e orçamento nele pre	vamente à execução vistos, carecendo de	do projeto aprovado, com observância dos autorização expressa da FCG qualquer						
2. C	concretizar os objetivos assumidos, obrig erbas que, para além da atribuída pela f	ando-se para tanto, i lundação Calouste G	se necessário for, a reunir os meios e as ulbenkian, se mostrem necessárias para a						
3. M	dencionar explicitamente a FCG como fe u comunicação relativa ao mesmo.	nte financiadora do p	rojeto em qualquer documento, publicação						
4. A FG 5. M	utorizar, a qualquer momento, a realizaç CG, de missões de acompanhamento, ava fanter uma contabilidade própria devida erificação nor parte da FCG da execução	ão, por equipas espe- liação e de controlo c mente identificada e orcamental do projet	clalizadas e devidamente mandatadas pela lo projeto, nas suas diferentes vertentes. atualizada que possibilite a apreciação e						
6. M	 Manter um dossier do projeto, actualizado e disponível, constituído pelos seguintes elementos: a. Formulário de candidatura e respectivos anoxos; b. Comunicación da decisión de anorxoseño; 								
	 Termo de Acellação; declaão de aprovação, quando aplicável; Pedido de alteração à declaão de aprovação, quando aplicável; 								
 e. Cronograma de realização física e financeira; r. Cópia dos pedidos de pagamento e respetivas listagens dos documentos comprovativos de despesa; g. Cópia dos documentos de despesa, relativamente aos gastos gerais do projeto; 									
7. O	 h. Documentação relativa à publicidad) processo técnico-financeiro deve manti ias. 	e dos apoios recebido 2r-se atualizado, não	s. sendo admissível um atraso superior a 60						
 Apresentar um relatório de progresso semestral e um relatório final do projeto nos quais deverá constar informação demonstrativa quer da atividade desenvolvida, quer da gestão financeira do projeto. Dar cumprimento ás demais normas constantes do Regulamento do concurso. 									
II - A FCG reserva-se o direito de modificar, se necessário, o subsidio concedido, ou de exigir o respetivo reembolso total ou parcial, em caso de não execução do projeto nas condições inicialmente acordadas ou entretanto modificadas.									
Lisboa,			Jospho para a forma						
	And Pro. 7	-	Thunave						
	Coordenador Responsável	O Res (Com es	pontável pela Entidade Beneficiána rimbo- ou são branco da Institução)						
	Tomara el		and the second s						
http://oarstidatures.gutbenken.pt/Pages/AewPage.aspx?EDIT=PGQNG35_PTAPROCESS=1439124PORMNAME=Terms%304e%20Acela%C3%A7%C3 1/2									

Training Sessions

[AF1] - Meaningful Math Learning in Children with Autism Spectrum Disorder,

also committed to the creation of extension activities where mathematics / culture / community / university are articulated in a natural and meaningful way.

var Council v

with the assessment of 4 children with ASD

patterns through statistical analysis

data having in account the

Analysis of NIM's users usage

identification of user learning

triangle, with GeoGebra

Cátia Belém (21 trainees 12*2=24 hours)

Outputs 2017

Calouste Gulbenkian funded project LEMA within the program: Special Education 2016

Training Sessions

[AF2] -Technologies and Digital Tools for Mathematics Teaching, *Cátia Belém* (22 trainees 11*2=22 hours)

[AF3] - Functionalities of the Learning Digital Environment of Mathematics for Children with ASD *Isabel Santos* (33 trainees 12*3=36 hours)



LEMA 3rd version – refinement based on data analysis linked with the training actions with 23 teachers



1st National Congress of Autism and Mathematical Learning – CNAM 2017, June 29, 30



ORIESPA, a digital learning game for children with spacial educational needs, aiming the development of spatial abilities





Elements of a one-parameter family of triangular spherical tilings and of one-parameter families of dihedral spherical pentagonal tilings

Outputs 2018





Awards



EUROPEAN DISABILITY FORUM ANDISABILITY FORUM M. ISABEL SANTOS WINNER EDF-ORACLE E-ACCESSIBILITY



teachers

MSc Thesis

P. Almeida].

PhD Thesis

Luísa Oliveira: Teaching tasks for basic education using GeoGebra, University of Aveiro, Dec. 2017, 238 pp. [Supervisor: Ana M. D'Azevedo Breda]

Maria Isabel Santos: Digital technologies to

support the development of mathematical

reasoning of students with autism spectrum

disorder, Univ. of Aveiro, March, 2018, 380 pp.

[Supervisors: Ana M. D'Azevedo Breda, Ana M.

Maria Lurdes Gandarinho: Thematic and historical aspects of a journey through the art of ceramic tiles and paintings of Aveiro, University of Aveiro, Dec. 2015, 129 pp. [Supervisor: Ana M. D'Azevedo Breda].

Dulce Nogueira: Topics of the history of trigonometry, University of Aveiro, Dec. 2013, 232 pp. [Supervisor: Ana M D'Azevedo Breda].

1st version of the digital game "Puzzle" developed for the elderly community with the main goal of improving their cognition capacities

Relevant Publications



Evolution / deformation of the one parameter families of dihedral spherical pentagons





SCHOLARSHIP 2017-2018

PhD THESIS

Future work

Internal of Autism and Developmental Disorders	Brief Report: Preliminary Proposal of a Conceptual Model of a Digital Environment for Developing Mathematical Reasoning in Students with Autism Spectrum Disorders Santos, M. I., Breda, A. & Almeida, A. M., Journal of Autism and Developmental Disorders, August 2015, 45(8), pp 2633–2640	Bit State S	Complex functions with GeoGebra Breda, A. & Santos, José M., Teaching Mathematics and its Applications, June 2016, 35 (2), pp. 102-110	<text><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></text>	Symmetries of ceramic tiles of Aveiro facads by means of GeoGebra Carlos, L. & Breda, A., Revista do Instituto GeoGebra Internacional de São Paulo, June 2017, 6 (2), pp. 81-92	 CMat Penafiel CMat Castelo de Paiva Fernão de Magalhães Circumnavigation Gam Invitation of the Director of the Office of the Organization of Ibero- American States – in Portugal
Educational Technology Research & Development Marst + Marster 2 + April 2017	Design approach of mathematics learning activities in a digital environment for children with autism spectrum disorders Santos, M. I., Breda, A. & Almeida, A. M., Educational Technology Research and Development,	PORTUGALIAE MATHEMATICA The pursue of the Portuguese Radionadical Society	A new class of monohedral pentagonal spherical tilings with GeoGebra Breda, A. & Santos, José M., Portugaliae Mathematica, February 2018, 74(3), pp. 257-266.	<section-header><section-header><text><text><image/></text></text></section-header></section-header>	Spherical Geometry and Spherical Tilings with GeoGebra Breda, A. & Santos, José M., Journal for Geometry and Graphics November 2018, 22(2),pp. 283-299.	 From LEMA to DiLEMA GoldenG Education Games for A (EGfA) Spherical Tilings with
ALEET Association for Disastened Communications & Technology	October 2017, 65(5), pp1305–1323	i di manan Maramatan Kasar		Manging Editors B. F. Toor, Parenty, M. Taroy, H. Tarohol (Versing) Heldestenant, Weiting		GeoGebra

Geometrix members were supported, in part, by Fundação para a Ciência e a Tecnologia (FCT), within project UID/MAT/04106/2019.









