

Aprendizaje cooperativo: panorama de las investigaciones científicas publicadas en Sciencedirect en el período 1965-2017

Cooperative learning: overview of scientific research published in Sciencedirect in the period 1965-2017

Idevis Lores-Leyva*

Félix Díaz-Pompa**

Onaida Calzadilla-González**

*Universidad de Guantánamo, Cuba.

**Universidad de Holguín, Cuba

ORCID: <https://orcid.org/0000-0001-9261-8040>

<https://orcid.org/0000-0002-2666-1849>

<https://orcid.org/0000-0003-1655-3921>

Correo(s) electrónico(s):

idevisll@cug.co.cu

felixdp1978@gmail.com

onaida@gmail.com

Recibido: 05/04/2019

Aceptado: 20/10/2019

Resumen: El presente estudio analiza la producción científica encontrada en Sciencedirect (Scopus) relacionada con el aprendizaje cooperativo en el periodo 1965 a 2017. Estudio exploratorio-descriptivo donde se tuvo en cuenta indicadores bibliométricos. Se registraron 1 057 publicaciones, existiendo un crecimiento en los últimos años. Se identificó variabilidad en la producción científica por años, el 2013 y 2015 son los de mayor productividad. Dieron cobertura 277 revistas a la visibilidad de esta temática, se muestra el mapa de descriptores más abordados en las investigaciones publicadas. La producción científica no se logra consolidar a partir del nivel de productividad de autores.

Palabras clave: Bibliometría; Producción científica; Scopus; Sciencedirect; Aprendizaje cooperativo.

Abstract: This study analyzes the scientific production found in Sciencedirect (Scopus) related to cooperative learning in the period 1965 to 2017. An exploratory-descriptive study where bibliometric indicators were taken into account. 1 057 publications were registered, with growth in recent years. Variability in scientific production was identified for years, 2013 and 2015 are the ones with the highest productivity. 277 journals covered the visibility of this topic, the map of descriptors most approached in published research is shown. Scientific production cannot be consolidated based on the level of productivity of authors.

Keywords: Bibliometrics; Scientific production; Scopus; Sciencedirect; Cooperative learning

Introduction

Cooperative learning emerges as an important area of international social science research Slavin (2014), Johnson and Johnson, (2014). It is considered a valuable tool to foster

learning in today's academic institutions, Johnson & Johnson (2016); García-Almeida & Cabrera-Nuez (2018).

Cooperative learning according to Gillies (2014), Erbil (2020) is recognized as a pedagogical practice that promotes learning and socialization among students. Studies conducted at different educational levels employ different cooperative learning techniques, Slavin (2014). This proposal is uniquely attractive for experimentation in the classroom, and aims not only to achieve significant disciplinary learning, but also to develop social skills that are required today at all educational levels. Gillies (2014) and Serrano and Pons (2014). From this perspective, with the implementation of cooperative learning, it is a matter of overcoming certain "gaps" generated by the exclusive application of traditional learning techniques. According to Shawver (2020), at all educational levels where students work in cooperative situations, academic, social and psychological results are better.

With the implementation of cooperative learning, the aim is to achieve (Johnson & Johnson, 2016; Bermejo Díaz, Pulido Salas, Galmes-Panades, Serra Payeras, Vidal Conti and Ponseti Verdaguer, 2021) five essential elements: positive interdependence, face-to-face interaction, individual responsibility, social skills and autonomous group processing.

In this sense, García Cabrera, González López and Mérida Serrano (2012) refer that the cooperative methodology contributes to:

- (1) Increase the level of achievement of students, considered in a wide range of age and in cooperative activities of different nature;
- (2) Improve the intrinsic motivation towards learning;
- (3) Create a positive attitude towards learning;
- (4) Correlate positively with high levels of self-esteem;
- (5) To make students responsible for their involvement in learning;
- (6) To improve group cohesion and value differences as positive elements of heterogeneous groups;
- (7) To facilitate the integration of students with special educational needs;
- (8) To reduce aggressive behavior by facilitating democratic mechanisms of action.

The elements addressed so far, allow us to appreciate the importance of the implementation of cooperative learning for the achievement of meaningful learning and development of

social skills at different educational levels. However, it is considered necessary to research how these scientific results transcend the limits of the researcher and are available to the scientific community.

Through the scientific publications according to López-Torres, Basora, Orozco and Bellón (2014) the results of the research transcend the limits of the author himself and can be shared by the scientific community. The purpose of the research is to contribute to the advancement of knowledge, in this sense, the publication is an essential phase of this since it allows the dissemination of new knowledge and contributes decisively to scientific progress.

According to De Moya et al. (2010) scientific activity can be measured by analyzing the number of publications (productivity) and the frequency with which these works are cited (visibility). In this sense, bibliometric indicators favor the analysis of scientific production not only in a quantitative way, but also in a qualitative way, that is, the repercussion that this production has.

In this regard, Buela-Casal (2010) suggests that with the implementation of bibliometric indicators, all aspects related to the evaluation of scientific production and productivity are planned and put into practice. The information obtained serves to accurately characterize the state of development of research and, consequently, contribute to decision-making on science policy, Cunningham (1997).

Bibliometrics, today is developed as an essential methodology in the evaluation of scientific production and all phenomena that have to do with the communication of science. It constitutes a fundamental instrument to build and know the present and history of research. However, the existing studies in several branches of knowledge are limited, according to González Sala, and Osca Lluç. (2016), after medicine, psychology is the science that most uses this study methodology.

In this sense, the educational context requires bibliometric revisions, which allow the evaluation of the state of scientific production in the different fields of research, so that the different lines of research are consolidated and contribute to the opening of new scientific searches.

El presente trabajo tiene como objetivo analizar la producción científica que versa sobre el aprendizaje cooperativo durante el período 1965-2017 recopilada en Sciencedirect (Scopus). The units of study were the original scientific articles directly related to cooperative learning, indexed in the Scopus Sciencedirect mainframe database.

Based on determining the source of information for the identification of the original articles, a generic search strategy is carried out in order to recover the greatest possible number of published references during the study period. The key words in Spanish and English were selected: "cooperative learning" and "cooperative learning" and the search is carried out where they appear in the TITLE, KEYWORDS and ABSTRACT.

With the help of the Endnote X7 bibliographic manager, the process of standardizing the results obtained from the search is carried out, duplicates are eliminated and special characters are rectified. They are exported for data processing with the help of Bibexcel version 2016-02-20 and with Excel 2010 the descriptive analysis of the variables was performed. In addition, VOSviewer 1.6.8 was used to generate the maps of author and keyword concurrence.

Finally, the analysis of the Bibliometric study was based on each productive level according to indicators of author productivity, productivity of articles per journal, author collaboration per journal, language ability, productivity of articles per year, thematic categories and author collaboration in order to know the characteristics and evolution of cooperative learning in the period analyzed.

Development

The main results from the indicators that were taken into account for the development of this study are the following:

Time evolution of productivity

A total of 1 057 articles were analyzed, during the period studied. The first work on this subject dates from 1965 and its author is Edward J. O'Connell, with the work "The effect of cooperative and competitive set on the learning of imitation and nonimitation". The graph shows a discreet growth in the number of publications during the 19th century and an increase in the present millennium. The period from 1965-1980 is the period of least

productivity and the years 2013 and 2015 the most productive with 84 papers each (See figure 1).

The average number of papers published from 1965 to 2017 is 24 original articles with 26.5 standard deviation. The trend analysis shows an increase in the number of publications. The forecast for 2021 (with a 75.8% regression coefficient) is approximately 84 original articles on the subject in question.

Figure 1: Evolution of Cooperative Learning Publications

Source: Self elaborated

Productivity and language

In relation to the most representative language in scientific publications, it could be observed that of the 1 057 articles recovered only 4 languages are presented, standing out English with the majority of the publications with a total of 1 052 (99%) (See figure 2), followed by Spanish represented by 1% with a total of 12 publications. To lesser extend Portuguese and French appear.

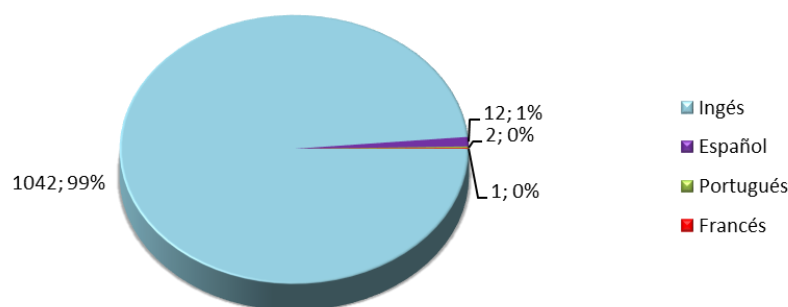


Figure 2: Distribution of publications by language

Source: Self elaborated

Productivity per magazine

The scientific production on the subject of study registered in Scienedirect according to the period studied was distributed in 277 journals. Eleven (11) journals are the most representative, with more published works, firstly, the Computers & Education Journal with 211 original articles published, followed by the Procedia - Social and Behavioral Sciences journal with 125 and Expert Systems with Applications with 28, then 5 journals between 20 and 26 published articles and three journals between 17 and 19 published works (See figure 3).

Figure 3: Scientific production by journals

Source: Self elaborated

Of the number of magazines (277), eleven (magazines), which represent 3.97% of the total, concentrate 50% of the total number of publications. The journal Computers & Education reaches 19.96% of the total publications collected (See table 1), followed by the journal Procedia - Social and Behavioral Sciences with 11.83%. The rest of the journals oscillate between 1.6 and 2.6%.

Magazines	N publications	% meaningful	% cumulative
Computers & Education	211	19,96	19,96
Procedia - Social and Behavioral Sciences	125	11,83	31,79
Expert Systems with Applications	28	2,64	34,43
IFAC Proceedings Volumes	26	2,46	36,90
Neurocomputing	26	2,46	39,36
International Journal of Educational Research	25	2,37	41,72
Contemporary Educational Psychology	22	2,08	43,80
Computers in Human Behavior	22	2,08	45,88
Applied Soft Computing	19	1,80	47,68
Learning and Instruction	17	1,61	49,29
Teaching and Teacher Education	17	1,61	50,89
266 magazines	519	49.10	49,11

Total	1057	100	100
-------	------	-----	-----

Table 1: List of journals that publish 50% of the papers on cooperative learning

Source: Self elaboration

Level of up-to-date bibliographic references

As for the level of updating in this area of knowledge, it is evident that the documents are replaced by others with newer information. From the calculation of Price's index, it can be seen that 0.44 of the bibliography is from the last few years.

Productivity per author

Table 2 shows the nine (9) most prolix authors of the total (of the 3 033 authors when processed by frequency of publications a total of 491 different authors are registered). Robyn M. Gillies, with 10 works, is the researcher with the most works published in this database, followed by Donald F Dansereau with nine (9), David W. Johnson and Roger T. Johnson both with eight (8) works, the rest (5 authors) publishes between six (6) and five (5) works.

Authors	Number of signed articles
Gillies, Robyn M.	10
Dansereau, Donald F.	9
Johnson, David W.	8
Johnson, Roger T.	8
Dimitriadis, Yannis	6
Asensio-Pérez, Juan I.	5
Lopez-Guede, Jose Manuel	5
O'Donnell, Angela	5
Rocklin, Thomas R.	5

Table 2: Neatest authors

Source: Self elaboration

Distribution of the number of authors per manuscript

As for the distribution of the number of authors per manuscript, the 1 057 articles are signed by a total of 3 033 authors. With a range of 21, the dispersion of the number of authors per manuscript is evident. The original articles signed by two authors have the highest average with 29.04%. Manuscripts signed by one and two authors concentrate 50% (See Table 3).

Number of authors per manuscript	Number of articles	% meneanful
----------------------------------	--------------------	-------------

1	221	20,90
2	307	29,04
3	247	23,36
4	141	13,34
5	73	6,91
6	30	2,84
7	15	1,42
8	8	0,76
9	4	0,38
10	4	0,38
11	2	0,19
12	1	0,09
13	1	0,09
16	1	0,09
18	1	0,09
22	1	0,09
Total	1 057	100

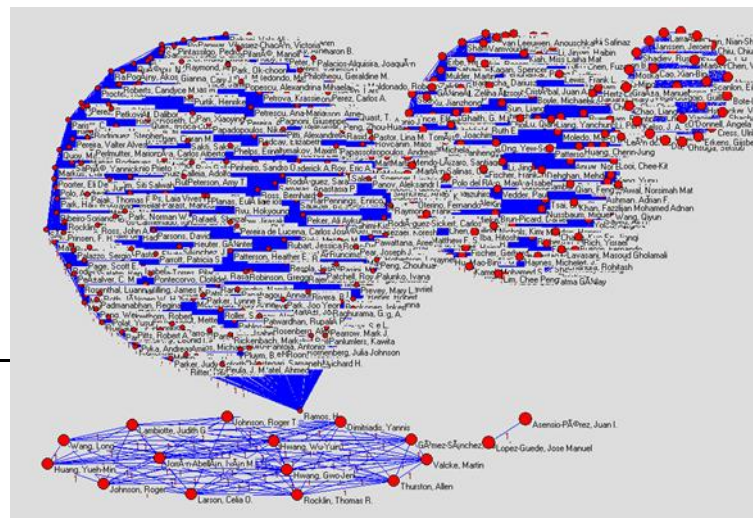
Table 3: Classification according to number of authors per manuscript

Source:Self elaboration

Social analysis of authorial partnership

The map with the social analysis of authorial partnership, from the 3 033 signatures shows the formation of five clusters (See figure 4). The clusters with the highest concentration are the authors of one and two publications.

The total number of signatures included in the articles is 3033, which means that the



average number of signatures involved in the articles (collaboration index) is 2.86

Figure 4: Collaborative network

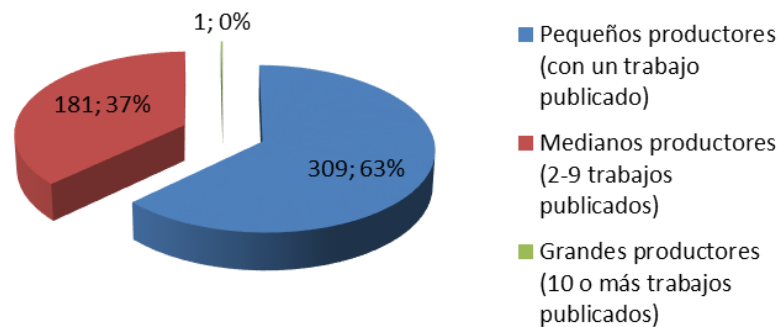
Source: Self elaboration

Author Distribution by Productivity Level

As for the distribution of authors according to the level of productivity (small, medium and large producers). Of the 491 authors, 62.93% (309) of the total number of authors belong to the group of small-scale producers (see Figure 5), while 36.87% (181) are medium-scale producers.

Figure 5: Level of productivity of authors

Source: Self elaboration



Main productivity lines

Of the 1,057 articles analyzed, a total of 2,558 keywords were extracted. The concurrency analysis performed with VOSviewer on two keywords allowed finding 348 concurrences. Figure 6 shows the relationship between the key descriptors and the formation of 18 clusters where a greater number of researches are concentrated.

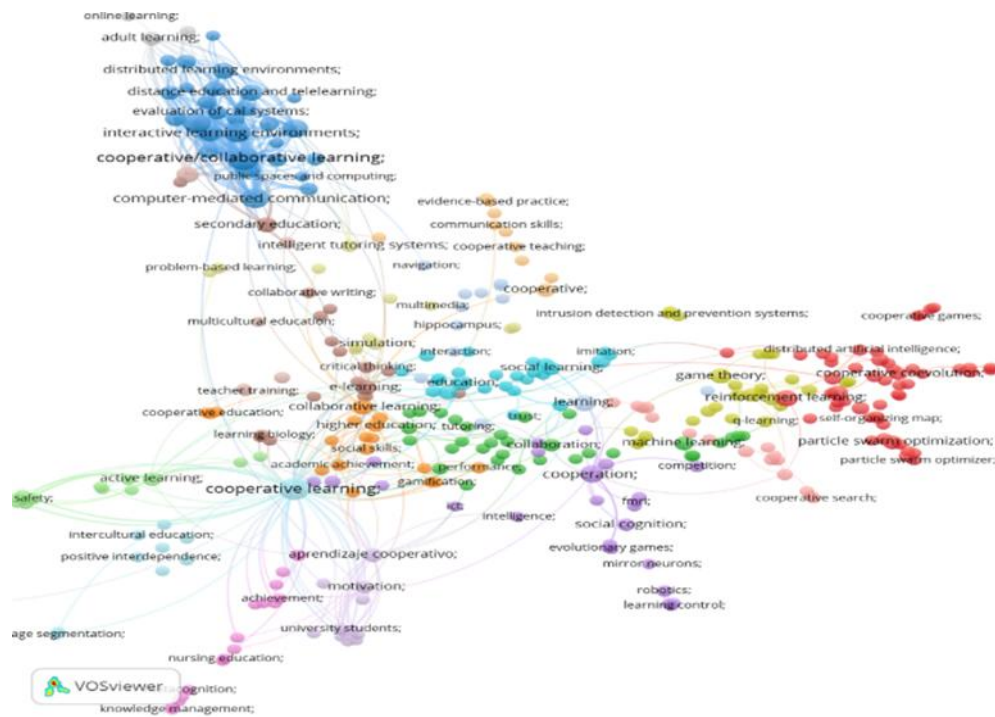


Figure 6: Keywords concurrency map

Source: Self elaboration

With the help of the same program the 348 descriptors were classified and ordered obtaining among these the 10 most frequent key words shown in table 4. First, the descriptor "cooperative/collaborative learning" appears, followed by "teaching learning strategies" and cooperative learning. In this same order are the descriptors that are closely related to the development of cooperative/collaborative learning with the use of computer and communication technologies as mediators in the teaching-learning process. It also highlights two levels of teaching that so far constitute the fundamental scenarios for the

implementation and generalization of cooperative learning, the elementary level and distance education.

Keywords	Concurrency	Strength of the links
Cooperative/collaborative learning	194	603
Teaching/learning strategies	70	246
Cooperative Learning	134	235
Computer-mediated communication	69	233
Interactive learning environments	70	228
Improving classroom instruction	47	160
Learning Communities	47	157
Teaching decisions	33	120
Distance education and telelearning	24	84
Basic Education	23	75

Table 4: Most Concurrent Keywords

Source:Self elaboration

Conclusions

Based on the bibliometric analysis of the scientific production on cooperative learning indexed in Sciencedirect (Scopus) in the period 1965 - 2017, it is shown that there is a significant number of articles available and at the service of researchers. The trend analysis shows an increase in the number of publications and for 2021 it is predicted the publication of approximately 84 manuscripts. The pioneering work found in this database is in the name of the researcher Edward J., O'Connell published in 1965.

Regarding language productivity, as occurs in studies by Corrales-Reyes, Fornaris-Cedeño and Reyes-Pérez (2017); González Sala & Osca Lluch (2016), the works indexed in Scopus are entirely limited to the Anglo-Saxon sphere, with a poor representation of publications in other languages. We have avoided quality works from other parts of the world.

Cooperative learning is a subject of interest in a considerable number of journals, 277 of which cover the work of researchers related to this subject. It is a strength that the topic has the attention of a wide representation of journals so that they contribute to consolidate the scientific production. On the other hand, eleven journals concentrate 50% of the published manuscripts where the journal *Computers & Education* publishes 20% of the total published articles.

In terms of productivity per author, five (5) researchers lead the ranking. Although there is dispersion in the number of signing authors per article, 50% are concentrated in articles signed by one and two authors. It is evident an unequal distribution of the productivity, most of the authors publish few works, while a minority publishes most of the relevant works on the topic in question, conforming the most prolific group.

The degree of actuality of the publications is 0.44 which shows that the subject is of interest of a considerable number of researchers for the different levels of teaching, around 50% of the published manuscripts belong to the last 5 years, constituting a current and useful subject of the scientific community.

The analysis of the thematic descriptors registers a number of publications with greater frequency in the thematic production referring to the cooperative/collaborative learning, the relation between both models is due to the fact that in some cases it is seen in diverse educational scenarios with the same sense, as a synonym of the work of groups. However, Panitz (1999) states that both models are not inclusive, but complementary according to the type of problem to be solved. Cooperative learning, to which a significant number of descriptors are associated, which are fundamentally directed to the search for teaching and learning strategies, the use of information and communication technologies (ICTs), and the environment of learning interactions, forms the other nucleus. The physical space the classroom and the teaching process, communication, among others.

Cooperative learning constitutes a source of inquiry with opportunity for the development of new research, which is essential as a support for decision-making in the educational context with the aim of improving the quality of the teaching-learning process at different educational levels, where solid evidence to support it is often lacking. Cooperative learning, offers a different perspective of conception of the teaching-learning process for the integral

formation of the students, in this sense, more research is needed, and awareness of its importance, because it constitutes a challenge that demands time, and it should begin with the scientific community itself, and in particular with the leaders and scientific research groups.

Bibliographic references

- Bermejo Díaz, J. M., Pulido Salas, D., Galmes-Panades, A. M., Serra Payeras, P., Vidal Conti, J., & Ponseti Verdaguer, F. J. (2021). Educación física y universidad: Evaluación de una experiencia docente a través del aprendizaje cooperativo. *Retos*, 39, 90-97.
- Buela-Casal, G. (2010). Scientific Journal Impact Indexes and Indicators for Measuring Researchers' Performance Índices de impacto de las revistas científicas e indicadores para medir el rendimiento de los investigadores. *Revista de Psicodidáctica*, 15(1). Retrieved from <https://ojs.ehu.eus/index.php/psicodidactica/article/view/731>
- Corrales-Reyes, I. E., Fornaris-Cedeño, Y., & Reyes-Pérez, J. J. (2017). Análisis bibliométrico de la revista investigación en educación médica. Período 2012-2016. *Investigación En Educación Médica*. doi:10.1016/j.riem.2017.02.003
- Cunningham, P. (1997). The evaluation of European programmes and the future of scientometrics. *Scientometrics*, 38(1), 71–85. doi:10.1007/bf02461124
- De Moya, F., Chinchilla, Z., Benavent-Pérez, M., Corera-Álvarez, E., González-Molina, A., & Vargas-Quesada, B. (2010). *Indicadores bibliométricos de la actividad científica española*. Madrid: Fecyt.
- Erbil, D. G. (2020). A Review of Flipped Classroom and Cooperative Learning Method Within the Context of Vygotsky Theory. *Frontiers in Psychology*, 11. doi:10.3389/fpsyg.2020.01157
- García Cabrera, M. del M., González López, I., & Mérida Serrano, R. (2011). Validación del cuestionario de evaluación ACOES. Análisis del trabajo cooperativo en educación superior. *Revista de Investigación Educativa*, 30(1), 87-109. doi:10.6018/rie.30.1.114091

- García-Almeida, D. J., & Cabrera-Nuez, M. T. (2018). The influence of knowledge recipients' proactivity on knowledge construction in cooperative learning experiences. *Active Learning in Higher Education*, 21(1), 79–92. doi:10.1177/1469787418754569
- Gillies, R. M. (2014). Developments in Cooperative Learning: Review of Research [Desarrollos en aprendizaje cooperativo: revisión de la investigación]. *Anales de Psicología*, 30(3), 792-801. doi:10.6018/analesps.30.3.201191
- González Sala, F., & Osca Lluch, J. (2016). Análisis de las publicaciones españolas en la categoría Psychology Educational de la Web of Science durante el periodo 2004-2013. *Aula Abierta*, 44(1), 46–54. doi:10.1016/j.aula.2015.07.001
- Johnson, D. W., & Johnson, R. (2016). Cooperative learning and teaching citizenship in democracies. *International Journal of Educational Research*, 76, 162–177. doi:10.1016/j.ijer.2015.11.009
- López-Torres Hidalgo, J., Basora Gallisà, J., Orozco Beltrán, D., & Bellón Saameño, J. Á. (2014). Mapa bibliométrico de la investigación realizada en atención primaria en España durante el periodo 2008-2012. *Atención Primaria*, 46(10), 541–548. doi:10.1016/j.aprim.2014.02.007
- Panitz, T. (1999). Collaborative versus cooperative learning- a comparison of the two concepts which will help us understand the underlying nature of interactive learning. Retrieved from May 26, 2013, <http://home.capecod.net/~tpanitz/tedsarticles/coopdefinition.htm>
- Serrano, J.-M., & Pons, R.-M. (2014). Introduction: Cooperative Learning [Introducción: aprendizaje cooperativo]. *Anales de Psicología*, 30(3), 801-804. doi:10.6018/analesps.30.3.201251
- Shawver, T. J. (2020). An experimental study of cooperative learning in advanced financial accounting courses. *Accounting Education*, 29(3), 247–262. doi:10.1080/09639284.2020.1736589
- Slavin, R. E. (2014). Cooperative Learning and Academic Achievement: Why Does Groupwork Work? Aprendizaje cooperativo y rendimiento académico: ¿por qué

funciona el trabajo en grupo?. *Anales de Psicología*, 30(3), 785-791.
doi:10.6018/analesps.30.3.201201