



Bibliometric characteristics of articles on key competences indexed in ERIC from 1990 to 2013

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Article**Bibliometric characteristics of articles on key competences indexed in ERIC from 1990 to 2013****Abstract**

This paper analyses the bibliometric characteristics of 616 journal articles on key competences indexed in ERIC in a 23 year-period following documentary analysis. This observation method allowed us to highlight key elements like the population, educational level, topics, etc. to focus whether this literature contributes towards implementing competence-based education. The findings of key competence-based articles confirm that competence discourse in education has become a highly-rate topic of debate from 1999 to 2013. In the two last decades, there has been a gradual increase in articles based on research combined with a decline in articles of a descriptive nature. The main contributions of articles on competency-based education are significantly in line with topics related to reflection on competence discourse and education policies that should be implemented. There is still a clear need for publications which provide examples and empirical evidence aimed at developing basic competences.

Keywords: key competences, competence-based education, competence-based curricula

Introduction

Competency-based education is one of the issues which currently most occupies and concerns European educational systems and organisations. It is a relatively new epistemological discourse which goes beyond simple curricular reform or innovation in teaching and learning (Aguerrondo, 2009; Delors, 1996; & Michael Halász., 2011; Moon, 2007; OECD 1994, OECD 1999 2005; Rychen & Salganik, 2001; Tedesco, Operti, & Amadio, 2013).

One indicator of the impact of this discourse on education has been the huge number and variety of resources published over the last decade. Given this overwhelming body of evidence, the authors of this paper consider it necessary to determine to what extent this literature contributes towards actually implementing competence-based education in the classroom and, by extension, enables the achievement of strategic objectives promulgated by institutions and European educational organizations. With this in mind, we consider it essential to highlight the main aspects that characterize bibliographic resources on key competences published to date, and to determine how appropriate and transferable these contributions are.

We believe that our approach to this study is warranted in the face of the widespread proliferation both of terminology and of existing resources on the subject of competences. Our study aims to contribute to the discussion on the urgent need to build a solid theoretical framework for competence-based education, given evidence that it does not yet have a clear epistemological and practical body of reference to guide practitioners who have to implement and evaluate it in classrooms.

Competency-based education within the framework of the European Union

In March 2000, the Lisbon European Council (European Commission, 2006) proposed that the European Union should be the world's most competitive knowledge economy. To achieve this strategic objective, it stipulated that education and training systems should adapt to the demands of the knowledge society, and improve the level and quality of work. For this reason, one of the main action points focused on the development of European citizens' key competences.

This decision required a commitment to the notion of competence - or the skills essential for full participation in society - as central to the processes of teaching and learning. From an epistemological point of view, the origin of this construct is broad and diverse. However, thanks to new trends in international assessment processes, such as, for instance, the Programme for International Student Assessment (PISA), the concept of competence transcends these contexts to become the core of the educational framework (Tiana, 2011). As a result, key competences are now considered to be the object of basic compulsory education. Learning objectives are no longer the exclusive domain of the skills associated with an academic discipline. Now, the challenge is to develop individuals' abilities to deal with problems and complex demands, mobilizing psychosocial resources, knowledge, skills and attitudes previously acquired in learning situations similar to the contexts which they will come

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6 across in their daily, professional or academic lives (Tiana, Moya, & Luengo,
7 2011).

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9 As a result of these developments, the Council of Europe considered it
10 necessary to identify and define those competences which once integrated into
11 the curricula of European educational systems, would best contribute to
12 students leading successful lives. In the first instance, this aim was addressed
13 via the DeSeCo project (OECD, 2005). This initiative, besides contributing to
14 the dissemination of the concept of key competences, represented a step
15 forward in establishing a set of key competences as the key of basic education
16 (Tiana, 2011).

17 Drawing on developments arising from the DeSeCo project, the European
18 Parliament approved recommendation 2006/962 / EC in which, after expert
19 involvement through a so-called Open Method of Cooperation, eight key
20 competences were defined, and a framework for further implementation and
21 development outlined (European Commission, 2006). The eight key
22 competences are:

- 23
- 24 • Communication in the mother tongue
- 25 • Communication in a foreign language
- 26 • Mathematical competence and basic competences in science and
27 technology
- 28 • Digital competence
- 29 • Learning to learn
- 30 • Social and civic competence
- 31 • Sense of initiative and entrepreneurship
- 32 • Cultural awareness and expression.
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34 Competence-based education implied curriculum change, but above all, it
35 represented a new way of thinking about education. There was also at that time
36 a political and ideological dimension that was evident in the definition of criteria
37 for selecting and implementing competence development in schools
38 (Perrenoud, 1999; Morin, 1999).

39 The result of this whole process came down to two broad approaches: an
40 educational approach based on fundamental skill development and learning for
41 life, and a highly professional approach based on drawing on established
42 standards from the world of work (Climent, 2010). Evidence suggests that the
43 balance is tilting towards the professional approach. In other words, the
44 specification of educational curricula and learning outcomes are adjusting to
45 criteria dictated by economic globalization and market needs. However, we
46 should not lose sight of the fact that competency-based education also involves
47 addressing educational theories aimed at combating social exclusion (Include-
48 ed consortium, 2009; Kraft, 1999; Resnick, 1987; U.S. Department of
49 Education, 2013) in order to prepare people for the challenges of the digital age.
50 There is, in a sense, a tendency towards promoting lifelong learning, and a
51 need for people to be capable of critically analysing and dealing with any type of
52 problem or social injustice (Halász & Michel. 2011, p. 290).

53 54 **The problem of implementing competence-based education**

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6 On the basis of recommendations made by the Council of Europe regarding the
7 need to promote the acquisition of key competences, all member states have
8 adopted measures for curricular implementation. Currently there are numerous
9 studies and reports whose main objective is to analyse the means and impact of
10 policies and strategies developed to this end (Dąbrowski & Wiśniewski, 2011;
11 Dobber et al, 2013; European Commission / EACEA / Eurydice, 2012; European
12 Union, 2013; Gordon et al, 2009; Halász & Michel, 2011; IBE-UNESCO, 2007;
13 Krause, 2010; Moon, 2007; OECD, 2013; Pepper, 2011; Solzbacher, 2006;
14 Tawil & Cougoureux, 2013; Tiana et al, 2011; Urban, Vandembroeck, Van
15 Laere, Lazzari, & Peeters, 2012).

16
17 Irrespective of whether these studies affect all, or only some of the eight
18 competences strategically selected and defined in the Council of Europe
19 recommendations, the main conclusion is that implementation and evaluation of
20 key competences is occurring unevenly across European Union member states.

21 While the framework for implementation states that curricular integration of key
22 competences should be carried out in a balanced way, it also appears that this
23 process only focuses on those skills related to academic disciplines likely to be
24 assessed by certifying organisations. Transversal competences which are not
25 specifically assigned to any academic discipline are barely dealt with at all
26 (Educational Centre for Research and Innovation, 2008; European Commission
27 / EACEA / Eurydice, 2012). Ambròs (2014) provides a clear example of the
28 development of Audiovisual Competence, by incorporating it into the Catalan
29 educational programme because of the lack of a subject to address this
30 competence.

31
32 According to Halász & Michel (2011), some of the factors that might explain the
33 reasons for this imbalance are the following: the proliferation of terminology and
34 the diversity of theoretical perspectives that are used to define the concept of
35 competence; social and cultural characteristics of countries or regions designing
36 new curricula; the relationships between commitments made by states,
37 educational policies and their implementation at grass-roots level; and the
38 existence and accessibility of referents and resources that enable the
39 development and assessment of key competences in the classroom. In this
40 respect, although there is still a strong focus on traditional academic discipline
41 curricula, institutions and education professionals have at their disposal a
42 number of recommendations, materials and reports to try to reverse this trend
43 (Council of The European Union, 2010; European Commission, 2012; European
44 Union, 2013; Krause, 2010; OECD, 1999).

45
46 Nonetheless, policy and curriculum innovation, as well as a proliferation of
47 resources do not necessarily ensure a transformation in the discourse
48 surrounding competences or lead to effective and tangible action. The biggest
49 challenge facing those responsible for the implementation of competence-based
50 education is to change the thinking and practice of teachers in the classroom
51 (Halász & Michel., 2011). Some of the obstacles to overcome relate to
52 academic traditions of basic education and teacher training, or the pressures of
53 state educational institutions to achieve optimal results in international rankings.
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6 This article explores the impact of another possible factor: the contribution of
7 resources published on this subject. In particular, this study focuses on
8 identifying and describing the bibliometric characteristics of articles on key
9 competences indexed in ERIC from 1990 to 2013.

10 11 **Method**

12 To address this objective, we opted for descriptive analysis as a research
13 method. This method allowed us to analyse the content of bibliographical
14 sources selected and highlight his key elements.

15 16 **Population and sample**

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18 On the basis of a search for resources indexed in the Educational Resources
19 Information Center (ERIC) database, we established a population composed by
20 2,016 references published from 1990 to 2013. This database, sponsored by the
21 United States Department of Education is considered one of the most wide-
22 ranging reference sources in the field of in education. To date, it contains over
23 one million records obtained from a variety of sources: books, academic papers,
24 government documents, theses, teaching materials and journal articles.

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26 Secondly, we used the keyword "key competence" and the option search "peer
27 reviewed" to select just a sample of journal articles. This decision was made for
28 the following reasons: a) we were dealing with resources considered by the
29 scientific community as highly-regarded rigorous studies; b) due to their
30 relatively uniform format, it was easy to analyse and compare resources,
31 regardless of the journal in which they were published; c) ERIC provides a
32 considerable and up-to-date volume of bibliographic resources while also
33 providing good advanced search and retrieve functions.

34
35 As illustrated in Table 1, we had a sample of 616 articles. Allowing for a 5%
36 margin of error and a 95% confidence interval, the minimum number of items
37 required would be 323. Consequently, we concluded that our sample was more
38 than adequately representative.

39 **Insert Table 1 about here**

40 41 **Data Analysis**

42
43 As shown in Table 2, data analysis was carried out using a variety of descriptive
44 and inferential statistical tests.

45
46 Descriptive analyses consisted of studying frequency distributions and
47 percentages, and applying Coefficients of Variation (CV) of the results obtained
48 according to the number and type of journal articles published resulting from the
49 search term 'key competences'. Other variables we took into account were:
50 period (1990 to 2013), kind of articles, level (infant, primary, secondary and
51 university) and topic.

52
53 With regard to inferential statistical tests, we applied the chi-square (χ^2) test to
54 determine whether the number of published articles was conditioned by the
55 publication period or the educational level of reference. We used the Pearson
56 correlation coefficient to determine the degree of relationship between the
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6 articles published during the most prolific periods. Finally, we performed a
7 Student-t test to compare Fisher samples in order to classify the number of
8 articles published according to reference topic and to verify the predominance
9 of publications by specific topics.

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11 **Insert Table 2 about here**

12 **Results**

13
14 In this section, we first present the findings of our basic bibliometric analysis of
15 key competence-based articles. We then examine the educational context and
16 topics of these articles.

17 ***Basic bibliometrics of competence-based articles***

18
19 First, we should emphasize that the total number of articles indexed in ERIC
20 since the 1990s is considerable. Our search for the phrase 'key competences'
21 produced 616 results¹. As we can see in Figure 1, more than half these items
22 (329) were published from the year 2000 onwards.

23
24 However, we should clarify that, although at the time the search was conducted,
25 not even five years of the current decade had passed, the number of articles
26 published at that point (270) was almost equivalent to the number of articles
27 published between 2000 and 2009. We were curious to know whether there
28 was a significant relationship between the articles published in both periods. By
29 calculating the Pearson correlation coefficient ($r = .960$; 4df, $P < .01$), not only
30 did we confirm this relationship among the number of journal articles published
31 in a particular period of time, but we also found grounds to assert that the
32 number of articles published in both periods was relevant. In other words, it was
33 confirmed that the key competences were a very important topic for the
34 educational system.

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36 It is therefore highly likely that the number of articles published in this decade
37 will be significantly higher than previous ones. If this trend is confirmed in future
38 studies, there will be clear evidence to conclude categorically that the discourse
39 of competence education has been a key topic in the field of education for the
40 past 20 years.

41
42 We see that ERIC presents four types of articles on competences: research,
43 descriptive, evaluative and opinion. The first set of bars in Figure 1 represents
44 the total number of published articles. We will explain type of article in detail.

45 a) articles based on research projects; b) descriptive articles that review existing
46 literature on key competences; c) articles based on internal or external
47 evaluation reports focusing on the implementation process of key competence
48 programmes; d) opinion and promotion articles. As can be seen in Figure 1,
49 research and descriptive articles account for most of the articles published from
50 2000 to the present. Although in each decade studied research articles are the
51 most common, together with descriptive articles they have consistently
52 outnumbered evaluation and opinion articles. However, in the present decade,
53 there seems to have been a certain turning point with regard to evaluation
54 articles, which are now practically on a par with descriptive ones. Whatever the
55 case, this new trend should be confirmed in the next few years.

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Insert Figure 1 about here

These results allow us to venture various hypotheses regarding the relevance of these publications.

First, we needed to confirm whether this increase in articles was conditioned by the widespread implementation of a competence discourse in education. Judging by the results, there is evidence for a statistically significant increase in articles published from 2000 to 2013 ($X^2 = 7.818$; 2df, $P < .025$).

Secondly, we wanted to determine whether there are variations regarding the type of published articles over time. As stated above, the results of Figure 1 clearly show that the majority are research articles, especially since 2010. However, we need to address the data shown in Table 3 (below) to qualify this trend. In this respect, if we look at the Coefficient of Variation (CV) of articles published since the year 2000, besides there being an increase in published articles, there has also been an increase in the spread of such contributions to journals (1990-1999, $CV = 37$; period 2000-2009, $CV = 3055$; period 2010-2013, $CV = 4523$). Therefore, the CV suggests that an increase in the number of published articles is accompanied by a broadening in the range of topics discussed in these articles.

Insert Table 3 about here

Context and topics of articles published

Although bibliometric results obtained in the previous section provide us with key information to determine the relevance of articles on educational competence, we need to deepen our understanding of additional factors in order to provide more relevant evidence regarding their primary contributions.

One of these factors is related to the educational context these articles reference (Figure 2). Contrary to what might be expected, regardless of the generic category "Others", many of the articles are situated in a higher education context (40%). This clearly contrasts with the small percentage (barely 10%) of articles which deal with different stages of compulsory education. However, when we tested whether this difference is significant, the results indicate that, from a statistical point of view, there is no apparent reason to conclude that the number of articles about competences depends on the educational level which they reference ($X^2 = 2.844$; 5df, $P > .10$).

Insert Figure 2 about here

Moreover, it is also important to note the topics addressed by articles on key competences. The information provided by ERIC shows a variety of different topics (Figure 3). Taking as a reference the number of items associated with each of these thematic areas, we see a predominance of topics related to competence discourse and its implementation in various educational systems (*Foreign Countries*: 238 and *Competence*: 146). These outnumber topics related to classroom application (*Intervention*: 51; *Skill Development*: 32; or *Assessment*: 22). From a statistical standpoint, these differences are confirmed by comparing each of this two groups of concepts composed by didactic topics or educational issues ($t = 47$, $p < 0.02$).

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Insert Figure 3 about here

Discussion and conclusion

The large number of references generated in recent decades confirms that competence discourse in education has become a highly-rated topic of debate. This trend might be explained by considering some tendencies which have emerged since the year 2000: the appearance of a competence discourse in education (Brown, Lauder, & Ashton, 2008; Hozjan, 2009; Mulder, Weigel, & Collings 2008; Weinert, 2004); the implementation of competences in state curricula based on recommendations by European institutions (Council of The European Union, 2010; European Commission, 2012; European Council, 2009) and the reputation of external evaluation tests conducted by national and international organizations (Educational Centre for Research and Innovation, 2008; OECD, 1999).

In addition, since 2000 there has been a gradual increase in articles based on research, combined with a decline in articles of a descriptive nature. These results might indicate that once a competence discourse has become established on the basis of reviews and theoretical reflections, empirical evidence based on scientific rigor is needed in order to guide the implementation of competency curriculum projects (Aguerrondo, 2009; Dobber et al, 2013; Mulder et al, 2008; Solzbacher, 2006; Urban et al, 2012).

Moreover, the number of articles and the variety of topics might be an obstacle in establishing a clear line of applied research in education competencies in school and teacher [training education](#). [This is a key factor that impedes us from narrowing the subject of research in studies into competence-based education](#). In this regard, the clear imbalance between the number of publications in the area of basic education and higher education may be a further example of the problem in deciding whether competency development is a matter for compulsory education, or is exclusively the domain of post-compulsory and university education (Goody, 2004; Mulder et al. 2008; Weinert, 2004).

This study also shows that the main contributions of articles on competency-based education are significantly in line with topics closely related to reflection on competence discourse and education policies that should be implemented, at the expense of publications which provide examples and empirical evidence aimed at developing basic competences. Therefore, these results confirm the opinion of those who consider that professionals responsible for the teaching and assessment of competences in the classroom have precious few references on how to do it (European Commission / EACEA / Eurydice, 2012; Goody, 2004; Mulder et al. 2008; Pérez, 2008; Weinert, 2004).

Implications

Processes related to the implementation and development of educational

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6 projects based on key competences are complex. Consequently, it is difficult to
7 establish a relevant theoretical and practical framework of reference simply on
8 the basis of reviews and studies which focus on analysing the test results of
9 external evaluations prepared by supranational organizations and educational
10 administrations. With this in mind, there is a need to promote studies that focus
11 on teaching and learning processes in the classroom to develop key
12 competences.

13 It has been claimed that criteria for the selection and definition of key
14 competences, and learning results obtained from teaching them, cannot be
15 performed outside the social and cultural characteristics of each educational
16 system (Morin, 1999). This implies that the ultimate purpose of implementing
17 key competences should not focus solely on expected results and compare
18 them for the sole purpose of classification. Nor should we rely on these results
19 to justify the supremacy of some educational policies and knowledge about
20 certain areas over others. This paper highlights the need to reorient
21 competence studies towards more applied contexts. In other words, studies
22 should be oriented towards processes closely linked to the development of key
23 competences in the classroom. The aim should be to ensure that people
24 acquire the knowledge, skills and resources necessary to enable them to
25 develop their personal potential, and in turn, to achieve their academic and
26 professional goals.

27
28 The proliferation of research articles and, by extension, articles set in a
29 university context, may be an indication that research on key competences is
30 not in line with the real needs of professionals who need to implement the
31 competency curriculum in schools. Furthermore, one wonders whether the
32 objectives and results of this research are accessible, meaningful and
33 transferable to such practitioners. These questions highlight the need to
34 promote studies which focus on establishing a framework of best practice
35 directed both at designing activities and projects, and the extent of teaching-
36 learning methodologies with regard to different ways of thinking about cognitive
37 processes (Sternberg, 1997). Some initiatives, such as UNESCO's ASPnet
38 (Associated Schools Project Network) project, are working in this direction,
39 creating a collection of Good Practices that provides empirical examples to
40 generate ideas for teachers and contribute to the improvement of educational
41 practice. In other words, these studies and best practices should become the
42 main reason for promoting a methodological change in teacher
43 training education. We need to see real advances in what students do in the
44 self-access centre alternative systems of assessment as formative-assessment,
45 shared-assessment or self-assessment, and in teachers mastering
46 methodologies such as PBL, learning by doing, case studies, etc (Boud, &
47 Falchikov, 2007; Czerniawski, Guberman, & McPhail, 2016; A.Fullan, &
48 Langworthy, 2013; Lave, & Wenger, 1991; Yorke, 2003). The purpose of this is
49 twofold. First, to enable students to develop higher cognitive processes, and
50 therefore, attain key competencies. Secondly, to enable teacher trainees to
51 teach these competencies in the classroom, having developed them during their
52 training at university.

53 **Future studies**

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6 The present study needs to be complemented by content analysis of the main
7 articles in impact journals. This is the only way to obtain a more precise and
8 tangible idea of the contributions of journal articles, but also of other existing
9 bibliographic resources, for the implementation of competency-based
10 curriculum projects.

11
12 Furthermore, it would be useful to conduct a study on basic competences
13 articles published in non-indexed journals, such as [Guix](#), [Aula de Innovación](#)
14 [Educativa](#) and [Aula de Secundaria](#), published by Graó in Spain, French
15 journals, like *La Classe* and *Cahiers pédagogiques*. Materials and manuals for
16 teacher development, produced by Associações de Professores in Portugal and
17 [Teach Primary](#) and [Teach Secondary](#) on-line journals in UK.

18
19 Moreover, this and similar studies should usher in qualitative applied research
20 that focuses on the teaching and learning of competences in the classroom. In
21 this way, scientific output would come closer to the real needs of practitioners
22 who have to take on the social responsibility of implementing the competency
23 curriculum in the classroom.

24
25 We believe that by adopting such an approach to qualitative studies we are
26 more likely to find answers to the following questions: What are the purposes of
27 educational competences and from what knowledge or experiences are they
28 drawn? What criteria have to be taken into account for the selection, and
29 operational and functional definitions of competences? What action should be
30 encouraged in the classroom to achieve significant development of selected key
31 competences? What criteria should be taken into account in order to claim that
32 the results obtained are relevant to the aims of the competency curriculum?
33 What indicators need to be present in order to verify students' level of
34 performance in the key competencies in a credible and relevant way?

35 **Note on contributors**

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38 Barcelona. He teaches primary school physical education methodology. He is
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42 through physical education.

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53 page: <http://www.ub.edu/dllenpantalla/content/english>

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6 Silvia Burset is a lecturer at the Department of Visual Arts at the University of
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9 world of education, through teaching developed with learning-based competency
10 methodologies.
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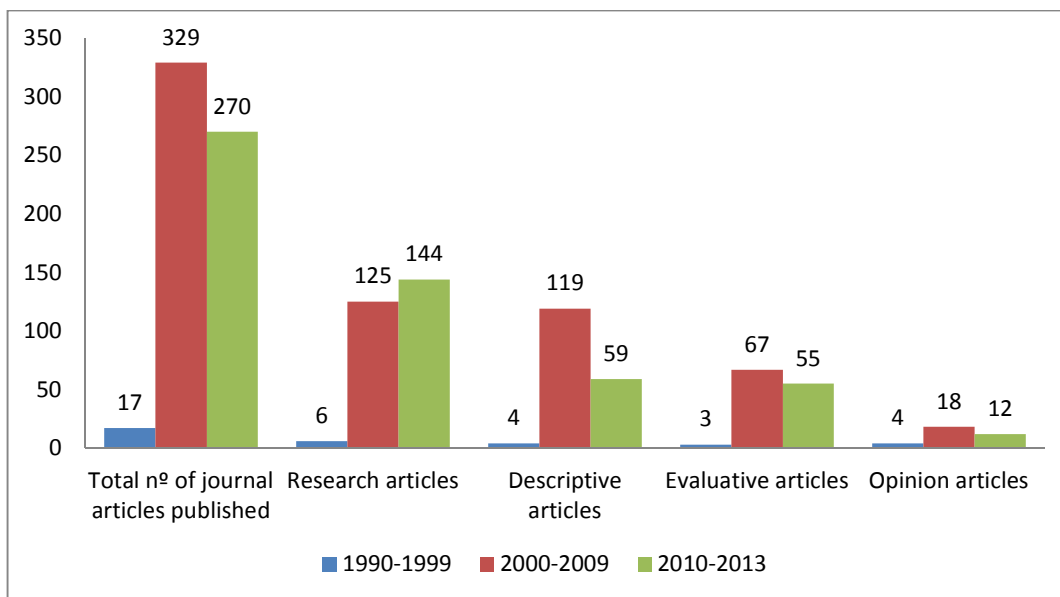


Figure 1. Number and type of competence-based articles published since 1990 (Source: ERIC)

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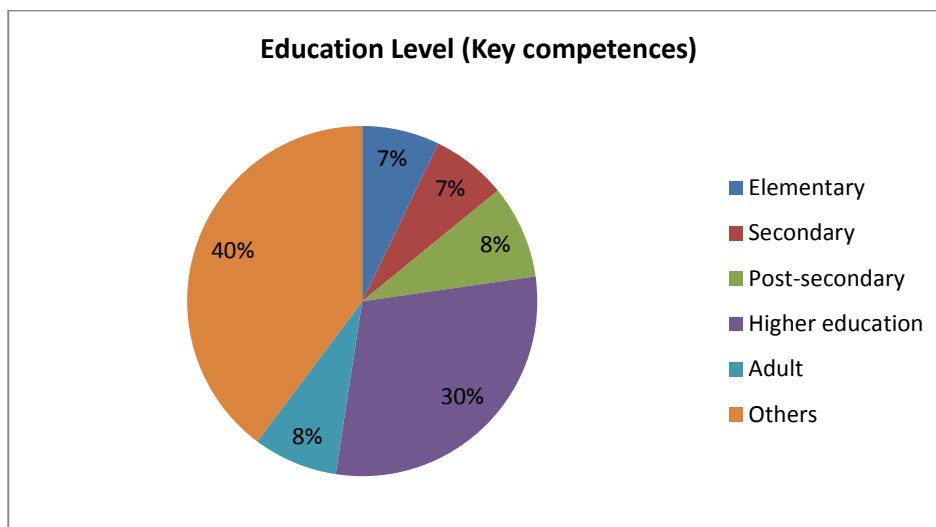


Figure 2. Percentage of articles published by level of education (Source: ERIC)

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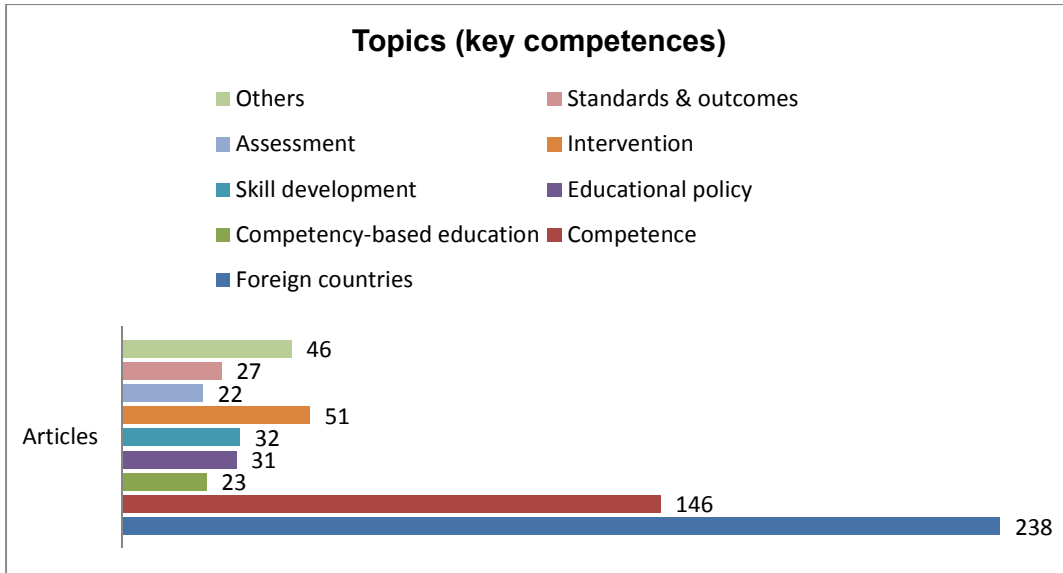


Figure 3. Number of articles by topic (Source: ERIC)

Table 1. Population and criteria for the selection of the study sample

	Population	Sample
Bibliographic sources	2016 bibliographic resources	616 articles
Delimitation criteria	Bibliographic sources indexed in ERIC	Keyword: "key competences Peer-reviewed journal articles"
Sampling technique		Intentional non-probabilistic

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Table 2. Data Analysis Plan

Sources	Statistical analysis	Criteria
616 articles	Descriptive	<ul style="list-style-type: none"> No. of papers published since 1990 Type of published articles Education level of reference Topics
	Inferential	<ul style="list-style-type: none"> Degree of relationship between the number of papers published and the period of publication Degree of relationship between the number of published articles and educational level Ratio of articles published during periods with major publications. Comparison of topics grouped according to their purpose or scope of impact

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Table 3. Data of articles published since 1990

Journal Articles	1990-1999	2000-2009	2010-2013	Total
N	17	329	270	616
Mean	4,25	82,25	67,5	154
Variance	1,58	2512,91	3053,66	
CV (%)	37	3055	4523	

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