

**Anual report 2011**  
**GeoGebra Institute of Cantabria**  
[www.geogebra.es](http://www.geogebra.es)

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## **0 Introduction**

The InstitutoGeoGebra de Cantabria (IGC) was founded in May, 2009. It is associated to the Centro Internacional de EncuentrosMatemáticos (CIEM) of the Universidad de Cantabria ([www.ciem.unican.es](http://www.ciem.unican.es)).

Two characteristics of this Institute are

- the plural origin of its members (from different regions within Spain and from several different countries)
- the special relation of its staff to some important, nationwide, projects and courses related to GeoGebra (see <http://recursostic.educacion.es/gauss/web/> and, as a sample page, [http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/novedades.htm](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/novedades.htm) )

In fact, in May 2010, a cooperation agreement has been signed between the IGC and the Instituto de Tecnologías Educativas (ITE), (<http://www.ite.educacion.es/>), of the Spanish Ministry of Education

## **1 People**

- Three new members along year 2011.
- Issuing along this year the following certificates:

Users: 4 certifications

- Remarkable: Prof. Manuel Sada, new GeoGebra Institute Trainer, since March 14, 2011.

## **2 Training and Support**

- Setting up a moddle platform (Spring 2011)

<http://moodle.geogebra.es/>

Responsible persons:

Rafael Losada, <[rafaell@educastur.princast.es](mailto:rafaell@educastur.princast.es)>

Julio Valbuena, <[juliovh@educastur.princast.es](mailto:juliovh@educastur.princast.es)>

Rubén Suárez, <[rubensua@educastur.princast.es](mailto:rubensua@educastur.princast.es)>

## TRAINING COURSES

Different members of the IGC have been involved at the following courses during 2011:

- R. Losada et. al. Cooperation with the Geogebra Virtual Courses (CVG) offered by the Instituto de Tecnologías Educativas (ITE), of the Spanish Ministry of Education. Number of teachers (from Spain and South-America) following these courses along this year (the first number refers to those that passed the course):

100 / 160 - GeoGebra en la Educación Primaria

600 / 775 - GeoGebra en la Enseñanza de las Matemáticas (Secundaria). Iniciación

150 / 180 - GeoGebra en la Enseñanza de las Matemáticas (Secundaria). Profundización

10 / 20 - GeoGebra en la Enseñanza de las Matemáticas. Experimentación en el aula

Moreover, all the materials of these courses have been up dated to **GeoGebra 4** (including CAS), see:

Primaria: [http://geogebra.es/cvg\\_primaria/index.html](http://geogebra.es/cvg_primaria/index.html)

Secundaria: <http://geogebra.es/cvg/index.html>

- M. Sada. Participating at the virtual in-service training course (50 hours) for members of the Society of Math Education at the Extermadura Region, organized by the Consejería de Educación of Extremadura: "Utilización didáctica del software de geometría dinámica GeoGebra bajo Linex en el aula de matemáticas".

- M. Sada. Developing and launching a Lab: "Experimentando las TIC (el Proyecto Gauss) en el aula (de ordenadores)" for teachers at the Navarra region:

[http://dpto.educacion.navarra.es/formacionprofesorado/images/filepicker\\_users/72c1d46d27-64/Proyecto%20Gauss.pdf](http://dpto.educacion.navarra.es/formacionprofesorado/images/filepicker_users/72c1d46d27-64/Proyecto%20Gauss.pdf)

- M. J. González- López. As part of the cooperation agreement Universidad de Cantabria/Universite de Niamey (Niger), the following course has been developed: "COURS D' INITIATION A GEOGEBRA, UN LOGICIEL EDUCATIF LIBRE POUR L'ENSEIGNEMENT DES MATHEMATIQUES", March 2011. Niamey. See <http://ig-niger.refer.ne/>

- Two Geogebra Sessions (6 hours) entitled "Geometría con Geogebra" in the context of the "Program of Mathematics for Talented Students" (ESTALMAT) of the University of Cantabria and the Sociedad Matemática de Profesores de Cantabria (SMPC)  
[http://www.estalmat.unican.es/documentos/Actividades\\_2010\\_11/actividades\\_1011\\_Mayo.htmhttp://www.estalmat.unican.es/documentos/Actividades\\_2011\\_12/actividades\\_1112\\_Oct.htm](http://www.estalmat.unican.es/documentos/Actividades_2010_11/actividades_1011_Mayo.htmhttp://www.estalmat.unican.es/documentos/Actividades_2011_12/actividades_1112_Oct.htm)

- J. L. Álvarez, A. Pérez, M. Sada. Participating at the Basque Country University Summer-course (including in most lectures, GeoGebra materials): "Matemática Digital: Eskola 2.0" (<https://sites.google.com/site/matematicadigitaleskola20/home>)

- F. Maíz. Developing and launching a Lab: "Taller de GeoGebra para Matemáticas", III Jornadas Integración de las TIC en la Enseñanza. CRIF "Las Acacias". Madrid, June 2, 2011. Pdf: <http://www.geogebra.org/en/upload/files/fmaizjimenez/spanish/Taller%20GeoGebra/Taller%20de%20GeoGebra%20para%20Matematicas%20Francisco%20Maiz%20Jimenez.pdf>

- R. Losada. In-service University members training course. June 24, 2011. "Geogebra: el programa y sus recursos".  
<http://moodle.unican.es/moodle/course/view.php?id=500&edit=0&sesskey=ljjInVwvrl>

- F. Maíz. Developing and launching a Lab: "Taller de papiroflexia Matemática" at the 15 JAEM (Jornadas Aprendizaje y Enseñanza de las Matemáticas). Gijón (Asturias), July, 3, 2011. Circa 800

participants. See:

[http://15jaem.org/index.php?option=com\\_content&view=article&id=110&Itemid=99](http://15jaem.org/index.php?option=com_content&view=article&id=110&Itemid=99)

Prezi: <http://prezi.com/d8cm39s7hfdp/taller-de-papiroflexia-matematica/>

Pdf:

<http://www.geogebra.org/en/upload/files/fmaizjimenez/spanish/Papiroflexia/Taller%20papiroflexia%20Francisco%20Maiz%20Jimenez.pdf>

• F. Maíz: "Trabajando por proyectos en la enseñanza. Uso de recursos TIC: Presentaciones, GeoGebra". Comunicación en III Jornadas Integración de las TIC en la Enseñanza. CRIF "Las Acacias". Madrid, June 2, 2011 <http://formacion.enlinea.educa.madrid.org/itic11/>

Video: [http://mediateca.educa.madrid.org/reproducir.php?id\\_video=6aqzat9s8k8cus4i](http://mediateca.educa.madrid.org/reproducir.php?id_video=6aqzat9s8k8cus4i)

Prezi: [http://prezi.com/\\_jz6ocy4h430/trabajando-por-proyectos-en-la-ensenanzauso-de-recursos-ctic-presentaciones-geogebra/](http://prezi.com/_jz6ocy4h430/trabajando-por-proyectos-en-la-ensenanzauso-de-recursos-ctic-presentaciones-geogebra/)

Pdf: [http://formacion.enlinea.educa.madrid.org/itic11/comunicaciones/06\\_francisco\\_maiz.pdf](http://formacion.enlinea.educa.madrid.org/itic11/comunicaciones/06_francisco_maiz.pdf)

• J. L. Álvarez, M. Sada. In-service Secondary Education Teachers training course, specific for members of the Sociedad Matemática de Profesores de Cantabria. October 14-15, 2011. 29 participants, two lecturers. [http://www.ciem.unican.es/es/curso\\_geogebra\\_2011](http://www.ciem.unican.es/es/curso_geogebra_2011)

• M. González-López. In the context of the TutorMates Project, virtual course for in-service secondary mathematics teachers "iniciación a Tutormates"  
<https://formacion.tutormates.es/login/index.php> (October-December 2011).

• R. Losada et. al. Seminar "Curso de actualización para tutores ITE-Geogebra", November 11-12, 2011. 19 participants, from all over Spain, all of them tutors of the different ITE-Geogebra on-line courses (<http://formacionprofesorado.educacion.es/index.php/es/materiales/materiales/236-geogebra-en-la-ensenanza-de-matematicas>) organized by the Instituto de Tecnologías Educativas (Ministerio de Educación). See [http://www.ciem.unican.es/es/curso\\_ite\\_geogebra](http://www.ciem.unican.es/es/curso_ite_geogebra) for more information on this Seminar.

• J. L. Álvarez. [Jornada sobre GeoGebra 4 y el Proyecto Gauss](#), Santiago de Compostela, December, 17, 2011

#### OTHER ACTIVITIES OF SUPPORT

• Helping Angel Torres Cristerna on GeoGebra contacts in Mexico; Garazi Santamarina on Geogebra contacts in the Basque Country to work on a GeoGebra Master Thesis; and helping on different issues posed by colleagues from the IGC.

### 3 Development and Sharing

#### ADVANCED TECHNIQUES

Contador de aciertos

<http://geogebra.es/cvg/manual/html/contador.html>

Cronómetro

<http://geogebra.es/cvg/manual/html/segundos.html>

#### SELECTION OF NEW MATERIALS:

Geo-GeoGebra (versión en inglés)

<http://geogebra.es/cvg/15/html/earth.html>

Anamorfosis

<http://geogebra.es/cvg/15/html/anamorfosis.html>

Triángulo de Sierpinski (como atractor de un sistema dinámico caótico)

[http://es.wikipedia.org/wiki/Tri%C3%A1ngulo\\_de\\_Sierpinski](http://es.wikipedia.org/wiki/Tri%C3%A1ngulo_de_Sierpinski)  
<http://geogebra.es/cvg/14/html/atractor.html>

Polígonos de Sierpinski (introducir "frac" -sin comillas- en la casilla de entrada -input box-

)[http://es.wikipedia.org/wiki/Tri%C3%A1ngulo\\_de\\_Sierpinski](http://es.wikipedia.org/wiki/Tri%C3%A1ngulo_de_Sierpinski)  
<http://geogebra.es/cvg/14/html/atractor.html>

Análisis armónico (con sonido)

[http://geogebra.es/cvg/14/html/analisis\\_armonico.html](http://geogebra.es/cvg/14/html/analisis_armonico.html)

Transformaciones afines

<http://geogebra.es/cvg/manual/html/transformaciones.html>

I\_XLVII

[http://geogebra.es/cvg/15/html/I\\_XLVII.html](http://geogebra.es/cvg/15/html/I_XLVII.html)

Dualidad

[http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/geometria/cuerpos/dualidad/actividad.html](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/geometria/cuerpos/dualidad/actividad.html)

Los lugares del triángulo

[http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/geometria/poligonos/triangulo\\_lugares/actividad.html](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/geometria/poligonos/triangulo_lugares/actividad.html)

Teselados. Método quita y pon

[http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/geometria/teselados/quita\\_pon/actividad.html](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/geometria/teselados/quita_pon/actividad.html)

Fractales

<http://docentes.educacion.navarra.es/msadaall/geogebra/fractales.htm>

• Several applets illustrating different "Klein vignettes", of the IMU/ICMI Klein Project, see

[http://wikis.zum.de/dmuw/Klein\\_Vignettes](http://wikis.zum.de/dmuw/Klein_Vignettes):

Ombra mai fu

[http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/geometria/cuerpos/ombra\\_mai\\_fu/actividad.html](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/geometria/cuerpos/ombra_mai_fu/actividad.html)

Hipercubo

[http://recursostic.educacion.es/gauss/web/materiales\\_didacticos/eso/actividades/geometria/cuerpos/dimensiones\\_hipercubo/actividad.html](http://recursostic.educacion.es/gauss/web/materiales_didacticos/eso/actividades/geometria/cuerpos/dimensiones_hipercubo/actividad.html)

Heron

<http://geogebra.es/cvg/14/4.html>

• The GeoGebra applet "Lléname" (R. Losada), see

[http://recursostic.educacion.es/apls/informacion\\_didactica/4](http://recursostic.educacion.es/apls/informacion_didactica/4), has been used in an essential way at

- "El uso de applets en las matemáticas de la enseñanza secundaria", Tamara Díez Sainz, a Master Thesis at the Universidad de Cantabria, 2011.

- A Ph.D. thesis: María del Mar García-López "[Evolución de Actitudes y Competencias Matemáticas en Estudiantes de E Secundaria al Introducir GeoGebra en el Aula](#)", [English Summary](#), (2011). Ph.d. Thesis. Universidad de Almería, Spain.

- At the conference "Matemáticas jugando con agua", E. Gómez y R. Wolfson, U. Berkeley. Universidad de Cantabria, February 23, 2011. See

[http://www.matesco.unican.es/talleres\\_matematicas/talleres%20matematicas%20en%20accion2011.html](http://www.matesco.unican.es/talleres_matematicas/talleres%20matematicas%20en%20accion2011.html)

#### 4 Research and Collaboration

##### RESEARCH

- On Automatic Theorem Proving with GeoGebra:

- Research meeting at Santiago de Compostela (J. L. Valcarce, F. Botana, Z. Kovacs, T. Recio), February, 2011.

- Paper and a talk at the meeting ICCSA (The 11th International Conference on Computational Science and Its Applications, Santander, June 20-23, 2011): R. Losada, T. Recio, J. L. Valcarce: "Equal bisectors at a vertex of a triangle", B. Murgante et al. (Eds.): ICCSA 2011, Part IV, LNCS 6785, pp. 328341. Springer-Verlag, Berlin Heidelberg 2011.

- Paper and a talk at the meeting ICCSA (The 11th International Conference on Computational Science and Its Applications, Santander, June 20-23, 2011): M. A. Abánades, F. Botana, J. Escribano, J. L. Valcarce: "Using Free Open Source Software for Intelligent Geometric Computing", B. Murgante et al. (Eds.): ICCSA 2011, Part IV, LNCS 6785, pp. 353-367. Springer- Verlag Berlin Heidelberg 2011.

- Talk by Francisco Botana and Miguel A. Abanades: "An Automatic Deduction Environment for Dynamic Geometry Based on the Open Source Computer Algebra System Sage". 17th International Conferences on Applications of Computer Algebra (ACA 2011), Houston, Texas, USA, June 2011.

- Talk by Francisco Botana and Miguel A. Abanades: "Automatic Deduction in Dynamic Geometry using Sage". THedu'11, workshop in the 23rd International Conference on Automated Deduction (CADE 2011), Wrocław, Poland, July 2011.

- Talk by Francisco Botana: "A Symbolic Companion for Interactive Geometric Systems". CICM 2011, Conference on Intelligent Computer Mathematics, Bertinoro, Italy, July 2011

- Talk by Miguel A. Abanades and Francisco Botana: "An Automatic Deduction Environment for GeoGebra Based on the Open Source Computer Algebra System Sage". International GeoGebra Conference. August 29-31, 2011. Hagenberg.

- Talk by Miguel A. Abanades: "LocusEqu: a command to (symbolically) obtain the equation of a locus". International GeoGebra Conference. August 29-31, 2011. Hagenberg.

##### COLLABORATION WITH OTHER INSTITUTES:

- On going cooperation with the Universite Niamey (Niger) to develop curricular materials on GeoGebra. See: <http://geogebra.es/pub/niger.pdf>

- Participation of M. Abanades at the GeoGebra Institutes Working Group. International GeoGebra Conference. August 29-31, 2011. Hagenberg.

- Helping, along 2011, other colleagues settling a GeoGebra Institute. Case of --Geogebra Institute of Valencia (Spain)

[http://www.semcv.org/index.php?option=com\\_content&view=article&id=179&Itemid=92](http://www.semcv.org/index.php?option=com_content&view=article&id=179&Itemid=92)

- Geogebra Institute of Castilla-La Mancha (Spain)

- Geogebra Institute of Niamey (Niger), <http://ig-niger.refer.ne/>

--GeoGebra Institute of Lawrenceville (USA)

[http://wiki.geogebra.org/en/GeoGebra\\_Institute\\_of\\_Lawrenceville](http://wiki.geogebra.org/en/GeoGebra_Institute_of_Lawrenceville)

- Participation at the EGINET proposal (European Geogebra Institutes Network).

## 5 Outreach

### CONFERENCES

- "Fibonacci, Klein, Geogebra". Talk by T. Recio at the III Seminario Internacional de la ACG (Associació Catalana de GeoGebra), Barcelona, February 18-19, 2011. [http://acgeogebra.cat/joomla/index.php?option=com\\_content&view=article&id=44&Itemid=32](http://acgeogebra.cat/joomla/index.php?option=com_content&view=article&id=44&Itemid=32)

--- "Matemáticas en el diseño de azulejos". Talk by Mora, J.A. at the III Seminario Internacional de la ACG (Associació Catalana de GeoGebra), Barcelona, February 18-19, 2011. [http://acgeogebra.cat/seminaris/III\\_2\\_2011/josea\\_mora.zip](http://acgeogebra.cat/seminaris/III_2_2011/josea_mora.zip)

- "GeoGebra también en el estudio de la Probabilidad" plenary lectura by Manuel Sada at the "III Jornades de l'Associació Catalana de GeoGebra" (Barcelona, february 18-19) <http://prezi.com/xfdpqgwbb4rp/geogebra-tambien-para-el-estudio-de-la-probabilidad/>

- "Fibonacci, Klein, Geogebra". Talk by T. Recio at the II Seminario Internacional de la ACG (Associació Catalana de GeoGebra), Barcelona, February 18-19, 2011. [http://acgeogebra.cat/joomla/index.php?option=com\\_content&view=article&id=44&Itemid=32](http://acgeogebra.cat/joomla/index.php?option=com_content&view=article&id=44&Itemid=32)

- "Matemáticas 2.0". Talk by T. Recio at the II Simposioi-Test, Aranjuez (Madrid), April 6-7, 2011. See [http://dosi.itis.cesfelipesecondo.com/heol/doku.php?id=simposio\\_itest](http://dosi.itis.cesfelipesecondo.com/heol/doku.php?id=simposio_itest)

- "Geometría, Arte y Naturaleza". Talk by M. Fioravanti at the "Segundas Jornadas APRENCEOM" (CIEM, Castro-Urdiales, June 6-8, 2011). See <http://www.ciem.unican.es/node/836>

- "Devenir de la geometría dinámica". Talk by T. Recio at the "Segundas Jornadas APRENCEOM" (CIEM, Castro-Urdiales, June 6-8, 2011). See <http://www.ciem.unican.es/node/836>

-Talk by T. Recio at the Conference Real Algebraic Geometry, Rennes (France), June 20-24, 2011. See <http://perso.univ-rennes1.fr/ronan.quarez/rag2011/rag2011.html>

- "Deducción automática en geometría dinámica con Sage". Talk by M. Abanades and F. Botana at the "II Jornadas Sage/Python" (Universidad de La Rioja, Logroño, Spain, June 28-29, 2011). See <http://www.unirioja.es/dptos/dmc/sage2011/>

- "Está pasando, lo estás haciendo", plenary lecture by J. L. Alvarez and R. Losada at the 15 JAEM (Jornadas Aprendizaje y Enseñanza de las Matemáticas). Gijón (Asturias), July, 3, 2011. Circa 800 participants. See [http://www.15jaem.org/index.php?option=com\\_content&view=article&id=112&Itemid=96](http://www.15jaem.org/index.php?option=com_content&view=article&id=112&Itemid=96)

### OTHER DISSEMINATION ACTIVITIES

-Helping introducing GeoGebra in the catalogue of the Promoting Economical Useful and Maintained software (PLUME) project (France, CNRS, a library of free software for higher education and research) <http://www.projet-plume.org/> See: <http://www.projet-plume.org/fiche/geogebra>

- Helping disseminating two academic works dealing with GeoGebra:

Teresa Garcia-Mangas: "La Geometría Dinámica como herramienta didáctica para el dibujo", (2011). Master Thesis. Universidad de Cantabria, Spain. See: [http://geogebra.es/pub/TFM\\_tgm.pdf](http://geogebra.es/pub/TFM_tgm.pdf) and <http://geogebra.es/pub/Resumen%20def.pdf>

María del Mar García-López "Evolución de Actitudes y Competencias Matemáticas en Estudiantes de Ecdunaria al Introducir GeoGebra en el Aula", [English Summary](#), (2011). Ph.d. Thesis. Universidad de Almería, Spain.

- Inviting A. Stylianides to deliver a talk ("Exploring GeoGebra's potential role in reasoning-and-proving in geometry: issues of visualization, generalization, and proof") at the Klein Conference: "Elementary Geometry from an Advance Point of View", Aveiro (Portugal), September 1-3, 2011. See <http://c3.glocos.org/egapv2011/>

- Invited lecture "Software matemático libre" by Miguel Abanades in the Teacher Training Master Program at the Universidad Complutense de Madrid. October 26, 2011.

## 6 Publications

- M. A. Abánades, F. Botana, J. Escribano, J. L. Valcarce: "Using Free Open Source Software for Intelligent Geometric Computing", B. Murgante et al. (Eds.): ICCSA 2011, Part IV, Lecture Notes in Computer Science (LNCS) 6785, pp. 353-367. Springer- Verlag Berlin Heidelberg 2011.

- J.L. Álvarez, R. Losada: "Los applets de funciones en el Proyecto Gauss". Uno, núm 58, July 2011. Pp.25-37

- J.L. Álvarez, R. Losada: "El proyecto Gauss en la Escuela 2.0". Abre (RIATE), núm 2, Juny 2011. Pp. 21-25.  
[http://www.riate.org/version/v2/index.php?option=com\\_remository&Itemid=33&func=startdown&id=206&lang=es](http://www.riate.org/version/v2/index.php?option=com_remository&Itemid=33&func=startdown&id=206&lang=es)

- J.M. Arranz, R. Losada, J.A. Mora, M. Sada. "Realidades de GeoGebra". Suma núm 67. FESPM Junio 2011. Pp. 7-20

- J.M. Arranz, R. Losada, J.A. Mora, T. Recio, M. Sada: "Modeling the cube using GeoGebra". In L. Bu & R. Schoen (Eds.), Model-Centered Learning: Pathways to mathematical understanding using GeoGebra (pp. 119-131). Rotterdam: Sense Publishers. 2011.

- F. Botana and M. A. Abanades: "An Automatic Deduction Environment for Dynamic Geometry Based on the Open Source Computer Algebra System Sage". Submitted. (post-proceedings 17th International Conferences on Applications of Computer Algebra (ACA 2011), Houston, Texas, USA, June 2011)

- F. Botana and M. A. Abanades: "Automatic Deduction in Dynamic Geometry using Sage". Submitted. (post-proceedings THedu'11, workshop in the 23rd International Conference on Automated Deduction (CADE 2011), Wrocław, Poland, July 2011)

- R. Losada, T. Recio: "Descubrimiento Automático en un problema Centenario". Gaceta de la Real Sociedad Matemática Española, Vol. 14 (2011), No. 4, Pp. 693-702

- R. Losada, T. Recio, J. L. Valcarce: "Equal bisectors at a vertex of a triangle", B. Murgante et al. (Eds.): ICCSA 2011, Part IV, Lecture Notes in Computer Science (LNCS) 6785, pp. 328341. Springer-Verlag. Berlin Heidelberg 2011.

- F. Maíz: "Sequences in GeoGebra ", The International Journal "GeoGebra The New Language For The Third Millennium" [Vol.2 No.1 GGIJRO](#) (GeoGebra International Journal of Romania). ISSN: 2247-7241 (e-Journal). ISSN: 2068-3227 (Printed journal). May, 2011.

-M. Sada: "Los applets para la enseñanza de la estadística y probabilidad". Uno, núm 58, July 2011. Pp.38-48

-S. Pana and E. Seoane: "With set squares" The International Journal "GeoGebra The New Language For The Third Millennium" [Vol.2 No.1 GGIJRO](#) (GeoGebra International Journal of Romania). ISSN: 2247-7241 (e-Journal). ISSN: 2068-3227 (Printed journal). May, 2011.