Universidade do Minho
Instituto de Educação

Sandro Jonas de Almeida Monteiro

Course design in e-Learning and the relationship with attrition and dropout: a systematic review

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Dissertação de Mestrado
Mestrado em Ciências da Educação
Área de Especialização em Tecnologia Educativa

Trabalho realizado sob a orientação do
Doutor José Alberto Lencastre

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DECLARAÇÃO

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É AUTORIZADA A REPRODUÇÃO PARCIAL DESTA DISSERTAÇÃO APENAS PARA EFEITOS DE INVESTIGAÇÃO, MEDIANTE DECLARAÇÃO ESCRITA DO INTERESSADO, QUE A TAL SE COMPROMETE.

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Title: Course design in e-Learning and the relationship with attrition and dropout: a systematic review

Abstract: Worldwide, the e-Learning market has been growing faster and faster, but not without some disappointments. One of the biggest setbacks regarding e-Learning is related to the high rates of attrition that leads to frustration and, eventually, to dropout. Student dropout rates for e-Learning are higher than traditional face-to-face courses. For all reasons that might have an influence in attrition and dropouts in e-Learning we argue that course design is the key. In order to validate this assumption and understand the possible relationship between course design in e-Learning with attrition and dropout, a state of the art research was performed.

The primary objective was to facilitate e-Learning professionals, decision and policy makers' resolutions for minimizing attrition and dropout, grounded on literature which was searched, selected and analysed through a transparent, rigorous and replicable process. To achieve this, it was decided to conduct a systematic review of literature. Also, sharing this systematic review process as a learning artefact, is in our view, as important as the systematic review results itself. As so, we set the specific objectives of: (i) understand the relationship between course design in e-Learning with attrition and dropout; (ii) identify dropout reasons in relationship with course design in e-Learning; (iii) validate course design as a problem affecting dropout in e-Learning.

After conducting a twelve-step scoping process the protocol was written, including the following review question: *What is the relationship between course design with attrition and dropouts in e-Learning?* After applying the protocol, 1826 citations where identified, 6 of which were found to have an acceptable rigour, credibility and relevance.

After analysing the citations, it was concluded that there is in fact a relationship, and that course design can lead to improvements in attrition and dropout rates, but can also have the opposite effect. We argue that course design strategies or factors cannot be devised without the considerations of several other aspects. A single measure, an isolated strategy, or a course design change without carefully considering all other factors will be insufficient to reduce significantly existing dropout rates.

Título: Design de cursos em e-Learning e a relação com o desgaste e a desistência: uma revisão sistemática

Resumo: Em todo o mundo, o mercado de e-Learning tem vindo a crescer, mas não sem algumas desilusões. Uma das maiores contrariedades em relação ao e-Learning está relacionado com as altas taxas de desgaste que levam à frustração e, eventualmente, à desistência. As taxas de abandono em e-Learning são superiores comparativamente aos cursos no modelo presencial. Por todas as razões que possam ter influência no desgaste e desistência em e-Learning, argumentamos que o design dos cursos é a chave. De forma a validar este pressuposto e compreender a possível relação entre o design de cursos em e-Learning e o desgaste e a desistência dos alunos, foi realizada uma pesquisa de estado da arte.

O objetivo principal foi de facilitar aos profissionais de e-Learning, responsáveis e decisores políticos, soluções de forma a minimizar o desgaste e a desistência, fundamentada em literatura pesquisada, selecionada e analisada através de um processo transparente, rigoroso e replicável. Para alcançar este objetivo, foi decidido realizar uma revisão sistemática da literatura. Igualmente, partilhar este processo de revisão sistemática como um artefacto de aprendizagem é, na nossa opinião, tão importante quanto os resultados da revisão sistemática em si. Assim, estabelecemos como objetivos específicos: (i) compreender a relação entre o design de cursos em e-Learning com o desgaste e desistência; (ii) identificar as razões de desistência em relação ao design de cursos em e-Learning; (iii) validar o design de cursos como um problema que afeta as desistências em e-Learning.

Após a realização de um processo de delimitação do âmbito (*scoping*) com doze passos, o protocolo foi redigido, incluindo a seguinte questão de revisão: *Qual a relação entre o design de cursos em e-Learning e o desgaste e a desistência?* Após a aplicação do protocolo, foram identificados 1826 artigos, 6 dos quais foram considerados ter um rigor, credibilidade e relevância aceitáveis.

Após analisar os artigos, foi concluído que existe de facto uma relação, e que o design de cursos pode levar a melhorias nas taxas de desgaste e desistência, mas também pode ter o efeito oposto. Argumentamos que as estratégias ou fatores de design de cursos não podem ser concebidos sem consideração de vários outros aspetos. Uma medida única, uma estratégia isolada ou uma mudança de design de curso sem considerar cuidadosamente todos os outros fatores serão insuficientes para reduzir significativamente taxas de abandono existentes.

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INTRODUCTION

In recent years the e-Learning courses have grown exponentially all over the world, as they are a genuine alternative to traditional face-to-face training (Lencastre & Coutinho, 2015), especially to non-traditional learners with full-time jobs (Herrington, Reeves, & Oliver, 2010). Although many institutions implement e-Learning to meet the learners' needs, according to literature it is considerable the percentage of learners that do not complete e-Learning courses (Sun, Tsai, Finger, Chen, & Yeh, 2008; Tan & Shao, 2015). Some authors report dropout rates in e-Learning around 50 percent (Consortium, 2003), i.e., half of the learners enrolled in an online course does not complete it or leave without reaching the goals of the course. Unfortunately, there have been few credible studies to explore attrition and factors affecting these dropout rates. Previous research (Lencastre, Bronze, Ilin, & Özonur, 2014) allows us to admit that the factors that influence non-performance could be classified into two broad categories:

(1) factors related to the learner and his/her context, and

(2) factors related to the course design.

Mostly, the studies in the literature are devoted to investigating the students' factors (Consortium, 2003; Sun et al., 2008; Tan & Shao, 2015) and less research is dedicated to linking attrition and dropout with course design, and explore the pedagogical dimension as a way to prevent students from withdrawing or not completing the course.

This dissertation presents a study developed within a master course in Educational Technology analysing critical factors influencing students' attrition and dropout and the relationship with course design in e-Learning through a systematic review, following an adapted version of Boland, Cherry, and Dickson (2014, p. 10) proposed 9 steps. Our aim is to contribute to the state of art, to help teachers and trainers taking better decisions when designing e-Learning courses, but also to share this systematic review process as a learning artefact, a helpful guide for future researchers, particularly when developing a master dissertation or a PhD thesis.

The dissertation is also part of ongoing Erasmus+ Strategic Partnership, the "Better e-Learning for all" project, aimed to enhance the knowledge about e-Learning as a primary environment for adult education. Thus, the partnership has been studying the e-learning dropouts and dropout reasons reported in literature in order to write a suitable state of the art about this subject.

PROBLEM AND OBJECTIVES

Worldwide, the e-Learning market has been growing faster and faster (Sun et al., 2008), but not without some disappointments (Lencastre et al., 2014). One of the biggest setbacks regarding e-Learning is that related to the high rates of attrition (Wang, 2003) that leads to frustration (Arbaugh & Duray, 2002; Thurmond, Wambach, Connors, & Frey, 2002; Wu, Tsai, Chen, & Wu, 2006) and, eventually, to dropout. Student dropout rates for e-Learning are 15–20% higher than traditional face-to-face courses (Angelino, Williams, & Natvig, 2007). For all reasons that might have an influence in attrition and dropouts in e-Learning we argue that course design is the key. In order to validate this assumption and understand the possible relationship between course design in e-Learning and attrition and dropout, it was decided to perform a state of the art research.

The primary objective of this study is to facilitate e-Learning professionals, decision and policy makers' resolutions for minimizing attrition and dropout, based on scientific literature which was searched and selected based on a transparent, rigorous and replicable process. To achieve it, we decided to conduct a systematic review of literature (Gough, Oliver, & Thomas, 2012). Sharing this systematic review process as a learning artefact, a helpful guide for researchers, particularly when developing a master dissertation or a PhD thesis, is in our view, as important as the results itself. As so, we set the specific objectives of:

(i) Understand the relationship between course design in e-Learning with attrition and dropout;

(ii) Identify dropout reasons in relationship with course design in e-Learning;

(iii) Validate course design as a problem affecting attrition and dropout in e-Learning;

Our aim is to capture a complete picture while focusing in the objectives raised above, following an adapted version of Boland et al. (2014, p. 10) proposed 9 steps. As so, the systematic review process is described in full detail, including practical steps and difficulties found.

RELEVANCE

As learner enrolment into e-Learning courses is expected to continue to grow, specially to non-traditional target groups in continuing education (Moore, Dickson-Deane, & Galyen, 2011), finding the key factors that will promote learner engagement and retention is a goal we share as it has impacts on the learning institutions, and most importantly in the learners (Leeds et al., 2013). The e-Learning providers are spending more time in the online course environment yet progressing fewer learners (Li & Irby, 2008). Learners lose tuition money, delay graduation and experience feelings of inadequacy for not completing the course (Tinto, 2006). For some learners the frustration is so high that stop their online learning after their initial experience (Sun et al., 2008), resulting in high rates of attrition, i.e., they can even finish the course but don't want to have more online experiences.

Previous research has suggested that the e-Learning providers were more focused on the technological issues rather than in course design, minimizing the theories of learning and pedagogy (Stansfield, 2009). As stated by Lencastre and Coutinho (2015), technical decisions are not superfluous when it comes to online learning, but they do not occupy the central place when seeking appropriate didactic scenarios. Thus, it is necessary to take into consideration the theories that specifically relate to online learning, and use a pedagogy that places the responsibility of learning on the learner, with the trainer's key role being to create opportunities and environments that foster independent and collaborative student learning.

Improving retention is a shared priority for many institutions and learners. This research may be helpful in more strategically directing those efforts to yield the greatest benefit for all parties.

1. METHOD

Although it is not common to perform a Systematic Review in fields other than Health, its value in Education is indisputable. With the increase of research and its generalized availability, how to decide what is relevant and scientifically sound? How can decision makers and professionals keep up with the advances in their fields?

In this dissertation, we argue that a "systematic review methodology is accepted as a research methodology in its own right" (Boland et al., 2014, p. 9), which is "designed to locate, appraise and synthesize the best available evidence relating to a specific research question to provide informative and evidence-based answers" (Boland et al., 2014, p. 3). As so, it was decided to perform a systematic review as a methodological approach to state of the art (Gough, Oliver, & Thomas, 2012) following an adapted version of Boland et al. (2014, p. 10) proposed 9 steps.

Systematic reviews follow well-defined and transparent procedures and always require the following:

    i.   definition of the question or problem,

    ii.   identification and critical assessment of the available evidence,

    iii.   synthesis of the findings, and

    iv.   the drawing of relevant conclusions.

Systematic reviews aim to find as much as possible of the research relevant to the particular research questions, and use explicit methods to identify what can reliably be said on the basis of these studies (Gough et al., 2012). Methods should not only be explicit but systematic with the aim of producing varied and reliable results.

As said before, systematic reviews are attempts to review and synthesise existing research in order to answer specific research / review question. Once a question is formulated, and its theoretical foundations established, the protocol is written. This protocol describes the steps that will be followed for the review. A protocol describes:

    a)   the way existing studies are found;

    b)   how the relevant studies are judged in terms of their usefulness in answering the review question;

   c) how the results of the separate studies are brought together to give an overall measure of effectiveness. Different questions and different theoretical bases will require different methodological approaches (Gough et al., 2012).

We decided to slightly adapt Boland et al. (2014) nine step systematic review process. While Boland et al. (2014) proposes only one moment for applying the inclusion and exclusion criteria, after screening titles and abstracts and before selecting full-text papers, we argue that having two moments greatly reduces the necessary time for completing the review, especially when having great amount of initial citations.

The first moment, after Literature searching and using Endnote reference manager, quantitative data collected like peer review, published year, publication type, language will be filtered. That allows a considerable reduction of citations for title and abstract screening, the moment where the remaining inclusion and exclusion criteria will be applied. The following 9 steps will be followed.

1. Performing scoping searches, identifying the review question and writing the protocol;
2. Literature searching;
3. Applying inclusion and exclusive criteria in quantitative data;
4. Screening titles and abstracts;
5. Selecting full-text papers;
6. Quality assessment;
7. Data extraction;
8. Analysis and synthesis;
9. Writing up and editing.

The first 7 steps are described in the following sub-chapters, step 8 in chapter 2 while step 9 is present in the entire paper, including chapter 3 and 4, Discussion and Conclusion, respectively. Studies included in the review are screened for quality, so that the findings of a large studies can be combined. Peer review is a key part of the process; qualified independent researchers control the author's methods and results. For this research, we developed a protocol for the systematic review by following the guidelines and procedures of Boland, Cherry, and Dickson (2014), and consultation with e-learning specialists on the topic. This protocol specified the review question, search strategy, inclusion, exclusion and quality criteria, data extraction, and methods of synthesis.

Systematic reviewing can be a difficult and time consuming activity (Boland et al., 2014). Nevertheless, with the amount, and complexity, of available information, there has been a real need to develop and establish a process to provide, in a concise way, the results of research findings. Most notably, the dramatic increase in the amount of accessible research today makes it impossible for decision makers, policy makers and professionals to keep up to date with advances in their field. Systematic reviews allow concise synthesis of a large body of research and therefore address some of these issues.

The following sub-chapters describe in detail how the process went, necessary if any other researcher would want to replicate the study and part of the nature of conducting a systematic review. It's also a mean to inform of the needed steps to conduct a systematic review in Education, useful for someone who is planning to conduct one.

1.1. PERFORMING SCOPING SEARCHES, IDENTIFYING THE REVIEW QUESTION AND WRITING THE PROTOCOL

Scoping searches aren't a comprehensive search, they "are performed to determine whether your topic area is suitable for a review" (Boland et al., 2014, p. 21) and to define the scope of the review by refining the review question.

Our first approach was to have a vision of dropout rates and dropout reasons in e-Learning courses in each country and organization of the "Better e-Learning for all" partners, without actually having a review question to start. Therefore, topic areas for initial scoping searches would be dropout, e-Learning, country and organization.

We separated those topics in strings numbered from 1 to 4. In string 3 and 4 we used our own country and organization as a reference. Each string combined keywords using a OR Boolean operator to include possible alternatives in each topic area. A 5th and 6th string was added with the combination of the previous strings using a AND Boolean operator. Primary language was English having all translatable keywords a Portuguese alternative.

Keywords – Version 1
(1) ("dropout rates" OR "taxas de desistência")

(2) ("distance education" OR "distance learning" OR elearning OR e-learning OR "online teaching" OR "online learning" OR "online education" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

At the 17th of December 2015, we did our first query (string 5) at the ("b-on," n.d.) portal, as it searches several databases at once. The query produced 1507 results, which, after filtering out books and e-books, our initial exclusion criteria, resulted in 110 identified citations. We then browsed the results for its relevance, mostly by reading their titles and abstracts and we looked at their keywords field in order to find more suitable keywords to add to string (1) and (2) of our search strategy. The following keywords were added to the initial set, sorting them to their appropriate string: "computer assisted instruction", "drop-out rate", "barriers to learning", "instructional systems", "teaching aids & devices", "web-based education", "web-based instruction", "interactive learning environment".

Keywords – Version 2

(1) ("dropout rates" OR "drop-out rate" OR "barriers to learning" OR "taxas de desistência")

(2) ("distance education" OR "distance learning" OR elearning OR e-learning OR "online teaching" OR "computer assisted instruction" OR "online learning" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

We then restarted our query process with a set of new keywords (version 2). Query was performed at the 17ᵗʰ of December 2015. First we did string (6) with a total of 45 results at the ("b-on," n.d.) database. We filtered those results by publication removing books and e-books, resulting in 5 records (search engine automatically removed duplicates), but only one citation was a study conducted at *Universidade do Minho*. No keywords were found useful.

At first 2 queries at b-on, advanced search was used with the following settings:

- "Localizar todos os meus termos de pesquisa", "Locate all of my search therms"
- "Pesquisar assuntos relacionados", "Apply equivalent subject"
- "Pesquisar também no texto integral dos artigos", "Search also at article's integral text"

A third query was conducted (string 5), also at the 17ᵗʰ of December, this time at ("ERIC - Education Resources Information Center," n.d.) database, resulting in 2 citations. From those, 3 keywords were added to the existing search strategy: "electronic learning", "online courses", "virtual classrooms". At this point we also decided to remove "rates and it´s translation "taxas" in Portuguese in string (1), as we wanted to include both qualitative and quantitative evidence.

Keywords – Version 3

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "desistência")

(2) ("distance education" OR "distance Learning" OR elearning OR e-learning OR "electronic learning" OR "online teaching" OR "computer assisted instruction" "virtual classroom" OR "online learning" "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

The forth query was conducted at the 21st of December 2015 at the ("ERIC - Education Resources Information Center," n.d.) database, leading to 3 citations. A further look at the descriptors related terms allowed for the keyword "persistence" and it´s Portuguese translation "persistência" to be added to the first string.

Keywords – Version 4

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "desistência" OR "persistence")

(2) ("distance education" OR "distance learning" OR elearning OR e-learning OR "electronic learning" OR "online teaching" OR "computer assisted instruction" "virtual classroom" OR "online learning" "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

The following query was performed at ("Web of Science [v.5.20] - All Databases Home ", 2015) database at the 21st of December 2015, conducting an advanced search for each string separately both in titles (TI) as in topics (TS). We then combined the strings with the AND Boolean (see Figure 1). After a deeper look at the results we didn´t find suitable keywords to add to the search strategy.

Figure 1 - Scoping search strategy at ISI Web of Science.

In order to understand the volume of citations produced at the researcher´s institution, we conducted the next query at ("RepositoriUM - Universidade do Minho," 2014), Universidade do Minho database. We opted not the use the String 3, "Portugal", as we assume that would be, in most cases, implicit. We also included the Portuguese translation of "persistence", "persistência", and another synonym for dropout in portuguese: "abandono" as we neglected to do so in previous queries.

Keywords – Version 5

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "persistência" OR "desistência" OR "abandono")

(2) ("distance education" OR "distance learning" OR elearning OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

We then decided to search at ("Panorama e-Learning," n.d.), a Portuguese think tank for e-Learning. We used the search option for "taxa de desistência" and "taxa de abandono", but got no results, so we broaden the search and look for "desistência" and "abandono", also with no results. We decided to browse the "Qualidade" subpage (Quality) and searched the included reports for the previously mentioned keywords. During this process, we found another relevant keyword: "taxa de conclusão" OR "completion rate". We decided to keep the word "rate" as removing it would end up finding too many irrelevant results.

Keywords – Version 6

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "desistência" OR "persistência" OR "abandono" OR "taxa de conclusão" OR "completion rate")

(2) ("distance education" OR "distance learning" OR elearning OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning" OR "educação a distância" OR "aprendizagem a distância" OR "ensino online" OR "educação online" OR "ensino híbrido" OR "cursos online" OR "formação online")

(3) Portugal

(4) "Universidade do Minho"

(5) 1 AND 2 AND 3

(6) 1 AND 2 AND 4

Beside the already used databases (B-ON, ERIC, ISI and Repositorium) we wanted to find other sources of relevant studies.

In order to understand where to look, we used "Google Scholar" n.d.). Search strategy had to be adjusted because of character limitation:

("dropout" OR "desistência" OR "persistência" OR "abandono" OR "taxa de conclusão") AND (elearning OR "e-learning" OR "blended learning" OR "b-learning" OR "educação a distância" OR "cursos online" OR "formação online") AND Portugal

We note down the following institutional databases:

- Repositório Aberto – Universidade Aberta: repositorioaberto.uab.pt
- Repositório Aberto – Universidade do Porto: https://repositorio-aberto.up.pt/
- IC-online – Instituto Politécnico de Leiria: https://iconline.ipleiria.pt
- RIA – Universidade de Aveiro: http://ria.ua.pt/
- Servizo de Publicacións – Universidade da Coruña: http://revistas.udc.es/
- Repositório Científico do Instituto Politécnico do Port*o*: http://recipp.ipp.pt
- Plataforma de revistas em open access da Universidade de Aveiro: http://revistas.ua.pt/
- Biblioteca Digital do Instituto Politécnico de Bragança: http://bibliotecadigital.ipb.pt/
- Repositório da Universidade do Algarve: http://sapientia.ualg.pt
- Repositório da Universidade de Évora: http://rdpc.uevora.pt/
- uBibliorum – Repositório Digital da UBI: http://ubibliorum.ubi.pt/
- RCAAP – Repositório Científico de Acesso Aberto de Portugal: http://www.rcaap.pt/
- Estudo Geral –Universidade de Coimbra: https://estudogeral.sib.uc.pt/jspui/
- Repositório – Universidade Nova de Lisboa: https://run.unl.pt

And Magazine:

- Educação, Formação & Tecnologias: http://eft.educom.pt/index.php/eft

After searching, we faced a disproportional number of results as compared with previous databases. This was due to the fact that most institutional databases used Dspace (repository application) configured to search all fields including full text, which produces a vast amount of results. We therefore decided to not use the above-mentioned databases for scoping and for the rest of the review.

1.1.1. Assessing the search strategy and quality of results

At this moment it was decided to focus on understanding the volume and the quality of the results in order to "determine if the topic area was suitable for a review" (Boland et al., 2014, p. 21). Using the latest keyword version, the combination of strings was analysed using the AND Boolean for a search performed at the 3rd of January 2016 (see Table 1).

Table 1 - Volume citations found for version 6 combined keywords by database and total

	B-ON	ERIC	ISI (TI)	ISI (TS)	RepositoriUM	Total
1 AND 2	3139	1278	45	462	2	4926
1 AND 2 AND 3	16	4	0	2	2	24
1 AND 2 AND 4	0	0	0	0	0	0

The combination of 1 AND 2 AND 4 produced no results, which can be explained by an inappropriate search strategy or the lack of attributed keywords that match our search (the focus of relevant results may be something else and therefore no relevant keywords was added in searchable fields) or if actually no research was made.

The combined results of 1 AND 2 AND 3 produced 24 citations, which were imported to Mendeley v.1.15.2. After removing duplicates, 19 unique citations were found, which after title and abstract review, lead to relevant six citations:

- 1 report (Doerfert, FernUniversitat, & Others, 1989) published in 1989 "contains short descriptions of about 200 selected distance education institutions throughout the world." including dropout rates with Portugal represented.
- 1 article (Lourenço, Ferreira, Duarte, Gonçalves, & Duarte, 2013) refers to the monitoring of the b-learning graduate course "Technology and Industrial Management" course curriculum suitability at the Polythecnic Institute of Setúbal (IPS). Data collected includes dropout rates, which at 2010-2011 were lower than other IPS engineering courses;
- 3 results having in common the main author Pena, Nuno (N. Pena & Isaias, 2010) (N. Pena & Isaías, 2010) (N. J. M. S. R. Pena, 2011) refers to a Framework for instructional design named IPTEACES (Involvement, Preparation, Transmission, Exemplification, Application, Connection, Evaluation and Simulation) aimed at improving effectiveness in

corporate e-learning. Dropout rates in courses developed using this framework are reported low;

- 1 book section (Nicolau, Caeiro, Martinho, & Azeiteiro, 2015) reports the findings of a "study about student attitude towards e-learning and identifies barriers and motivators of e-learning adoption" and was conducted at the Universidade Aberta, Portugal. The results are considered as "key to decrease dropout rates of a 2nd cycle degree e-learning programme, analysed as a case study".

Without actually analysing the full articles, as we were still in a preliminary phase, we assessed the usefulness of the results.

Out of these 6 relevant results, we argue that 4 may contain the type of data we were looking for: a book section and the three results from Pena, Nuno. The effort (financially and time wise) to acquire books isn´t an option when we aim to replicate this methodology in each partner country. As so, books, book parts and e-books were included in the exclusion criteria. The report from 1989, (Doerfert et al., 1989), can be used as a reference for future studies, but its data isn´t recent enough for a state of the art review.

The 3 results concerning the framework of instructional design (N. Pena & Isaias, 2010; N. Pena & Isaías, 2010; N. J. M. S. R. Pena, 2011) may be interesting as they hint that applying structured models in course design may indeed decrease dropout rates.

At this moment, it was discussed what would be the best approach considering the insufficient citations obtained. One option was to look for more citations in other databases, another was to revise the keywords and strategy used, or eventually to continue the scoping and include more keywords using OR Boolean, or finally, to broaden the search, excluding the search string (3), Portugal.

Based on Boland et al. (2014) the choice should be to broaden the search, also, any other option might be a time consuming risk. This decision would affect the project´s initial expectations for a state of the art review which assessed each country partner context. But in fact, based on the scoping search, there isn´t enough data for that, but there is a fairly good chance of having enough data for a global or European context, based on the number of results of (1) AND (2).

1.1.2. Changing search strategy – first Protocol

The previous scoping results and conclusions were revealed at a meeting with fellow project partners. Beside validating the broadening of the search and therefore taking full responsibility for this systematic review process, it was decided that we should understand the relation of "course design" and "teacher´s competence" to the already existing "dropout" and "e-learning" strings. We wanted to test the hypothesis that teacher´s competence in course design had cause-effect relationship with "dropouts" in "e-learning".

As so, our first review question, which was still open to refinement was:
"What´s the relationship between teacher´s course design competence with dropouts in e-learning?"

Inclusion criteria

- Actual, published from 2011;
- Reviewed by experts, peer-reviewed;
- Addresses teacher´s course design competence and include dropout rates in e-Learning courses;
- Full article.

Exclusion criteria

- Books, book parts and e-books;
- Published before 2011;
- No original data;
- Not related with teacher´s course design competence and not including dropout rates;
- Not referring to an online course;
- Not written in English

From the latest keyword list (version 6), we removed all Portuguese alternatives as they were no longer needed, removed the third and fourth string and added a new third and fourth string.

<u>Keywords – Version 7</u>
  (1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate")

(2) ("distance education" OR "distance learning" OR elearning OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills")) AND (("course" OR "units of study" OR "thematic units" OR "subject units") AND ("design" OR "plan" OR "development"))

(4) 1 AND 2 AND 3

We then restarted the scoping search. Starting from ("b-on," n.d.) portal, we conducted a string (4) search adding 3 new keywords ("attrition", "learner engagement" and "course creation") to the search strategy (version 8).

<u>Keywords – Version 8</u>
(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "learner engagement")

(2) ("distance education" OR "distance learning" OR elearning OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills")) AND (("course" OR "units of study" OR "thematic units" OR "subject units") AND ("design" OR "plan" OR "development" OR "creation"))

(4) 1 AND 2 AND 3

The following search was conducted in both ("b-on," n.d.) and ("Web of Science [v.5.20] - All Databases Home ", 2015) at the 16th of January, adding 11 more keywords: "course evaluation" – only "evaluation" and synonym "assessment" will be added combining with "course";

"withdrawal (education)"; "attendance"; "instructional design" – only "instructional" is used in combination with "design"; "graduation rate"; "success rate"; "teacher evaluation"; "teacher effectiveness"; "teacher characteristics"; "educational quality"; "outcome measures".

It was then decided to add another string, moving *course design competence* related keywords from string 3. The updated search strategy had the following layout:

Keywords – Version 9

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "learner engagement" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate")

(2) ("distance education" OR "distance learning" OR elearning OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics"))

(4) ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(5) 1 AND 2 AND 3 AND 4

At the 18th January 2016, a search at the same databases as the previous query was performed. In a preliminary analysis of the title and abstracts, we found signs of valid results but also some mentions of engagement and attrition without references of dropout rates. After discussion, we decided to exclude "learner engagement" in string (1), as engagement may not be directly related with dropout (version 10).

Keywords – Version 10

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate")

(2) ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics"))

(4) ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(5) 1 AND 2 AND 3 AND 4

1.1.3. Protocol refinement based on keywords version 10

The review question was updated to include attrition:

"What´s the relationship between teacher´s course design competence with attrition and dropouts in e-learning?".

Inclusion criteria

- Published since 2011;
- Reviewed by experts, peer-reviewed (to reduce bias);
- Addresses teacher´s course design competence in e-learning courses and relates with dropout and/or attrition;
- Full article.

Exclusion criteria

- Books, book parts, e-books and magazine articles;
- Published before 2011;

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- No original data;
- Doesn´t address teacher´s course design in e-learning courses and or, if so, doesn´t related with dropout and/or attrition;
- Not written in English.

Another round of queries was conducted with satisfactory results. At this moment, it was believed that the scoping process had ended (later realizing not), and the *literature search* phase was started.

Data was collected at selected databases advised by a specialist, reaching the *Screening titles and abstracts* phase. In this step, two researchers, this dissertation author and his tutor, analysed the titles and abstracts of all citations collected and assigned one of three possible outcomes: *include, exclude* or *unsure*. The researchers were faced with a reduced number of *included* and *unsure* results, and decided to understand the reasons.

First, a reduced number of titles and abstracts did in fact mention course design explicitly, the majority does it implicitly.

Second, there are no mentions of teacher´s course design competence, while in fact there are several cases of course design proposals, approaches and changes motivated by high dropout and attrition rates. We hypothesise that the problem exists but may be neglected to be acknowledged due to an unwanted, frown upon self-criticism.

After considering several options, it was decided to exclude the string related to teachers, use the data collected from this last procedure to improve the search strategy and restart the scoping process. For details in how the *literature search* phase was performed for this Keyword version, see sub subchapter 1.2.1 Literature search - First try in page 39.

1.1.4. Protocol refinement based on keywords version 11

Review question:

"What´s the relationship between course design with attrition and dropouts in e-learning?"

Inclusion criteria

- Published since 2011;

- Reviewed by experts, peer-reviewed (to reduce bias);

- Addresses course design in e-learning courses and relates with dropout and/or attrition;

- Full article.

Exclusion criteria

- Books, book parts, e-books, magazine articles and conference proceedings;

- Published before 2011;

- No original data;

- Doesn´t address course design in e-learning courses and doesn´t relate with dropout and/or attrition;

- Not written in English.

<u>Keywords – Version 11</u>

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate")

(2) ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(4) 1 AND 2 AND 3

Proceeding with this new protocol to *literature search*, we ended up with 568 citations, after all including and excluding criteria was applied and removing duplicates. At this moment, it was believed that there were too many results and the possibility to do a peer review of so many titles and abstracts was inviable. It was decided to modify the search terms to reduce the number of results, as well as add a forth string to exclude MOOCs as they are of a different scope from the type of courses aimed.

"If your search strategy retrieves too many records, you may want to refine your inclusion criteria and modify your search terms accordingly. You may wish to consider how you can limit your search results further, such as by year, language or publication type (for example, journal articles, books or letters)." (Boland et al., 2014, p. 58).

1.1.5. Final Protocol

Review question:

"What´s the relationship between course design with attrition and dropouts in e-learning?"

Inclusion criteria

- Published since 2011;
- Reviewed by experts, peer-reviewed (to reduce bias);
- Addresses course design in e-learning courses and relates with dropout and/or attrition;
- Full article.

Exclusion criteria

- Books, book parts, e-books, magazine articles and conference proceedings;
- Published before 2011;
- No original data;
- Doesn´t address course design in e-learning courses and doesn´t relate with dropout and/or attrition;
- Not related with Moocs (Massive Open Online Courses);
- Not written in English.

Keywords – Version 12

(1) ("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate")

(2) ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR

"online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning")

(3) (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality"))

(4) ("MOOC" OR "Massive Open Online Courses")

(5) 1 AND 2 AND 3 NOT 4

1.1.5.1. Selecting databases

After consulting a specialist, we were given a list of the most reputable databases in Educational Technology. We then cross-checked them with the current database subscription (at the 21st of January 2016) of the Universidade do Minho ("Serviços de Documentação - Universidade do Minho," 2015). The following databases matched:

- ERIC (http://eric.ed.gov/)
- ISI Web of Science (http://isiknowledge.com/) - All journals included are peer-reviewed.
- Taylor & Francis Online (http://www.tandfonline.com/)
- ACM Digital Library (http://dl.acm.org/) - When asked ACM support if all content was peer-review it was told that "ACM's journals/transactions are peer reviewed. Magazines are not.". We identified magazines, newsletters in the results as "Commun. ACM", "SIGCAS Comput. Soc.", "SIGCSE Bull.", "SIGGROUP Bull." and "eLearn" at the Journal field in Endnote and created a filter to exclude them in our final results, so it only included peer-review.
- ScienceDirect (http://www.sciencedirect.com/) - ScienceDirect is Elsevier's peer-reviewed full-text database (Elsevier, 2014).
- SCIELO - Scientific Library online (http://www.scielo.org/php/index.php)
- B-On   portal (widgets.ebscohost.com/prod/customerspecific/ns000290/authentication/index.php) - Peer-review option at the database.
- Open Research Online - Open University (http://oro.open.ac.uk/)
- SCITEPRESS Digital Library didn't match the list, but after testing, it was found that there was full access to the database, and therefore included.

(http://www.scitepress.org/DigitalLibrary/HomePage.aspx) - An email was sent asking if all articles were peer-reviewed and if there was possible to export the search results in one file. There wasn't no reply after a week, but a phone call confirmed that all articles are peer-reviewed.

1.5.1.2. Managing Citations with Endnote

After applying each individual search strategy to all selected databases (see annex 1), results were exported and then imported in Endnote X7, using a unique folder for each database. We then looked at each folder for missing record type, author, year and title fields and completed them, if needed.

Smart folders were then created reflecting the inclusion and exclusion criteria (numbered from 2 to 6) and a single filter to check if there is any systematic or literature review done in this field (7):

Name	Description / Settings
2. Book	Books, e-books, book parts and book sections
	Reference type contains the word "Book"
3. Conf. Proc.	Conference Proceedings
	Reference type contains the word "Conference Proceedings"
4. Non Peer-Reviewed	Publications which aren´t peer-reviewed
	Reference type contains "Magazine" OR
	Journal/Secondary Title is "Commun. ACM" OR
	Journal/Secondary Title is "SIGCAS Comput. Soc." OR
	Journal/Secondary Title is "SIGCSE Bull." OR
	Journal/Secondary Title is "SIGGROUP Bull." OR
	Journal/Secondary Title is "eLearn"

5. Non English	Publications which aren´t in English
	Language containing Spanish OR French OR Korean OR Serbian OR
	Portuguese (manually added to field at each identified citation)
6. Since 2011	Published since 2011
	Year is greater or equal to 2011
7. Systematic and Literature Review	Search for Systematic and Literature Review in Titles and Abstracts
	Title contains "systematic review" OR "literature review"
	Abstract contains "systematic review" OR "literature review"

A Group from named "1. Filter A" was made to aggregate the inclusion and exclusion criteria's, done in smart folders, mentioned above.

Name	Description / Settings
1. Filter A	NOT 2. Book AND
	NOT 3. Conf. Proc. AND
	NOT 4. Non Peer-Reviewed AND
	NOT 5. Non English AND
	6. Since 2011

In order to check if smart folders were filtering correctly citations, we checked each smart folder results:

- At 2. Book, was the Publication Type correct? If unsure, follow each record unique URL. There was in fact a great amount of records that were wrongly catalogued as a Book, e-book, Book part or Book section when imported to Endnote;
- At 3. Conf. Proc., was the Publication Type correct? In all cases, they were and the title is a good indicator;
- At 4. Non Peer-Reviewed, we only looked for Publication Type contains Magazine, as Journal/Secondary Titles for non-reviewed publications were manually added;
- At 5. Non English, we confirmed that the records were indeed in a language other than English. The language field isn´t a commonly imported field in Endnote, so most records

have it blank. A visual overlook of the existing records and manually editing the language field to match their language when is something other than English, was our preferred filtering method;

- At 6. Since 2011, we sorted records by year and browsed top and bottom and confirmed its correctness;

For every identified record with wrong fields, we have corrected using the data contained at each unique record URL.

In 1. Filter A, results were then searched for missing record fields such as author, year and title fields and completed them, if needed. At this date, ERIC database didn't export abstracts and journal names and ACM didn't export abstracts.

To facilitate screening titles and abstract, the next step in the systematic review, we created a unique Output Style in Endnote's Bibliography Templates, based on "RefMan (RIS) Export", we chose to export Publication type, Title and Abstract only:

Journal Article
``JOUR|`
`Title|`
`Abstract|

Book
``BOOK|`
`Title|`
`Abstract|

1.2. LITERATURE SEARCH

1.2.1 Literature search - First try based on keywords version 10

Our first try in literature search was based on Keywords version 10 from the scoping search. The search strategy used at each selected database can be found in Annex 1, with indication of the date of the query, results and remarks.

Following an overview of the number of results collected on those databases are displayed and outcome is discussed.

<u>Overview of results collected</u>

Total citations with unfiltered results was 1233, while peer-reviewed totalled 710 citations. Filter A, aggregating most of the inclusion and exclusion criteria produced 242 citations (see Table 2), which after removing duplicates, lead to 146 unique results.

Table 2 - Number of citations found by database and filters for keywords version 10

Database	Results	Peer-Reviewed	Filter A
ERIC	367	96	46
Web of Science	28	28	13
Taylor & Francis Online	0	0	0
ACM Digital Library	40	18	9
ScienceDirect	5	5	4
SCIELO	0	0	0
B-On portal	365	135	63
Open Research Online	141	141	51
SCITEPRESS Digital Library	287	287	56
Total (N)	1233	710	242

We then moved to the next step in the systematic review, screening titles and abstracts, but decided to go back to the scoping process and change the search strategy (see subchapter 1.1.3 - Protocol refinement in page 31).

1.2.2 Literature search - second try based on keywords version 11

Our second try in literature search was based on Keywords version 11 from the scoping search. The search strategy used at each selected database can be found in Annex 2, with indication of the date of the query, results and remarks.

Following an overview of the number of results collected on those databases are displayed and outcome is discussed.

Overview of results collected

Total citations without any filtering was 3924, peer-review results 2396. Filter A, aggregating most of the inclusion and exclusion criteria produced 769 citations (see Table 3), which after removing duplicated ended in 568 unique results.

Table 3 - Number of citations found by database and filters for keywords version 11

Database	Results	Peer-Reviewed	Filter A
ERIC	1051	406	180
Web of Science	228	228	84
Taylor & Francis Online	0	0	0
ACM Digital Library	111	76	43
ScienceDirect	44	44	23
SCIELO	2	2	1
B-On portal	2066	1219	339
Open Research Online	140	140	48
SCITEPRESS Digital Library	281	281	52
Total (N)	3924	2396	769

It was decided not to move to the next step in the systematic review, screening titles and abstracts, as there were too many results (see subchapter 1.1.4 Protocol refinement in page **Error! Bookmark not defined.**).

1.2.3 Literature search - First last and final try based on keywords version 12

Our third and last try in literature search was based on Keywords version 12 from the scoping search. The search strategy used at each selected database can be found in Annex 3, with indication of the date of the query, results and remarks.

Following an overview of the number of results collected on those databases are displayed and outcome is discussed.

Overview of results collected

Total unfiltered results, with no inclusion and exclusion criteria applied, was 1826 citations, while peer-reviewed had a total of 1220 citations. Filter A which aggregated most of the inclusion and exclusion criteria resulted in 259 citations (see Table 4), which after removing duplicates ended in 248 results.

Table 4 - Number of citations found by database and filters for keywords version 12 (final version)

Database	Results	Peer-Reviewed	Filter A
ERIC	238	94	14
Web of Science	157	157	38
Taylor & Francis Online	4	4	4
ACM Digital Library	53	22	8
ScienceDirect	24	24	6
SCIELO	4	4	0
B-On portal	985	554	125
Open Research Online	86	86	17
SCITEPRESS Digital Library	275	275	47
Total (N)	1826	1220	259

1.3. SCREENING TITLES AND ABSTRACTS

An excel sheet was created containing the title and abstracts for the 248 results. Two citations were removed from the review, as they were duplicates that weren´t identified by Endnote.

Two copies for assessment were made, one for each researcher involved in this process, so no prior knowledge of the assessment was known to any of the researcher in order to prevent bias decisions.

Each researcher evaluated all 246 titles and abstracts and assigned one of the 3 possible outcomes: Exclude, Include and Unsure (see Annex 1).

The remaining inclusive and exclusive criteria, the ones directly connected with the review question, were taken in consideration.

For the 246 titles and abstracts assessed, the number of observed agreements was 0,587 (58,7%). We also computed the Kappa coefficient of agreement, which corrects for chance agreement (Cohen, 1960). The Kappa coefficient for Stage 4 assessments was 0,15, which is characterised as "slight agreement" by Landis and Koch (1977). All disagreements were discussed and resolved by the two researchers, before proceeding to the next stage. As a result of this discussion, 40 citations were considered suitable for further review.

Before advancing to the next phase of the review, we included a scheme of the process so far (see Figure 2).
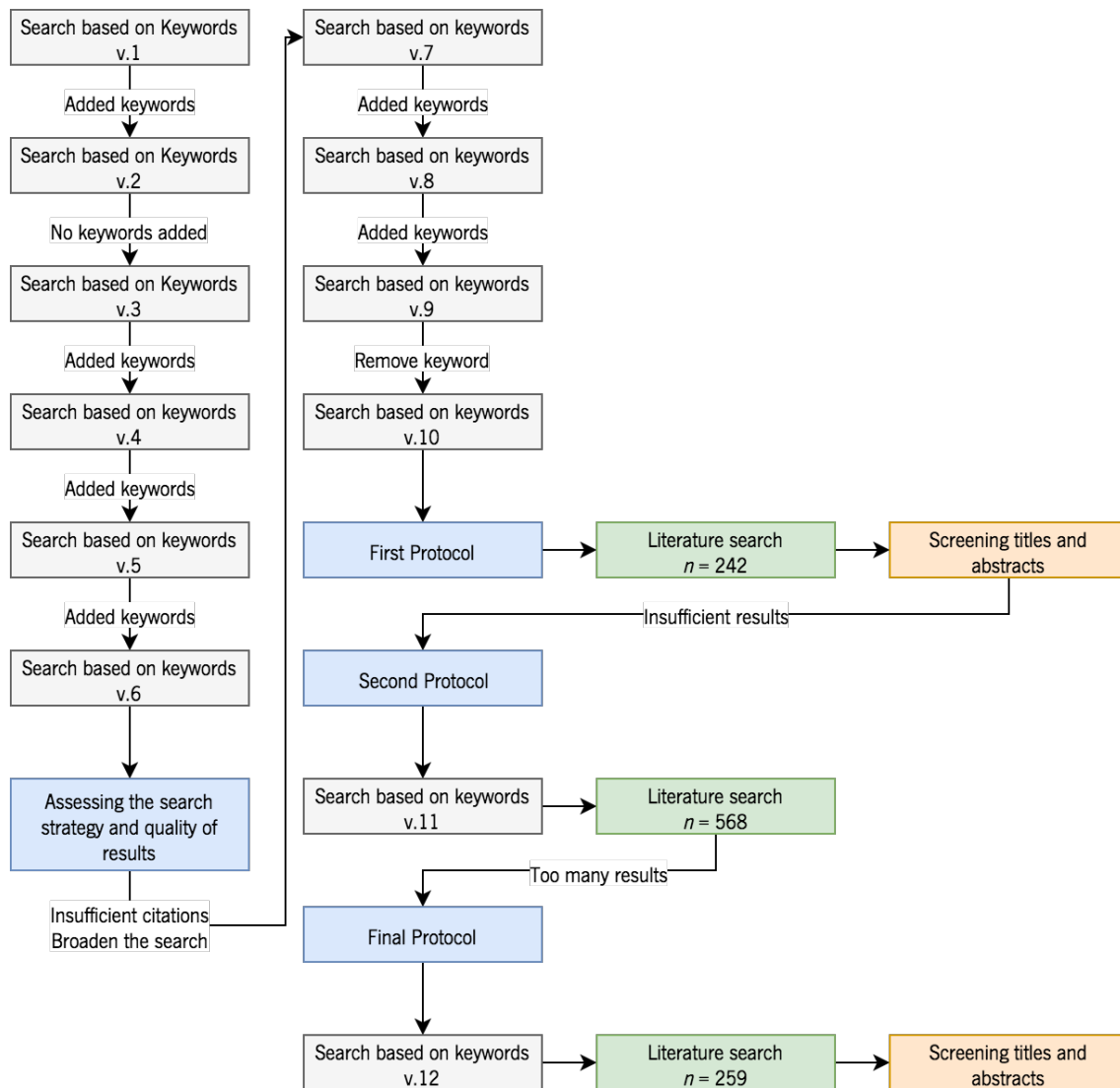
Figure 2 - Review process from start to screening tiles and abstracts

1.4. SELECTING FULL-TEXT PAPERS

Out of the 40 citations, one was in Japanese and therefore excluded, 7 we couldn't download the full text, as they weren´t open access or we didn´t possess access credentials. For those we asked our project partners their help at a first phase and about a week after we sent an email to the main authors to requesting the citations.

1. Devey, P. (2011). SURVIVOR: ONLINE COURSES - WHEN AND WHY DO STUDENTS DROP OUT OF YOUR ONLINE COURSE? Paper presented at the Edulearn11: 3rd International

Conference on Education and New Learning Technologies, Barcelona, SPAIN. <Go to ISI>://WOS:000326292903068

2. Gaytan, J. (2013). Factors Affecting Student Retention in Online Courses: Overcoming This Critical Problem. Career and Technical Education Research, 38(2), 145-155.

3. Hernandez Rubio, C. (2012). THE ONLINE UNIVERSITY IN THE EUROPEAN SPACE OF HIGHER EDUCATION: ANALYSIS OF AN EXPERIENCE. Paper presented at the Edulearn12: 4th International Conference on Education and New Learning Technologies, Barcelona, SPAIN. <Go to ISI>://WOS:000326239301088

4. McGee, D., Vasquez, P., & Cajigas, J. (2014). A Comparison between a Traditional and an Accelerated, Online, Adaptive Approach to Developmental Mathematics. Journal of Computers in Mathematics & Science Teaching, 33(4), 429-453.

5. Ruiz-Lopez, M. D., & Artacho, R. (2012). NUTRITION AND AGEING: THE INFLUENCE OF THE TEACHING MODE UPON ACADEMIC PERFORMANCE IN A FREE-CHOICE SUBJECT. 5th International Conference of Education, Research and Innovation (Iceri 2012), 44-46. (Poster)

6. Schopf, T., & Flytkjær, V. (2012). Impact of Interactive Web-Based Education With Mobile and Email-Based Support of General Practitioners on Treatment and Referral Patterns of Patients with Atopic Dermatitis: Randomized Controlled Trial. Journal of Medical Internet Research, 14(6), 46-46. doi:10.2196/jmir.2359

7. Waugh, M., & Su Searle, J. (2014). Student Persistence and Attrition in an Online M.S. Program: Implications for Program Design. International Journal on E-Learning, 13(1), 101-121.

After a waiting period of 1 month, we obtained 4 results, one of each was a poster and therefore excluded. We also received a citation after the agreed waiting period, and it was, therefore, excluded, making a total of 35 citations.

1.4.1. Citations identified via Expert

Six citations were sent by experts, the research partners, none of the which were selected for data extraction.

José Alberto Lencastre et al. (2014) was excluded as it didn´t present any results that related course design in e-learning with dropout or attrition. The same with Fritsch (2003), which compares the mean values of importance and satisfaction with no direct relation with dropout or attrition. Iglesias-Cancio (2014) is a work in progress and doesn´t presents any empirical data, the hypothesis presented is also not in the desired scope of this research as it simply doesn't mention any dropout and attrition: "The main objective of this research is to demonstrate through empirical means that applying gamification when building or upgrading an e-learning application or LMS can improve the students' participation, performance, and motivation." (Iglesias-Cancio, 2014).

Yukselturk, Ozekes, and Türel (2014) also doesn't address course design in e-learning courses and doesn´t relate with dropout and/or attrition, the study examines the effects of student personal characteristics on dropout and uses data mining techniques to predict dropout.

Jun (2005) thesis, relates Student Factors mainly, but also Course or Program factors (Number of learning hours for the course, Mandatory/voluntary attendance), but it was found too extensive for content analysis.

Juutinen (2011) focused in the emotions of e-learning users which resulted in the Pride-Frustration model. That model can be used in course design in e-learning and, in theory, affect dropout rates, but no empirical data of the application of the model is presented, and is therefore excluded.

1.5. QUALITY ASSESSMENT

While on the quality assessment process, researcher 1 (Sandro Jonas Monteiro, Universidade do Minho) exported the list of the final 35 citations from Endnote, using Endnote Export Output Style and saving as XML file type. This file was then imported in nVivo using Data – Endnote, this method insures that data from Endnote like title, author, abstract, and so on, is imported by adding a memo to each record in nVivo.

For the tool, it was decided to adapt 2 versions of the Critical Appraisal Skills Programme (CASP), Dingsøyr and Dyba (2008) and (CASP) (2013) for the assessment of qualitative research. The tool used on this research can be found at the Appendix 2.

The tool contained eleven criteria separated in two layers. The first contained three screening questions related to the quality of a study's rationale, aims, and context. A "No" in any of these

questions and the citation would be excluded, that was the minimum quality imposed in this systematic review. The second layer was related with the rigour, credibility and relevance and allowed the measurement of the citations value for the review.

The quality assessment was performed by 3 researchers for a total of 35 citations using Microsoft Excel and Word. The eleven criteria were graded in a "Yes", "No" and "Can't tell".
Researcher 1 assessed all the citations, while researcher 2 (José Alberto Lencastre, Universidade do Minho) did 16 and researcher 3 (Paula de Waal, University of Ferrara) assessed 19. Conflicts were discussed and a final of 6 citations were selected for content analysis.

None of the citations were answered "Yes" to all questions, but six citations had only one "No". We used that criteria to selected 6 citations. Below the references and the question answered as "No".

Deschacht, N., & Goeman, K. (2015). The effect of blended learning on course persistence and performance of adult learners: A difference-in-differences analysis. *Computers & Education, 87*, 83-89.
Have ethical issues been taken in consideration? No

Flynn, A. B. (2015). Structure and Evaluation of Flipped Chemistry Courses: Organic & Spectroscopy, Large and Small, First to Third Year, English and French. *Chemistry Education Research and Practice, 16*(2), 198-211.
Has the relationship between researcher and participants been considered adequately? No

Gaytan, J. (2013). Factors Affecting Student Retention in Online Courses: Overcoming This Critical Problem. *Career and Technical Education Research, 38*(2), 145-155.
Has the relationship between researcher and participants been considered adequately? No

Kalet, A., Ellaway, R., Song, H., Nick, M., Sarpel, U., Hopkins, M., Hill, J., Plass, J., & Pusic, M. (2013). Factors influencing medical student attrition and their implications in a large multi-center randomized education trial. *Advances in Health Sciences Education, 18*(3), 439.
Have ethical issues been taken in consideration? No

Leeds, E., Campbell, S., Baker, H., Ali, R., Brawley, D., & Crisp, J. (2013). The impact of student retention strategies: an empirical study. *International Journal of Management in Education, 7*(1/2), 22.

Have ethical issues been taken in consideration? No

Robinia, K. J., Maas, N. A., Johnson, M. M., & Nye, R. M. (2012). Program Outcomes Following Implementation of a HYBRID CURRICULUM at the CERTIFICATE LEVEL. *Nursing education perspectives, 33*(6), 374-377.

Has the relationship between researcher and participants been considered adequately? No

As no citation was added via Expert, the total of citations for content analysis was 6. Figure 3 shows the systematic review process and the number of papers identified at each stage after the scoping process was finished.
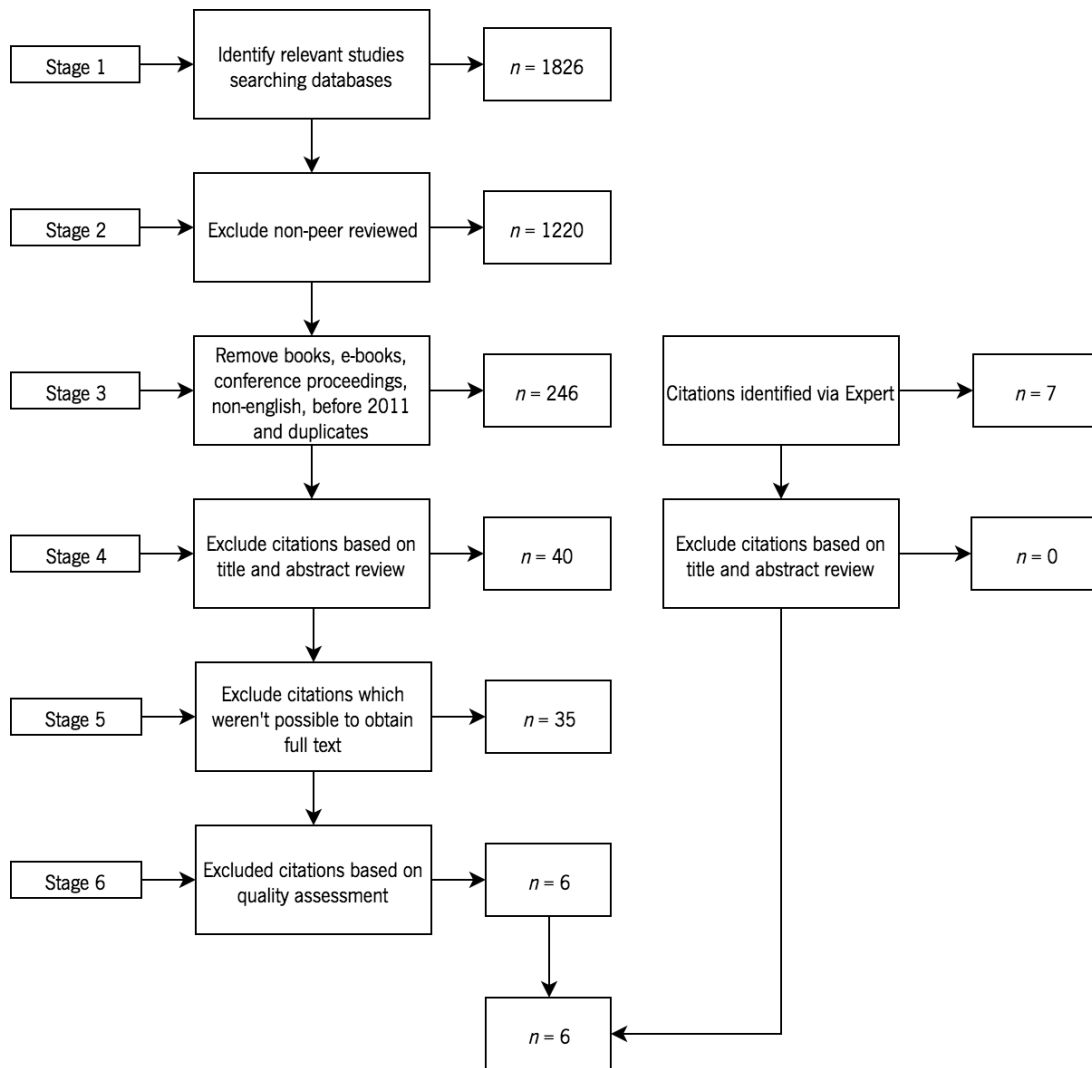
Figure 3 - Stages of the study selection process

1.6 DATA EXTRACTION

After the conclusion of the quality assessment, data extraction was started using using nVivo software.

During quality assessment, there was some preliminary coding based on the study characteristics to assist the process, but also to help understand some trends and tendencies for future data extraction. As mentioned by Boland et al. (2014), this is one type of data needed for a systematic review, descriptive data, the other being analytical data. As so, it was created 2 folders in nodes at nVivo, one for Descriptive Data and another for Analytical Data categories.

For Descriptive Data it was extracted title, year, author (s), reference type and research methodology. For Analytical Data, it was decided to gather goal/objective, scope, action, results, limitations/recommendations and dropout factors and strategies to overcome dropout factors. This two last categories were based from the work of Lee and Choi (2011), a review from existing empirical studies on online course dropouts in post-secondary education published from 1999 to 2009. This study was the closest reference we could find to our review question, and was used to categorize evidence from the citations.

The review proposes two main categories with the same structure, each with three sub-categories and several sub-sub-categories:

1) Dropout factors

    a) Student factors

        i) Academic Background

        ii) Psychological attributes

        iii) Relevant experiences

        iv) Skills

    b) Course/Program factors

        i) Course design

        ii) Institutional supports

        iii) Interactions

    c) Environmental factors

        i) Supportive environments

        ii) Work commitments

2) Strategies to overcome dropout factors

    a) Student factors

        i) Academic Background

        ii) Psychological attributes

        iii) Relevant experiences

        iv) Skills

    b) Course/Program factors

        i) Course design

        ii) Institutional supports

        iii) Interactions

   c) Environmental factors

      i) Supportive environments

      ii) Work commitments

Summary of Dropout factors based in Lee and Choi (2011) to assist the categorization:

Student factors

Academic Background	- GPA
	- Previous academic performance
	- SAT math score
Psychological attributes	- Locus of control
	- Motivation
	- Goal commitment
	- Love of learning
	- Self-Efficacy
	- Satisfaction
Relevant experiences	- Educational level
	- Number of previous courses completed online
	- Number of previous distance learning courses
	- Previous experience in the relevant field
	- Involvement in professional activities in relevant field
Skills	- Time management skills
	- Underestimation of the time required to balance their academic and professional obligations
	- Ability to juggle roles/balancing multiple responsibilities
	- Strong coping strategies
	- Resilience
	- Relevant prior computer training (searching the internet training, operating systems and file management training, and internet application training)
	- Computer confidence

Course/Program factors

Course design	-	Team-building activities
	-	Program quality
Institutional supports	-	Administrative support
	-	Student support infrastructure
	-	Orientation
	-	Tutorial attendance
Interactions	-	Inter-student interaction
	-	Faculty interaction with students
	-	Student participation

Environmental factors

Supportive environments	-	Financial aid
	-	Support from family, work, friends
	-	Emotional Support
	-	Supporting environments allowing study time
	-	Life circumstances
	-	Life challenger
	-	Life events
Work commitments	-	Employment status
	-	Work commitments
	-	Increased pressure of work
	-	Changes in work responsibilities and environments

Summary of Strategies to overcome dropout factors based in Lee and Choi (2011) to assist the categorization:

Student factors – Understanding of each student's challenges and 51ounselli

| Academic Background | - | Provide high quality and responsiveness of academic advising |
| Psychological attributes | - | Operate a screening procedure to determine students' locus of control |

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Relevant experiences	-	No strategies currently mentioned in the studies reviewed
Skills	-	Pre-assess students' skills
	-	Administer the diagnosis of students' basic skills (e.g., writing, computer, mathematics, and critical thinking) before course registration and offer remedial courses or technical training if necessary
	-	Provide computer training
	-	Ensure that students are comfortable with technology and have good writing skills
	-	Utilize a battery of autonomous assessment tools that can be scored immediately using computer adaptive assessment

Course/Program factors – Providing quality course activities and well-structured supports

Course design	-	Limit the class size to 20 students
	-	Offer a cohort- and team-based learning experience with extensive faculty feedback and interaction
	-	Provide content which is relevant to students' experiences and interests
	-	Make course content flexible and self-directive for students to access and explore
	-	Make curriculum more interesting and interactive to encourage student participation
	-	Reinforce a teacher's role as a facilitator of interactive learning
	-	Increase interaction in classroom using communication technology tools
Institutional supports	-	Identify at-risk students and provide them with appropriate training opportunities and guidance
	-	Provide student orientation programs including training in the use and application of Internet technologies
	-	Utilize advisers or tutors to support students
	-	Provide staff trainings to qualify them to provide guidance and support in online courses to qualify them

	-	Establish institutional student support infrastructure
Interactions	-	Use technological tools to facilitate and promote peer interaction
	-	Create online interaction forums that are compatible with these motivations to increase student–student interaction within an online course
	-	Monitor students' involvement in learning activities and their continuous progress
	-	Encourage extensive faculty feedback and interaction
	-	Develop online learning community

Environmental factors – Handling environmental issues and emotional challenges

Supportive environments	-	Use questionnaires to ascertain students' level of maturity and life challenger status
	-	Identify students as early as possible who might be more at-risk for excessive personal demands
	-	Have advisers trained to counsel students at a personal level
	-	Provide 53ounselling services that respond to emotional and health issues to meet students' need to feel socially connected not only to peers and faculty but also to staff at the institution
	-	Supply resources to ease the trauma involved in dropout decision when a student comes to the conclusion that withdrawal is indeed the best action to take
Work commitments	-	No strategies currently mentioned in the studies reviewed

2. ANALYSIS AND SYNTHESIS

This chapter in a Systematic Review is meant to present and summarize data (Boland et al., 2014). For the analysis of qualitative data, we privileged a content analysis (Bardin, 1979). Bardin (1979) features content analysis as empirical and, therefore, cannot be developed based on an exact model. However, for its operation, we followed some basic rules. First, the fundamental principles are explained: units of analysis, step models, working with categories, validity and reliability. Then, the central procedures of qualitative content analysis, inductive development of categories and deductive application of categories, are worked out.

2.1. DESCRIPTIVE DATA

Table 5 – Summary of descriptive data (continues)

Short Citation	Full Citation	Ref. type	Methodology
Deschacht (2015)	Deschacht, N., & Goeman, K. (2015). The effect of blended learning on course persistence and performance of adult learners: A difference-in-differences analysis. *Computers & Education, 87*, 83-89.	Journal article	Quantitative
Flynn (2015)	Flynn, A. B. (2015). Structure and Evaluation of Flipped Chemistry Courses: Organic & Spectroscopy, Large and Small, First to Third Year, English and French. *Chemistry Education Research and Practice, 16*(2), 198-211.	Journal article	Quantitative
Gaytan (2013)	Gaytan, J. (2013). Factors Affecting Student Retention in Online Courses: Overcoming This Critical Problem. *Career and Technical Education Research, 38*(2), 145-155.	Journal article	Qualitative
Kalet (2013)	Kalet, A., Ellaway, R., Song, H., Nick, M., Sarpel, U., Hopkins, M., Hill, J., Plass, J., & Pusic, M. (2013). Factors influencing medical student attrition and their implications in a large multi-center randomized education trial. *Advances in Health Sciences Education, 18*(3), 439.	Journal article	Quantitative

Table 5 – Summary of descriptive data

Short Citation	Full Citation	Ref. type	Methodology
Leeds (2013)	Leeds, E., Campbell, S., Baker, H., Ali, R., Brawley, D., & Crisp, J. (2013). The impact of student retention strategies: an empirical study. *International Journal of Management in Education, 7*(1/2), 22.	Journal article	Quantitative
Robinia (2012)	Robinia, K. J., Maas, N. A., Johnson, M. M., & Nye, R. M. (2012). Program Outcomes Following Implementation of a HYBRID CURRICULUM at the CERTIFICATE LEVEL. *Nursing education perspectives, 33*(6), 374-377.	Journal article	Quantitative

2.2. ANALYTICAL DATA

Analytical data was classified in eight categories: (i) modality, (ii) goal/objective, (iii) scope, (iv) action, (v) results, (vi) limitations/ recommendations, (vii) dropout factors, and (viii) strategies to overcome dropout factors.

Table 6 - Summary of Modality category (continues)

Citation	Evidence
Deschacht (2015)	Blended Classroom Course: "Faculty of Economics and Business launched a blended curriculum in its evening programme for adult students around the following key principles: 1) supported independent learning, 2) online co-operation and 3) face-to-face classroom teaching"
Flynn (2015)	Web-Enhanced course "In the flipped course, content traditionally delivered in lectures is moved online; class time is dedicated to focused learning activities."
Gaytan (2013)	Online Course: "The purpose of this study was to determine what a panel of 15 experts would identify as critical factors affecting student retention in online courses that will serve as implications for educational leaders to guide their student retention strategies, online organizational structures, institutional policies, and online instructional activities"
Kalet (2013)	Web-Enhanced Course

Table 6 - Summary of Modality category

Citation	Evidence
Leeds (2013)	Online Course: "This study investigated the impact of student retention strategies on retention rates in an online information systems course"
Robinia (2012)	Blended Classroom Course: "A hybrid curriculum, defined as offering 50 percent of second-semester theory course content online, was implemented"

Table 7 - Summary of Goal / Objective category

Citation	Evidence
Deschacht (2015)	"This paper aims to contribute to the debate on the effects of blended learning on student retention and performance"
Flynn (2015)	"To promote student learning and success"
Gaytan (2013)	"analyze critical factors affecting student retention in online courses that could serve as implications for educational leaders to guide their student retention strategies, online organizational structures, institutional policies, and online instructional activities."
Kalet (2013)	"The goal of this paper is to inform the design, reporting and application of future controlled trials in medical education by illustrating the need to carefully profile student participants in research studies who persist in or leave the studies over time and in doing so their representativeness of the populations from which they are drawn."
Leeds (2013)	"This study investigated the impact of student retention strategies on retention rates in an online information systems course."
Robinia (2012)	"This study examined satisfaction levels and learning outcomes before and after implementation of a hybrid curriculum."

Table 8 - Summary of Scope category (continues)

Citation	Evidence
Deschacht (2015)	"We use a large administrative data set containing the exam results of a business programme at the campus Brussels of the KU Leuven in Belgium. All analyses are based on the exam results for 17,368 course enrolments of 1883 freshmen (both adult and regular learners), who either enrolled in the three-year undergraduate programme or in the bridge programme, which is open only to students who already have another bachelor's degree." (...) "there are 30 different courses in the analysis" (...) "The full programme consists of courses on accounting, business (e.g. management and marketing), economics (e.g. micro and macro economics), humanities (e.g. psychology and law), languages and methods (e.g. statistics and research methods)."
Flynn (2015)	"four undergraduate organic chemistry and spectroscopy courses at the first to third year level" (...) "The courses included Organic Chemistry I (CHM 1321, ~400 students, winter 2014), Organic Chemistry II (CHM 2120, ~400 students, fall 2013), Applications of Spectroscopy in chemistry (CHM 3122, ~140 students, fall 2013), and Applications de la spectroscopie en chimie (CHM 3522—the French version of 3122, 17 students, fall 2013)."
Gaytan (2013)	15 experts conducted a 3 round Delphi technique to understand their perceptions and recommendations about critical factors affecting student retention in online courses. "Expert participants were administrators with at least five years of experience working with online education and sufficient knowledge and experience with the various aspects involving student retention in online learning.".
Kalet (2013)	"The data is from a randomized controlled trial conducted at seven US medical schools investigating the educational impact of different instructional designs for computer-based learning modules for surgical clerks" (...) "All third-year medical students at the seven participating schools (N = 1,363)." (...) "Of the 1,363 eligible students, 995 entered the study representing an overall response rate of 73 % (ranging from 44 to 81 % across the seven schools)." (...) "Six of the schools had an 8-week long clerkship while one school had a 12-week clerkship."
Leeds (2013)	"A total of 162 students participated in the experiment." (...) "online information systems course" (...) "BISM 2100 is a pre-requisite course for entrance into the College of Business for both the traditional and the online programmes. It is part of the lower division core group of courses and must be completed successfully with a 'C' or better by all business majors"

Table 8 - Summary of Scope category

Citation	Evidence
Robinia (2012)	"The practical nursing program is housed in a four-year public university and admits up to 50 students annually." (...) "the records of all students admitted during the years 2004-2009 were examined, yielding a total of 225 graduates. Of these, 119 alumni were in the prehybrid group and 100 were in the hybrid group. There were 27 males and 198 females ranging in age from 18 to 60, with the average being 29.5 years of age. The ethnic backgrounds of the graduates (92 percent Caucasian in both groups) reflected that of universities in the surrounding community"

Table 9 - Summary of Action category (continues)

Citation	Evidence
Deschacht (2015)	"We exploit the variation from a series of natural experiments at a large university in Belgium, in which blended learning was introduced for one group of beginning business students - but not for another group of students who took identical exams."
Flynn (2015)	The conversion of large and small chemistry courses (organic & spectroscopy) to flipped course models at the first to third year undergraduate level.
Gaytan (2013)	A 3 round "delphi technique was used to collect and examine panelists' perceptions, experiences, and recommendations that would serve as implications for educational leaders to guide their student retention strategies, online organizational structures, institutional policies, and online instructional activities."
Kalet (2013)	"This paper considers volunteer bias as it impacted the WISE Trial, a large prospective trial that involved medical students at seven different US undergraduate medical schools" (...) "... we use the WISE Trial dataset to describe institutional and student factors associated with student participation and attrition rates." (...) "Each participant was asked to complete two online modules and three assessments based on the content of these modules. Each module, without assessments, represented approximately an hour of study time. Students were free to decide when and how quickly they completed the modules. Log data on participants' use of the WISE Trial modules and their completion of the study assessments was recorded by the online WISE-MD (a collection of online modules) system." (...) "Attrition study measures. The main outcome measure for this attrition study was the degree to which the medical students continued to participate in the WISE-Trial (a large multicenter field experiment using WISE-MD modules). Full participation in the study required them to complete (...) five study procedures"

Table 9 - Summary of Action category

Citation	Evidence
Leeds (2013)	"The faculty in the Online Bachelor's in Business Administration (BBA) programme in the Coles College of Business at Kennesaw State University developed a systematic approach for improving retention based on a framework contained in the Angelino et al. (2007) study." (...) "strategies were designed and executed in "Business Information Systems and Communication" (BISM 2100) during the spring 2009 semester."
Robinia (2012)	"A hybrid curriculum, defined as offering 50 percent of second-semester theory course content online, was implemented in order to free students from place-bound instruction and thereby open new clinical opportunities." "After a three-year cycle, program outcomes were compared between a prehybrid group of graduates and the hybrid graduates."

Table 10 - Summary of Results category (continues)

Citation	Evidence
Deschacht (2015)	"A first contribution of the study is related to the proposed model. We assert that it is a valid approach to assess learning effectiveness based on administrative data: it allows measuring the net effect and it enables detailed analyses per subset of courses, controlling for particular changes over time." (...) "If we compare the period before (Pre) and after (Post) the introduction of blended learning, we see an increase in the dropout rate among the treated students, from 35 to 41 percent. However, there is a substantial increase of the exam pass rate from 62 to 71 percent. These dropout and exam pass rates are not independent: dropout students are usually weaker students, so that an increase in dropout rates should produce an increase in the exam scores simply because the sample of students participating in the exam is restricted to stronger students (selectivity)" (...) "Our main findings are that blended learning has a negative effect on course retention (increased dropout rates) and a positive effect on student performance (higher exam scores). It is important to keep in mind that retention and performance on exams are directly related because of selectivity effects: if more students drop out because of blended learning activities, the remaining students that do take the final exams are likely to be positively selected (they have observed and unobserved characteristics that are positively correlated with performance)."

Table 10 - Summary of Results category (continues)

Citation	Evidence
Flynn (2015)	"The courses taught in a flipped model were compared to courses taught with the same course content. First, chi-square tests of independence were performed to compare the withdrawal rates between the flipped course format and previous years' data. The analyses revealed statistically significant reductions in withdrawal rates in both Organic Chemistry I and Organic Chemistry II courses taught in the flipped course format compared to previous years (...) Two exceptions were noted in Organic Chemistry I in 2010, (...) and in Organic Chemistry II in 2011. (...) The courses taught in a flipped format had average risk of withdrawal reductions of 3.1% and 4.2% for Organic Chemistry I and II, respectively." "While it could not be concluded that the flipped classroom model caused the improvements in the withdrawal rates, failure rates, and final grades, the evidence suggested at least a correlation with the flipped classroom model."
Gaytan (2013)	"Overall, the top three themes that emerged from this study were student self-discipline, quality of faculty and student interaction, and institutional support to students." (...) "Recommendations by Expert Panelists" (...) "1. Online students must receive a mandatory, face-to-face or online (e.g., training modules) orientation and training session prior to the beginning of the online course to ensure students understand the impact of self-discipline and time-management skills on their academic success in online courses. 2. Online students must be screened to ensure that they possess adequate computer skills and self-discipline to be considered a "good fit" for the online learning environment. Regarding self-discipline or self-regulation, students must become more responsible for their own learning to ensure academic success in online courses. 3. Online faculty must understand the critical importance of dynamic faculty-student and student-student interaction to the success of an online course. Institutions should monitor instructor response time and online presence. Professional development programs must be designed and delivered to ensure that instructors teaching online courses have received adequate training and, as a result, are very much aware of what works and what does not. 4. More effective and efficient online student support services must be available, such as tutoring, financial aid counseling, online course registration, online training and orientation modules, and remediation for struggling students. Online faculty play a very critical role in identifying at-risk students and refer them to the remediation support specialists."

Table 10 - Summary of Results category

Citation	Evidence
Kalet (2013)	"The NBME (US National Board of Medical Examiners) Subject exam was worth 20–30 % of the final clerkship grade in four of the programs while it was worth 45–60 % of the grade in the two with higher attrition rates, suggesting that the greater the portion of the overall clerkship grade attributed to by the NBME subject examination, the less likely participants were to persevere (p\0.001). No difference was found between urban and non-urban schools. While lower participant baseline self-regulation and self-efficacy and final NBME Subject Exam scores were correlated with attrition from the study, goal orientation measures (Mastery, Performance Approach and Performance Avoidance) did not correlate with attrition"
Leeds (2013)	"the final retention rate for the treatment group was 70.37% vs. 69.14% for the control group; this is not a statistically significant difference. These results suggest that the combined effect of the retention strategies was negligible." (...) "In summary, the retention strategies implemented in this study did not have a statistically significant impact on student retention rates. That is, those students in the treatment group who were exposed to a variety of retention strategies were just as likely to withdraw from class as those students in the control group who did not receive the additional retention activities." (...) "The most useful information from these results is that the highest percentage of withdrawals occurred within those who participated in the Personal Phone Call activity because that is also the activity with one of the lowest participation rates" (...) "The overwhelming reason for consideration of dropping the course was the required workload" (...) "many of the students who withdrew, also withdrew from all of their online courses, started with a heavy course load or did not need this course for their major."
Robinia (2012)	"Findings indicate no significant differences in NCLEX pass rates and grade outcomes between the groups and an improvement in satisfaction and attrition rates." (...) "an examination of attrition rates revealed that attrition was lower for the hybrid group at 1.3 percent compared with 4.8 percent for the prehybrid group during the second semester. An important aside is that attrition rates for both groups during the second semester reflected academic failures only. These findings correlate with the course grade outcomes, which reflected significantly higher Maternal-Child grades for hybrid students and no differences in Medical-Surgical II grades" (...) "The faculty found that using a hybrid curriculum resolved clinical space issues with an entire day now open for clinical scheduling."

Table 11 - Summary of Limitations/Recomendations category (continues)

Citation	Evidence
Deschacht (2015)	"In future analyses, ideally, the proposed measures are to be linked to other continuous quality improvement progress indices (Barrie, Ginns, & Prosser, 2005) and integrated in a multimethod evaluation of blended learning such as Laumakis, Graham, and Dziuban (2009). Another potential direction for future research is to study whether the effects of blended learning are a function of student characteristics (e.g. socio-demographics and prior schooling experience). In this way we could assess the inclusive character of the blended learning programme (cf. http://www.epractice.eu/files/media/media2232.pdf). If considered strategically important, also estimations of efficiency at the institutional level (reduced costs) or at the individual learner level (reduced learning time) could be made." (...) "A logical next step is to process these data and investigate students' blended learning experiences in an interpretative way (cf. Stracke, 2007)"
Flynn (2015)	"Only a very small part of a complex puzzle has been studied here. In the future, other factors that might have caused the positive effects observed should also be considered, including social, emotional, experiential, and cultural factors. Other potential outcomes of the new classroom model could also be investigated, such as its impact on students' argumentation skills (Kulatunga et al., 2013), conceptual change (Duit and Treagust, 2003), and metacognitive ability (Sandi-Urena et al., 2011)."
Gaytan (2013)	"Because this research study included only a handful of experts in the area of online instruction, researchers are encouraged to replicate this study using a larger sample of experts. In addition, researchers are encouraged to conduct formal, scientific research studies that employ other methodologies."
Kalet (2013)	"Field medical education trials, such as this one, are intrinsically bound to the contexts in which they take place (Hawe et al. 2004)." (...) "Because this dataset was from a study designed to assess educational effectiveness of CAI, and not attrition from educational research, we measured only those student characteristics known to impact learning therefore missing the opportunity to fully understand attrition by measuring relevant characteristics. (e.g. social responsibility, altruism, attitudes toward being subjects of research). When asked directly about this in focus groups, student participants at each study site consistently identified the main cause of attrition as competing time demands."
Leeds (2013)	"the findings highlight the importance of empirically testing these strategies prior to acceptance and inclusion in online courses" (...) "The ultimate goal is to determine characteristics of successful as well as unsuccessful online learners. Therefore, more research is needed to sort out confounding academic (GPA, previous online experience) and demographic factors that may be related to retention and success of students in online courses."

Table 11 - Summary of Limitations/Recomendations category

Citation	Evidence
Robinia (2012)	"The findings from this curriculum evaluation are limited to the experiences of this homogenous sample of students. Further inquiry is necessary to determine if hybrid learning outcomes are similar for a broader and more diverse population of certificate students. Results might also alter as new technologies evolve and faculty experience with online teaching expands. Finally, this sample population benefited from standardized computers, platforms, and an accessible help hotline. Therefore, caution for nurse educators working in environments lacking similar technological support is prudent."

Table 12 - Summary of Dropout factors category (continues)

Citation	Evidence	Dropout
Gaytan (2013)	**Course/Program Factors - Institutional Supports** "The top three factors that affect student retention in online courses were student self-discipline, quality of faculty and student interaction, and institutional support to students." (...) "By ''institutional support,'' experts meant that students must receive adequate support from the educational institution regarding admissions, registration, financial aid, tutoring, programs, policies, and procedures."	Expert knowledge and experience
	Course/Program Factors – Interactions Quality of faculty and student interaction "The second highest rated factor affecting student retention in online courses was quality of faculty and student interaction."	
	Student Factors – Psychological attributes Self-regulation/self-discipline "Expert panelists rated student self-discipline as the number one factor affecting student retention in online courses" "Artino (2008) referred to student self-discipline as the students' ability to self-regulate"	

Table 12 - Summary of Dropout factors category

Citation	Evidence	Dropout
Kalet (2013)	**Student Factors – Psychological attributes** <u>Self-Efficacy, Self-Regulation</u>	Correlated
	Course/Program Factors - Course Design <u>Exam weight of the course overall grade (correlated as weight increased)</u> "the greater the portion of the overall clerkship grade attributed to by the NBME subject examination, the less likely participants were to persevere"	
	Student Factors – Psychological attributes <u>Mastery goal orientation</u> "The individual preference for an absolute or intrapersonal standard in learning or achievement" <u>Performance approach—goal orientation</u> "The preference for setting individual goals based on a positive normative standard in learning or achievement" <u>Performance avoidance— goal orientation</u> "The preference for setting individual goals based on a on a negative normative standard in learning or achievement"	Non-correlated
	Environmental factors - Institutional characteristics <u>Urban/Non-Urban</u>	
Leeds (2013)	**Course/Program Factors - Course Design** <u>Required workload</u> "The overwhelming reason for consideration of dropping the course was the required workload."	Student survey

Table 13 - Summary of Strategies to overcome dropout factors category (continues)

Citation	Evidence	Dropout
Deschacht (2015)	**Course/Program Factors - Course Design** Online self-testing Screencast	Increased
	Course/Program Factors - Institutional Support Provide students greater flexibility "In the blended programme students have 8 h of lectures per week, complemented with a broad series of online applications such as web colleges, screencast, online self-testing, virtual office hours to support and assess learners' study activities, and provide them with greater flexibility in comparison with the regular programme." Establish institutional student support infrastructure "virtual office hours to support and assess learners' study activities"	
Flynn (2015)	**Course/Program Factors - Course Design** Repetition of activities every week "Each week began (from the students' point of view) by reading the ILOs followed by watching a video or reading the appropriate section in the textbook. Students completed a pre-class test before coming to class. Class time was dedicated to interactive learning activities. The weekly cycle ended with an online assignment (optional in the spectroscopy courses)."	Decreased

Table 13 - Summary of Strategies to overcome dropout factors category (continues)

Citation	Evidence	Dropout
Flynn (2015)	**Course/Program Factors - Course Design** <u>Structured course format</u> "structured course format that kept the students' responsibilities predictable (e.g., with consistent deadlines) while communicating high expectations;"	Decreased
	Course/Program Factors - Institutional Support <u>Extra, outside class learning support</u> "Extra learning supports were available for outside of class time, including tutorials, office hours, discussion forum, etc." <u>Classroom management experience</u> "this author's previous experience in classroom management; having previous taught lectures that were frequently punctuated by active learning opportunities using CRS questions facilitated the transition to a full flipped format;" <u>Facile Access to technical support</u> "facile access to technical support. Although not often needed, the rapid technical support from the Teaching and Learning Support Service was invaluable" <u>Establish institutional student support infrastructure</u> "teaching assistants who reviewed assignments and communicated areas of student difficulties"	
	Students Factors - Psychological attributes <u>Student's openness</u> "students' openness to working in a new classroom format."	

Table 13 - Summary of Strategies to overcome dropout factors category (continues)

Citation	Evidence	Dropout
Gaytan (2013)	**Course/Program Factors - Course Design** <u>Mandatory self-discipline and time-management training prior to the beginning of an online course</u> <u>Student self-discipline and adequate computer skills screening</u>	Expert recommendation

	Students Factors - Skills
	
	    <u>Self-discipline</u>
	
	    <u>Time management</u>
	
	    <u>Computer Skills</u>
	
	    <u>Self-regulation</u>
	
	    "Online students must receive a mandatory, face-to-face or online (e.g., training modules) orientation and training session prior to the beginning of the online course to ensure students understand the impact of self-discipline and time-management skills on their academic success in online courses."
	
	    "Online students must be screened to ensure that they possess adequate computer skills and self-discipline to be considered a "good fit" for the online learning environment. Regarding self-discipline or self-regulation, students must become more responsible for their own learning to ensure academic success in online courses."	

Leeds (2013)	**Course/Program factors – Course Design** <u>Syllabus quiz</u> <u>Course contract</u> <u>Student services</u>	Neutral
	Course/Program factors – Interactions <u>Email reply</u> <u>Ice Breaker</u> <u>Personal phone call</u> <u>Learning community</u>	

Table 13 - Summary of Strategies to overcome dropout factors category (continues)

Citation	Evidence	Dropout
Robinia (2012)	**Course/Program factors - Course design** Embedding of instructional support materials into online modules "With the goal of saving interactive content material for face-to-face classes, a review was conducted of all content for second semester courses. Instructional support materials, such as online video vignettes, skill modules, and case studies, were subsequently embedded directly into online learning modules." Gradual addition of online learning applications in a face-to-face environment "For students, there was also a deliberate and gradual addition of online learning applications in the face-to-face environment. For example, during first-semester lecture courses, students were required to use the WebCT platform to obtain lecture materials, submit assignments, post on discussion boards, and take online quizzes." Iteration based on knowledge and experience "Online teaching modalities evolved as individual faculty became more knowledgeable and comfortable with different online teaching practices."	Decreased

Table 13 - Summary of Strategies to overcome dropout factors category

Citation	Evidence	Dropout
Robinia (2012)	**Course/Program factors - Institutional supports** _Provide staff trainings to qualify them to provide guidance and support in online courses_ Faculty had previous knowledge in "campus course management system and used Blackboards WebCT to post syllabi, notes, grades, and announcements" and was committed to extend Faculty knowledge of "effective online teaching practices by attending on-campus seminars and reviewing pertinent literature" _Establish institutional student support infrastructure_ "Review of current campus support systems" _Universal laptop program_ "Universal laptop program: laptops are leased to all full-time students to ensure that faculty and students have the same hardware and software applications and access to technical support platforms" _Faculty consistency_ "The entire six-year period under study, there was a minimum of one consistent faculty member teaching in each course. In 2007, one new faculty member in Maternal-Child and one new faculty member in Medical-Surgical nursing were oriented to the course and online formal by senior faculty." _Faculty freedom to (re)design online lessons to meet course objectives_ "the individual freedom to design or redesign online lessons in order to meet course objectives" _Faculty commitment in keeping 50% of content online_ "All faculty remained committed to ensuring that 50 percent of course content remained online"	Decreased

3. DISCUSSION

DESCRIPTIVE DATA

Only one citation conducted a qualitative study, Gaytan (2013), while the rest were quantitative. All of the references were Journal articles.

ANALYTICAL DATA

Regarding **Modality** and following Mayadas, Miller, and Sener (2015) course-level definitions, one citation conducted research using a Blended Classroom format (Deschacht, 2015) where "online activity is mixed with classroom meetings, replacing a significant percentage, but not all required face-to-face instructional activities", two using a Web-Enhanced format (Flynn, 2015; Kalet, 2015) where "internet-based work augments classroom activity", two using an Online format (Gaytan, 2013; Leeds, 2013) where "all course activity is done online" and finally one using a Blended Online format (Robinia, 2012) where "most course activity is done online".

Only half of the citations **Goals/Objectives** was directly related with dropout and attrition. Deschacht (2015) focused on the effects of blended learning in student retention and performance, Gaytan (2013) analysed critical factors affecting student retention in online courses and Leeds (2013) the impact of retention strategies on retention rates in an online course. The remaining citations were aimed at student learning and success (Flynn, 2015), informing the design, reporting and application of future controlled trials in medical education (Kalet, 2013) and examining satisfaction levels and learning outcomes before and after the implementation of a hybrid curriculum.

Looking at the **Scope** category, we realize that all the citations analysed had their research conducted at Higher Education, at one or multiple undergraduate courses, except Gaytan (2013), which conducted a 3 round Delphi technique with 15 online education and student retention in online learning experts.
Of those citations that conducted research at Higher Education, Deschacht (2015) collected data from 30 courses in a Business program, Flynn (2015) from four organic chemistry and spectroscopy courses, Kalet (2013) from computer-based learning modules for surgical clerks at

seven medical schools, Robinia (2012) from a practical nursing program during the years 2004-2009, Leeds (2013) from an online information systems course which is a pre-requisite course into the College of Business.

Deschacht (2015) had the larger number of sample size (N), 1833 first year students, followed by Kalet (2013) with 1363 elegible third-year medical students (995 entered the study), Flynn (2015) had around 957 students, Robinia (2012) had 225 students and Leeds (2013), 162 students.

Regarding the **Action** category, Deschacht (2015) and Robinia (2012) both researched blending programs. While the former exploited the variation from a series of natural experiments in which blended learning was introduced for one group but not for another group who took identical exams, the latter applied a hybrid curriculum offering 50 percent of second-semester theory course content online and compared program outcomes between a prehybrid group of graduates and the hybrid graduates after a three-year cycle.

In a smaller scale, Flynn (2015) studied the blending of four large and small courses, but by using the flipped classroom strategy at the first to third year undergraduate level.

Gaytan (2013) used a 3 round Delphi technique to collect experts' perceptions, experiences and recommendations that would serve as implications for educational leaders to guide their student retention strategies, online organizational structures, institutional policies, and online instructional activities.

Kalet (2013) used a trial dataset to describe institutional and student factors associated with student participation and attrition rates, taking in consideration volunteer bias. Participants were asked to complete two online modules and three assessments based on that modules and log data was recorded of their actions. The main outcome measure for this attrition study was the degree to which the medical students continued to participate in the trial.

Leeds (2013) researched the implementation of retention strategies at the "Business Information Systems and Communication" online course.

Analysing the **Results** category, Deschacht (2015), beside the (unsuccessful) strategies used to overcome dropout and the increase of exam pass rate due to a selectivity effect after the weaker students had drop out, provided a useful model to assess learning effectiveness based on administrative data. Flynn (2015) evidences suggest at least a correlation of withdrawal rates, failure rates and final rates with the flipped classroom model. Gaytan (2013) main findings were

the top three critical factors affecting student retention in online courses and the recommendation to overcome those factors. Kalet (2013) found correlated and uncorrelated factors with attrition. One correlation was test the exam weight of the course overall grade, which may lead students prioritizing study time for examp preparation rather than other course activities. Leeds (2013) combined strategies to overcome dropout had no statistically significant effect and found that the main reason for withdrawal was the required workload, and that many also withdrew from all of their online courses, started with a heavy course load or did not need this course for their major. Robinia (2012) researched intervention was successful in resolving clinical space issues by implementing a hybrid format while improving satisfaction and attrition rates. There were no differences in pass rates and grades outcomes between prehybrid and hybrid groups.

For the **Limitations / Recommendations** category, Kalet (2013) and Robinia (2012) found relevant to mention the research context as a limitation. The latter regarding the specificity of a field medical education trial, the former regarding the homogenous sample population and their technological support benefits.

It was also recommended that other research methodologies should be used by Gaytan (2013) and Deschacht (2015). This last citation mentioning that students blended learning experiences should be analysed in an interpretive way.

Deschacht (2015) and Flynn (2015) question the effect of other factors while implementing a blended learning and flip classroom model, respectively, and recommend further research.

Furthermore, Deschacht (2015) recommends to combine strategies to overcome dropout with improvement progress indices, to integrate measures in a multimethod evaluation approach of blended learning and the authors question if the level of inclusiveness of blended learning can be assessed by studying students' characteristics. Flynn (2015) that other potential outcomes of flipped classroom model should be investigated. Gaytan (2013) to replicate the study with bigger sample of experts. Leeds (2013), which concluded no statistically significant difference in the retention strategies implemented, recommended to empirically test strategies before including them in online courses and that more research is necessary to understand complex academic and demographic factors that may be related to retention. Robinia (2012) refers the that rapid adoption of technology and experience in faculty can lead to different results in future.

Out of the six citations, half mentioned **dropout factors** and five mentioned **strategies to overcome dropout factors**. Leeds (2013) and Gaytan (2013) were the only citations that had both categories. In Leeds (2013), students were provided with a survey in order to assess the reasons for them not persisting after the implementation of strategies to overcome dropout, while in Gaytan (2013), experts recommended several strategies to overcome their previously pointed factors for dropout.

Only one citation (Kalet, 2013) found a tangible relationship between dropout factors and dropout rates, were correlation was found with two factors, one related with a Psychological attribute of the student (Self-Efficacy, Self-Regulation), another with Course Design (exam weight of the course overall grade), and no correlation with three Psychological attributes of the student (Mastery goal orientation, Performance approach—goal orientation, Performance avoidance— goal orientation) and an Institutional characteristic (Urban/Non-Urban). As for the other two citations, their results require validation in order to relate them in dropout rates. In Gaytan (2013), a panel of 15 experts identified critical factors affecting student retention in online courses, while Leeds (2013) results were based on a student's survey after they have dropped out.

Out of the ten dropout factors found in three citations, four were related with Course/Program factors, five with Student factors and one to Environmental factors, but only three were correlated or was attributed with the increase of dropout based on empirical evidence. From those three factors, two were related with Course Design: exam weight of the course overall grade (Kalet, 2013) and required workload (Leeds, 2013); and one related with the Students' Psychological attributes: Self-Efficacy (the judgment of personal capability in a specific domain), Self-Regulation (self-generated thoughts, feelings, and actions for attaining academic goals) (Kalet, 2013). We believe that carefully planning the exam weight of the course overall grade and considering the required workload is as clear of a course design decision as measuring students' Self-Efficacy and Self-Regulation, and helpful in devising strategies to minimize dropout.

Regarding strategies to overcome dropout factors, there were some that didn't produce a positive effect in retention. Deschacht (2015) strategies had a negative impact in course retention, Leeds (2013) strategies had no statistically significant impact. Still, understanding what didn't work, in their own context, can be helpful when considering strategies in future courses.

The other two citations (Flynn,2015; Robinia, 2012) found that their strategies were successful in reducing dropout/attrition while Gaytan (2013) provided expert recommendations. In any of these

cases, strategies to overcome dropout shouldn't be considered separately, they are part of a set of implemented/recommended strategies.

All of the 34 strategies used to overcome dropout factors were different, there was no similar strategies in two or more citations.

Of the 12 Course/Program Factors - Institutional Support strategies, 2 had a negative effect in dropout, dropout increased (Deschacht, 2015), and 10 contributed to the decrease of dropout (Flynn, 2015 and Robinia, 2012).

From the 12 Course/Program Factors - Course Design strategies found, 3 had a neutral effect (no statistically significant results), 2 were related with an increase of dropout and 5 strategies had a positive effect in dropout (dropout decreased). All of the 4 Course/Program factors – Interactions strategies had a neutral effect in dropout, all from the Leeds (2013). Finally, there was one strategy related with Students Factors - Psychological attributes, student openness, that contributed to decreasing dropout.

4. CONCLUSIONS

After conducting a twelve-step scoping process, with two "false" starts to the *literature search* phase, a definitive protocol was written. With it, 1826 citations where identified, 6 of which were found to have an acceptable rigour, credibility and relevance.

The content citations were then analysed and categorized according to their descriptive and analytical data. As part of the analytical data, dropout factors and strategies to overcome dropout factors were further sub-categorized having Lee and Choi (2011) work as a reference.

Recovering our review question – ***What is the relationship between course design with attrition and dropouts in e-learning?***

The results showed that there is in fact a relationship. Robinia (2012) and Flynn (2015) were able to reduce dropout rates in blending face-to-face courses and Kalet (2013) found correlated and uncorrelated dropout reasons, which included elements in course design but also students' psychological attributes. Nevertheless, some weren't that successful. Deschacht (2015) efforts to blend a face-to-face course lead to increased dropout rates and Leeds (2013) strategies for online retention had no statistically significant impact. One study (Gaytan,2013), consulted 15 experts, revealing that the quality of faculty, student interaction, and institutional support to students were the top three dropout factors and their recommendation was to screen and train students in computer skills, time-management, self-discipline and self-regulation. This screening process can be embedded in e-Learning courses, by designing it them so.

Regarding the objective of confirming **course design as a problem affecting attrition and dropout in e-Learning**, the different outcomes found in dropout rates, even when trying to reduce them by course design (strategies applied) and obtaining an opposite result, does, in our opinion, validate this assumption. Still, it is worth to mention that Institutional supports also plays an important role, as seen in Flynn (2015) and Robinia (2012) where several of these strategies were applied, successfully reducing dropout rates.

We argue that, based on the results, that course design strategies or factors cannot be devised without the considerations of several other aspects, including students and institutional support factors. While **identifying dropout reasons in relationship with course design in e-**

Learning, one of our objectives, we believe that beside the actual course design factors previously identified in our results, that student factors can in fact be considered in course design. While student factors can be assessed and a course can eventually be designed accordingly, institutional support looks at a bigger picture, and typically involves a study program, faculty or institutional long term strategies.

The results of this review show that a single measure, an isolated strategy, or a course design change without carefully considering several other factors will most likely be insufficient to significantly reduce existing dropout rates as we cannot assume the causal effect from any of the factors exposed, or the strategies implemented, as none of the authors actually did so. Most refer the great number of existing variables and the fact that they can only track a few. Some found correlations, others even measured in what extent some strategies affected the dropout rates. Still, this study offers some possible approaches for e-Learning professionals, decision and policy makers while planning to reduce attrition and dropout in e-Learning courses. But positive results found in this review should take in consideration each citation context and the fact that it is based, as far it is known, on not yet replicable studies.

The infinite possible combinations of student's context, institutional support and course design in each e-learning scenario, highlights the importance of having models and methods to predict dropout, to assess learning effectiveness and to profile dropouts and completers rather than just simply identifying dropout reasons. We believe that this finding is as important as understanding the reasons and strategies used to overcome dropout and attrition.

To finalize, we hope that this dissertation can assist and facilitate fellow researchers work in conducting a systematic review.

4.1 LIMITATIONS AND RECOMMENDATIONS

Performing a systematic review is clearly very laborious and requires a great deal of persistence. Even more so when it's part of a European funded project, like this one, with deadlines and expectations which are not only based on this review author personal context and planning, but must be coordinated with the partners involved. Still, it is a highly valuable experience, closer to what is expected while working in an organization, which a dissertation in most cases, fail to

replicate. As an example, it was intended to take three months to perform the content analysis, and it took a year.

For this dissertation, the results and conclusions only reflect the data extraction conducted by the author, by his own choice. For the Better-e project, a future publication will compare data analysis results between more researchers, resolving potential differences and enriching this work results and conclusions, as it was, for the remaining stages in this study. Hopefully this publication can bring new insights.

For future studies, it would be interesting to explore the relationships between the analytical categories, as this study didn't focused on statistical analysis. Also, replicating the citation studies and exploring variations would help understanding the effect of individual variables while holding others constant.

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APPENDICES

APPENDIX 1 – TITLE AND ABSTRACT REVIEW TOOL

ID	Title	Abstract	Researcher1 (R1)	Researcher2 (R2)	R1 | R2	Excluded on:
1	Title	Abstract	Include Exclude Unsure	Include Exclude Unsure	Include Exclude	Reason
2	Title	Abstract	Include Exclude Unsure	Include Exclude Unsure	Include Exclude	Reason

APPENDIX 2 – QUALITY ASSESSMENT TOOL

Screening Questions

	Researchers		
	R1	R2	Final

1. Is there original data?
Consider:
–Is the paper based on research (or is it merely a "lessons l earned" report based on expert opinion?
–Does the study present empirical data?

R1	R2	Final
Yes No Can't tell	Yes No Can't tell	Yes No

2. Is there a clear statement of the aims of the research?
Consider:
- What was the goal of the research?
- Why it was thought important?
- Its relevance
- Does it address course design in e-learning courses and does it relate with dropout and/or attrition?

R1	R2	Final
Yes No Can't tell	Yes No Can't tell	Yes No

3. Is there an adequate description of the context in which the research was carried out?
Consider whether the researcher has identified:
- The type of course, based in either formal or non-formal education;
- The nature of the institution that promotes the course;
- The team involved developping the course (e.g. skills, tasks);

R1	R2	Final
Yes No Can't tell	Yes No Can't tell	Yes No

If question 1, 2 and 3, receive a "No" response do not continue with the quality assessment.

Detailed Questions

	Researchers		
	R1	R2	Final

4. Was the research design appropriate to address the aims of the research?
Consider:
– Has the researcher justified the research design (e.g. have they discussed how they decided which methods to use)?

R1	R2	Final
Yes No Can't tell	Yes No Can't tell	Yes No

5. Was the recruitment strategy appropriate to the aims of the research?
Consider:
–Has the researcher explained how the participants or cases were identified and selected?
–Are the cases defined and described precisely?
–Were the cases representative of a d efined population?
–Have the researchers explained why the participants or cases they selected were the most appropriate to provide access to the type of knowledge sought by the study?
- If there are any discussions around recruitment (e.g. why some people chose not to take part)
–Was the sample size sufficiently large?

R1	R2	Final
Yes No Can't tell	Yes No Can't tell	Yes No

6. Was the data collected in a way that addressed the research issue? Consider: –Were all measures clearly defined (e.g. unit and counting rules)? - If the setting for data collection was justified - If it is clear how data were collected (e.g. focus group, semi-structured interview etc.) - If the researcher has justified the methods chosen - If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews were conducted, or did they use a topic guide)? - If methods were modified during the study. If so, has the researcher explained how and why? - If the form of data is clear (e.g. tape recordings, video material, notes etc) - If the researcher has discussed saturation of data –Whether quality control methods were used to ensure completeness and accuracy of data collection	Yes No Can't tell	Yes No Can't tell	Yes No
7. Has the relationship between researcher and participants been considered adequately? Consider: - If the researcher critically examined their own role, potential bias and influence during (a) Formulation of the research questions (b) Data collection, including sample recruitment and choice of location - How the researcher responded to events during the study and whether they considered the implications of any changes in the research design	Yes No Can't tell	Yes No Can't tell	Yes No
8. Have ethical issues been taken in consideration? Consider: - If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained - If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study) - If approval has been sought from the ethics committee	Yes No Can't tell	Yes No Can't tell	Yes No
9. Was the data analysis sufficiently rigorous? Consider: - If there is an in-depth description of the analysis process - If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data? - Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process - If sufficient data are presented to support the findings - To what extent contradictory data are taken into account	Yes No Can't tell	Yes No Can't tell	Yes No

- Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation		
10. Is there a clear statement of findings? Consider: –Are the findings explicit (e.g. magnitude of effect)? –Has an adequate discussion of the evidence, both for and against the researcher's arguments, been demonstrated? –Has the researcher discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)? –Are limitations of the study discussed explicitly? –Are the findings discussed in relation to the original research questions? –Are the conclusions justified by the results?	Yes No Can't tell	Yes No Can't tell	Yes No
11. How valuable is the research? Consider: - If the researcher discusses the contribution the study makes to existing knowledge or understanding e.g. do they consider the findings in relation to current practice or policy?, or relevant research-based literature? - If they identify new areas where research is necessary - If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used	Yes No Can't tell	Yes No Can't tell	Yes No

ANNEXES

ANNEX 1 – DATABASE SEARCH STRATEGY FOR KEYWORDS VERSION 10

1. ERIC

Search performed at the 25th of January.

Advanced Search: (''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'') AND ((''teacher'' OR ''professor'' OR ''instructor'' OR ''tutor'' OR ''trainer'') AND (''competence'' OR ''ability'' OR ''capability'' OR ''aptitude'' OR ''know-how'' OR ''proficiency'' OR ''expertise'' OR ''skills'' OR ''evaluation'' OR ''characteristics'')) AND (((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality'')) OR (''educational quality'' OR ''outcome measures''))
Results: 367

2. ISI Web of Science

Search performed at the 29th of January.

(1) TS=(''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'')

(2) TS=(''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'')

(3) TS=(("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics"))

(4) TS=((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(5) 1 AND 2 AND 3 AND 4

Results: 28

3. Taylor & Francis Online

Search performed at 25th of January.

Simple Search: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))
Results: 0

("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-

based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'')

Results: 30 results.

(''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'') AND ((''teacher'' OR ''professor'' OR ''instructor'' OR ''tutor'' OR ''trainer'') AND (''competence'' OR ''ability'' OR ''capability'' OR ''aptitude'' OR ''know-how'' OR ''proficiency'' OR ''expertise'' OR ''skills'' OR ''evaluation'' OR ''characteristics''))

Results: 27 results

(''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'') AND (((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality'')) OR (''educational quality'' OR ''outcome measures''))

Results: 0

4. ACM Digital Library

Search performed at 25th of January.

URL: http://dl.acm.org/

Search: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

Results: Although the database export dialog claimed it exported 37 results, EndNote imported 40 results (3 results with the same title but from proceedings and journal article).

5. ScienceDirect

Search performed at 26th of January.

Expert Search for all: tak(("dropout" OR "drop-out" OR "barriers two learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "relearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND ((("course" OR "units off study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures")))

tak refers to Title-Abstr-Key, contains the title, abstract, and author or publisher's keywords.

Search was done for titles, abstracts and publisher's keyword, as the normal search would look for all fields except references.

Results: 5

6. SCIELO

Search done at the 25th of January 2016

Search All Indexes: (''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'') AND ((''teacher'' OR ''professor'' OR ''instructor'' OR ''tutor'' OR ''trainer'') AND (''competence'' OR ''ability'' OR ''capability'' OR ''aptitude'' OR ''know-how'' OR ''proficiency'' OR ''expertise'' OR ''skills'' OR ''evaluation'' OR ''characteristics'')) AND (((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality'')) OR (''educational quality'' OR ''outcome measures''))

Results: No results were found, but the following string had 15 results, mostly written in Portuguese, with some in English.

(''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'')

Results: 0

7. B-On Portal

Search done at the 29th of January 2016

Advanced Search, search mode Boolean/phrase, all other checkboxes disabled:

(1) (''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'')

(2) ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics"))

(4) ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(5) 1 AND 2 AND 3 AND 4

Results: 365. While exporting, duplicates were removed, reducing the total from 176 reviewed articles to 135.

8. Open Research Online

Search done at the 26th of January 2016

256-character search limit, peer-reviewed publications.

Due to the limitations of the database search engine, we had to adjust the search strategy.

We decided to use only the keywords on (1) string, with some adjustments, as it only allowed word by word search.

Simple Title/abstract search using OR: dropout persistence attrition withdrawal attendance
Results: 141

9. SCITEPRESS Digital Library

Search done at the 27th of January 2016

Advanced search:

(1) Paper title: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted

instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(2) Abstract: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(3) Keywords: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND (("teacher" OR "professor" OR "instructor" OR "tutor" OR "trainer") AND ("competence" OR "ability" OR "capability" OR "aptitude" OR "know-how" OR "proficiency" OR "expertise" OR "skills" OR "evaluation" OR "characteristics")) AND

((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional")
AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR
"assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(4) 1 OR 2 OR 3

Results: Query had 287 results, while the database can only display 100. We decided to filter by
publication year, from 2011 to 2015 (last year available), as it was in fact part of the inclusion
criteria and allowed overcoming the obstacule, resulting in 56 citations.

ANNEX 2 – DATABASE SEARCH STRATEGY FOR KEYWORDS VERSION 11

1. ERIC

Search performed at 8th of February.

Advanced Search: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR
"completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR
"success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning"
OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual
classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based
education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning
environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND ((("course"
OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR
"plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR
("educational quality" OR "outcome measures"))
Imported in Endnote using filter ERIC (OvidSP).
Results: 1051

2. ISI Web of Science

Search performed at 8th of February.

(1) TS=("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion
rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success
rate")

(2) TS=("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) TS=((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(4) 1 AND 2 AND 3

Results: 228

3. Taylor & Francis Online

Search performed at 8th of February.

Simple Search: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

Results: 0

4. ACM Digital Library

Search performed at 8th of February.

Search: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic

learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

Results: Although it said 100 results, EndNote imported 111 results (11 results with the same title but from proceedings and journal articles).

5. ScienceDirect

Search performed at 8th of February.

Expert Search for all: tak(("dropout" OR "drop-out" OR "barriers two learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "relearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND ((("course" OR "units off study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures")))

tak refers to Title-Abstr-Key, contains the title, abstract, and author or publisher's keywords.

Search was done for titles, abstracts and publisher's keyword, as the normal search would look for all fields except references.

Results: 44

6. SCIELO

Search done at the 8h of January 2016

Search All Indexes: ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning"

OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning") AND ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

Results: 5 results, only 2 in English.

7. B-On Portal

Search done at the 8th of January 2016

Advanced Search, search mode Boolean/phrase, all other checkboxes disabled:

(1) ("dropout" OR "drop-out" OR "barriers to learning" OR "persistence" OR "completion rate" OR "attrition" OR "withdrawal" OR "attendance" OR "graduation rate" OR "success rate")

(2) ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "online teaching" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online courses" OR "online education" OR "web-based education" OR "web-based instruction" OR "teaching aids & devices" OR "interactive learning environment" OR "instructional systems" OR "blended learning" OR "b-learning")

(3) ((("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) OR ("educational quality" OR "outcome measures"))

(4) 1 AND 2 AND 3

Results: 2066. While exporting, duplicates were removed, reducing the total from 1219 peer-reviewed articles since 2011 to 339.

8. Open Research Online

Search done at the 26th of January 2016

256-character search limit, peer-reviewed publications.

Due to the limitations of the database search engine, we had to adjust the search strategy.

We decided to use only the keywords on (1) string, with some adjustments, as it only allowed word by word search.

Simple Title/abstract search using OR: dropout persistence attrition withdrawal attendance

Results: 140

9. SCITEPRESS Digital Library

Search done at the 9th of February 2016

We decided to do a simple search as previous combined search produced a large number of irrelevant results.

Simple search: (''dropout'' OR ''drop-out'' OR ''barriers to learning'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''withdrawal'' OR ''attendance'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''online teaching'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online courses'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''teaching aids & devices'' OR ''interactive learning environment'' OR ''instructional systems'' OR ''blended learning'' OR ''b-learning'') AND (((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality'')) OR (''educational quality'' OR ''outcome measures''))

Results: 281

ANNEX 3 – DATABASE SEARCH STRATEGY FOR KEYWORDS VERSION 12

1. ERIC

Search performed at 17th of February.

Advanced Search: abstract:(((''dropout'' OR ''drop-out'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online course'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''blended learning'' OR ''b-learning'')

AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality"))) OR title:((("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning") AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality"))) -MOOC -"Massive Open Online Courses"

Imported in Endnote using filter ERIC (OvidSP).

Results: 238

2. ISI Web of Science

Search performed at 17th of February.

    (1) TS=("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate")

    (2) TS=("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning")

    (3) TS=(("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality"))

    (4) TS=("MOOC" OR "Massive Open Online Courses")

    (5) 1 AND 2 AND 3 NOT

Results: 157

3. Taylor & Francis Online

Search performed at 17th of February.

Simple Search: ("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR

"elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning") AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) NOT ("MOOC" OR "Massive Open Online Courses")

Results: 4

4. ACM Digital Library

Search performed at 17th of February.

Search: ("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning") AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) NOT ("MOOC" OR "Massive Open Online Courses")

Results: 53

5. ScienceDirect

Search performed at 17th of February.

Expert Search for all: tak(("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning") AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) AND NOT ("MOOC" OR "Massive Open Online Courses"))

tak refers to Title-Abstr-Key, contains the title, abstract, and author or publisher's keywords.

Search was done for titles, abstracts and publisher's keyword, as the normal search would look for all fields except references.

Results: 24

6. SCIELO

Search done at the 17h of January 2016

Search All Indexes: (''dropout'' OR ''drop-out'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''graduation rate'' OR ''success rate'') AND (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online course'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''blended learning'' OR ''b-learning'') AND ((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality'')) AND NOT (''MOOC'' OR ''Massive Open Online Courses'')

Results: 4

7. B-On Portal

Search done at the 18th of January 2016

Advanced Search, search mode Boolean/phrase, all other checkboxes disabled:

(1) (''dropout'' OR ''drop-out'' OR ''persistence'' OR ''completion rate'' OR ''attrition'' OR ''graduation rate'' OR ''success rate'')

(2) (''distance education'' OR ''distance learning'' OR ''elearning'' OR ''e-learning'' OR ''electronic learning'' OR ''computer assisted instruction'' OR ''virtual classroom'' OR ''online learning'' OR ''online course'' OR ''online education'' OR ''web-based education'' OR ''web-based instruction'' OR ''blended learning'' OR ''b-learning'')

(3) ((''course'' OR ''units of study'' OR ''thematic units'' OR ''subject units'' or ''instructional'') AND (''design'' OR ''plan'' OR ''development'' OR ''creation'' OR ''evaluation'' OR ''assessment'' OR ''quality''))

(4) (''MOOC'' OR ''Massive Open Online Courses'')

(5) 1 AND 2 AND 3 NOT 4

Results: 985

8. Open Research Online

Search done at the 18th of January 2016

256-character search limit, peer-reviewed publications.

Due to the limitations of the database search engine, we had to adjust the search strategy.

We decided to use only the keywords on (1) string, with some adjustments, as it only allowed word by word search.

Simple Title/abstract search using OR: dropout persistence attrition

Results: 86

9. SCITEPRESS Digital Library

Search done at the 9th of February 2016

Simple search:

("dropout" OR "drop-out" OR "persistence" OR "completion rate" OR "attrition" OR "graduation rate" OR "success rate") AND ("distance education" OR "distance learning" OR "elearning" OR "e-learning" OR "electronic learning" OR "computer assisted instruction" OR "virtual classroom" OR "online learning" OR "online course" OR "online education" OR "web-based education" OR "web-based instruction" OR "blended learning" OR "b-learning") AND (("course" OR "units of study" OR "thematic units" OR "subject units" or "instructional") AND ("design" OR "plan" OR "development" OR "creation" OR "evaluation" OR "assessment" OR "quality")) NOT ("MOOC" OR "Massive Open Online Courses")

Results: 275