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Health Gamification Research – a bibliometric analysis

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ABSTRACT
In the last five years, the researchers embarked on original research in Gamification for health, however the Gamification professionals and health researchers still do not know where the references of the area are. Therefore, this study aims to identify the evolution and characteristics of the original articles of Gamification for health published in the database Scopus. The search was made in the database Scopus with the keywords "(gamif *) AND (health *) OR (medical) OR (physical activity) OR (running) OR (diet) OR (rehabilitation) OR (mental)". The original publications of Gamification in health are focused in the areas of welfare (32%) and management (21%). The US has 24.7% of authors, including the 3 authors who were published more are from the USA (3 publications) and all were women, 58% of the first authors are of the female gender. Another result, the Computer Human Behavior presented 7 publications. Therefore, the original publications of Gamification are centered in countries that already dominates other areas of knowledge but compared to journals it is possible to identify which publishes more articles of Gamification.
Keywords - Bibliometric; Gamification; Health; Original research; Scopus

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I. INTRODUCTION

The Gamification is a trend in the biggest companies in the world [1,2]. It has been applied in various sectors of the market aiming to engage people to perform tasks [3,4]. The Gamification uses the mechanics and dynamics of the video game to encourage people in the real world [5,6] In health, there is a need for solutions to stimulate the adoption of a healthy lifestyle. The Gamification in health has no scientific validation of their effects. For this reason, scientific researches are necessary to implement this tool in health with more effectiveness, identifying the risks and benefits.

The Gamification emerged in the scientific literature earlier this decade with a growing number of publications [7]. However, most publications are theoretical or pilot's researches in conferences or books needing explanatory studies [8]. In the last five years, the researchers embarked on original research in health. Whereas, the Gamification professionals and health researchers still do not know where the references are (authors, places and institutions) of the area, which are potential areas for application of Gamification and what stage of evolution are the research of Gamification for health to apply this knowledge produced with confidence in daily life with their patients. Therefore, this study aims to identify the evolution and characteristics of the original articles of Gamification for health published in the database Scopus.

II. METHODS

This survey was conducted from a search in the database Scopus. The date of the search was 31 July 2017. The search terms used were "(gamif *) AND (health *) OR (medical) OR (physical activity) OR (running) OR (diet) OR (rehabilitation) OR (mental)" in the "Article title, abstract and Keywords". The symbol * means that will be included articles that include the suffixes of words containing this symbol at the end of them. The search was limited to the document type "Article". All accessible publications were included between 2012 and 2017. From eligible manuscripts were excluded the: "Editorial", "Letter", "Review", "Conference Article", "Book Chapter". In addition, the publications that did not have the full text available were not included in the search. After performing the search and filters, 72 articles were exported to a spreadsheet for analysis.

The researchers analyzed descriptively the following data: "Article title", "number of authors", "journal name", "publication year", "international collaboration", "first author's gender", "health area", "author's country" and "affiliations". The genre of the first author was identified through the names and confirmed in surveys conducted in other databases of researchers, because some nationalities by name is not as clear a distinction of gender. International collaboration was set when there were authors of different nationalities in the article. The authors of

this article classified the health area studied as public health; Well-being; Mental health; Education and training; Management in health. Data analysis was performed with descriptive statistics showing relative and absolute frequencies, and arithmetic average.

III. RESULTS

The initial search produced 610 publications. Of these publications, 133 were eligible and 477 were discarded, because they were not original scientific articles. Then 61 publications were excluded because they did not relate to application of Gamification for health, leaving 72 articles for review (Fig. 1). This research included articles in five areas of health as categorization proposal (Fig. 2). Most studies have focused on the areas of well-being, including physical activity, lifestyle change, diet (32%), health (21%) management education and training (17%), global health (16%) and mental health (14%). The publications of original articles of Gamification for healthcare have grown in SCOPUS platform, with the first records in 2013. Of 72 eligible five articles were published in 2013, 13 in 2014, 17 in 2015, 24 articles published in 2016. In the year of 2017 have been published 13 until the date of the search carried out in this research.

The 72 articles have been published in 53 different journals, the main were Computer Human Behavior (6 articles), Games for Health Journal (5 articles), Journal of Medical Internet Research (4 articles), and Trials with 3 articles (Fig. 3). Among all the articles, there were 347 authors, an average of 4.8 per manuscript. Regarding the number of authors per article, 48 eligible articles submitted up to five authors. Other 24 showed six or more authors. The higher frequency of authors per article was two authors (18%), and 12.5% were found in studies with more than ten authors (Fig. 4). The most frequent first authors were Dennis T.A., Fleming T.M. and Merry S. with three publications each. Other 19 authors have published twice. The gender distribution of first author was 58% female and 42% male (Fig. 5).

In Fig. 6 shows the affiliation of the authors, whereas country of origin and institutions that most published. In the search were found 25 countries and 173 institutions. 24.7% of authors have defined your source of the UNITED STATES, 10.1% of United Kingdom, 8% from Canada, 6.7% of Australia and 6.7% of Spain. Other countries were mentioned, however with less than 6 articles published. About universities, the University of Auckland (4 articles), The City University of New York (3 articles), University of Alabama (3 articles), Vrije Universiteit Amsterdam (3 articles). Finally, were found 11 articles with international collaborations between authors, especially the British authors, who participated in five international partnerships. In addition, the Swiss, Americans and Dutch authors stand out as they were in three international collaborations.

IV. DISCUSSION

The present study demonstrated the evolution of publications of original articles in the area of Gamification for health, focusing on the areas of well-being and management. The publications have shown polarity of authors with many publications and a trend of co-authorship articles up to 5 authors. As to the gender of the first author, although discreet, a predominance of the female gender. Although many articles are made in collaboration, only 15% are international collaborations. The country with more authors were the United States, but in relation to universities, an Australian and a Dutch stood out.

The original publications of Gamification for health have increased gradually from 2013 on Scopus, start year of publications of original research as far as 24 publications in 2016. In 2017 were 13 publications until the middle of the year, suggesting an estimate of 26 publications until the end of this year, keeping up the increase of publications. Other Bibliometric studies or Gamification review found similar developments regarding this research, though the search keywords were different, and the focus of this study in peer-reviewed articles and documents [8,9,10]. The total number of 72 peer-reviewed original articles is small comparing to the total number of publications (610) found in the first search. This proportion is normal in emerging themes and technology related, which feature in the early years a profile of publishing articles in conferences or book chapters. However, demonstrates the need for studies with more rigorous methodologies, as demonstrated in the systematic review made by Looyestyn et al. (2017).

The Computer journal Human Behavior and Games for Health Journal were the most frequent with publications in Gamification for health. The first is the main periodical of Gamification topic when we look at other areas of publication of Gamification [11]. Furthermore, your scope about human behavior is one of the focus of Gamification studies, which is engage people or users in any task. Even more, is a high-impact journal, enabling a faster dissemination of knowledge in it produced. The Games for Health Journal focuses on the study of games targeted for health, like the uses of Gamification and video games to become a process behavior change more motivating and engaging. In addition, this is a new periodical, as well as the theme. So, it showed a

good channel for dissemination of knowledge that is being produced.

The Gamification for health has a large number of authors researching the topic. On this bibliometric, there are 373 authors. The most interesting is the profile of the first authors, in which most are women. Despite there are a large number of female professionals in the health area, and a male predominance in the technology area and Academy. [12,13]. This bibliometric has shown that women have excelled in this subject, demonstrating that the barriers presented by Howe-Wash and Turnbull (2016) may not exist on this subject or are decreasing. The same can be noticed when it was analyzed the authors whom had more publications, of which three were female. These data corroborate with the fact the forerunner in developing Gamification for health, Janie Mcgonigal (2011), also a woman, though she is not using the term Gamification, but the video game elements to engage people to change their way of life.

Another result was the number of authors per article, which showed that there is a lot articles with more than five authors. This trend of many authors was demonstrated in the research of Fernandes and Monteiro (2017), which found that the more recent studies in the area of computer science had an average of more authors per article, than older articles. This occurs by the requirement of an insane productivity of researchers to improve their resumes by getting them to join to write scientific articles [17]. In addition, the good journals charge expensive to publish, therefore, with more authors you can split the cost of publication. Although many articles have many authors, it was not found a large number of international collaborations, possibly because this is a new subject.

Regarding affiliations, there are references in United States; they have more than 30% authors working on this theme. Also, was the country that most published in international collaboration. This fact only confirms what occurs in most scientific areas, in which the United States is the primary affiliation of researchers [18,19], reflecting the large investment in research and technology made by this country [20] with universities all over the country researching Gamification for health. This also confirms the relevance and actuality of the theme. However, it is worth highlighting the Australian University of Auckland presented the greatest number of papers published, demonstrating there is a group of researchers that become reference in this theme.

Finally, this research has classified the articles selected in five major areas of health, especially for the publications in order to promote well-being or healthy lifestyle. Yes, that was one of the first areas to develop products of Gamification for health, generating the need to validate this tool scientifically. In addition, the main diseases that affect people, such as cardiovascular diseases and diabetes are prevented and treated with lifestyle changes, but the big problem is the motivation and engagement of people [21]. Therefore, companies, researchers and practitioners have glimpsed in the Gamification as a tool to assist in the process of engaging people to acquire a healthy lifestyle, as identified by Alahaivala and Oinas-Kukkonen (2016).

V. CONCLUSION

Therefore, this research demonstrated that the gamification for health is a field of study that is growing and already has the main journals for publication of the theme for the future studies. In addition, showed that women come growing their expertise in research areas that before had a majority of male authors. The research presented for future research the countries and universities that are references in gamification for healthcare. Even more in the well-being and management area, that has more received attention from researchers for deployment of gamification. Consequently, this study provides the scientific community a profile of the base publications of Scopus, allowing researchers to identify where to publish, about what, and whom to carry out a partnership.

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