EDUCATION AND BUSINESS AS A KEY TOPICS AT THE INSTAGRAM POSTS IN THE AREA OF GAMIFICATION

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ABSTRACT

The aim of this paper is to examine the communication content of Instagram social network users, on the basis of the hashtags they use relating to gamification and to define communities within the network in the context of education. The results are based on the analysis of Instagram's worldwide social network. Primary data were collected using script to capture communication on the social network Instagram. The analysis included Instagram photos selected on the basis of hashtag #gamification (17,994 contributions). The results identify that the most commonly associated expressions with hashtags #gamification are hashtags associated with education and business, especially where startup and innovation are concerned. On the basis of an analysis visually isolated communities with an average modularity of 0.506 were identified, which relate to the communication of the gamification on the social network Instagram: 1) Education, 2) Entrepreneurship, 3) Gamification in general, 4) Social and 5) Enjoyment. The benefit of analysis for the education area is to identify the university's links between Education and Entrepreneurship and the Teacher and Trust between education and enjoyment.

KEYWORDS

Business, education, gamification, instagram, social network

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Highlights

- *Main topics connected to #gamification are hashtags associated with education and business, especially where startup and innovation are concerned.*
- *In Gamification area university's are important area between Education and Entrepreneurship.*
- *Teacher and Trust are important in connection between education and enjoyment.*

INTRODUCTION

Gamification is a relatively new term first used by Nick Pelling in 2002 (Marczewski, 2013) but a sharp increase started in 2010 (Google, 2018). Gamification is a technique that can increase motivation and encourage users, especially in the field of education, which requires teaching and learning activities to be more fun and interesting (Kusuma, Wigati, Suryapranata, 2018).

A deep understanding of social, cultural and environmental issues in context of gamification and education is valuable to analyse people's activities on social networks connected with this topic (Hu, Manikonda, Kambhampati, 2014; Pilař et al., 2016a; Pilař et al., 2017a). Instagram is regarded to be the current fastest-growing social network (Wagner, 2015) and deserves the attention from the research community comparable to that of Twitter and other social media platforms (Naaman, Boase, and Lai 2010; Boyd and Ellison, 2007).

The review of the acadedemic literature on gamification and online social media networks suggests an broad interest in gamification and its use in business, advertising and education (e.g. Jackson and Luchner 2017, Holmes and Gee 2016, Insley and Nunan 2014, Trees 2015, Bittner and Schipper 2014, Dignan, 2011). Gamification can take many forms and the term itself is being used more broadly (Dignan, 2011). Trees (2015) states that gamification means using game mechanics and psychology to manage employees. The author adds that if you want to encourage employees, you will present elements as scores and rewards, provided that people are motivated to progress or win in the context of the game. It is also the idea of impelling the employee to communicate and collaborate using

a fun form. Other authors (Swan, 2012, Sarangi and Shah, 2015) state that gamification has emerged as a standard for the intersection of game elements and „non-game" activities (using elements in a „non-verbal" context). Swan (2012) adds that the general definition of gamification identifies it as a process of connecting game mechanics to processes, programs and platforms that would not traditionally use such concepts. Sarangi and Shah (2015) further add that gamification aids in linking employees to shape corporate identity and reputation. Gamification uses aspects of play, such as challenges, excitement, competition and rewards, and other elements such as the fun or pleasure that comes from interacting to make day-to-day tasks more eye-catching. Chorney (2012) and Paharia (2013) further state that gamification is a technology that uses digital game pieces to motivate people to act in a „non-gaming" environment. Gamification strategies typically include a combination of the above elements (Trees, 2015).

Gamification is driven by the premise that today's omnipresent technologies will converge with informed and active consumers (Prahalad and Ramaswamy, 2004). Holmes and Gee (2016) dealt with the framework for understanding play-based learning and teaching and state that one of the possibilities of gamification is to transform learning into gaming by adopting game elements and structures. Harwood and Garry (2015) empirically examined the gamification approach in online customer engagement and behavior. Their findings suggest that gamification techniques may assist practitioners in developing more robust consumer engagement strategies. Bittner and Schipper (2014) investigated the motivational effects and age differences in the gamification of product advertising. Specifically, they investigated what motivational incentives for game design affect the purchasing intentions of customer. The authors argued that gaming features can be easily used in product advertising. Insley and Nunan (2014) dealt with the role of gamification, the use of game mechanics, in enabling consumer engagement with online retailers. The origin of gamification has been linked to the fact of increased interest amongst consumer motivation researchers when shopping online. Zichermann and Linder (2010) found thatretailers started to improve online customer shopping experience through the process of gamification.

According to Sarangi and Shah (2015), gamification has been successfully used by various organizations such as L'Oreal, Deloitte and Starbucks. Kumar and Raghavendran (2015) also reportedsuccessful gamification in practice by Deloitte. This company demonstrates how to use the principles of gamification in managing relationship with employees and their productivity to change corporate culture and behavior, to discover talent or to promote innovation. Delloite uses its own program called Maverick, where employees compete across departments and deal with various business issues and reward innovative and creative thinking to develop new solutions. On the other hand, the authors also state that gamification does not necessarily have to meet every problem or challenge in the company. In addition, addressing complex and unstructured realities, such as customer problems, violates the structural aspect of the gamification process.

Furthermore, as mentioned Hamari, Koivisto, Sarsa (2014) there is an increasing number of successful startups whose entire service is focused on adding a gamified layer to a core activity (e.g. Codecademy – an online interactive platform that offers free coding classes), or who assist more traditional companies in gamifying their existing services (e.g. CallidusCloud - web sites to measure and influence user behavior using techniques such as gamification).

Social networks, such as Facebook, Twitter and Instagram are used to communicate and share information. People through social networks share not only photos, but also personal experiences, opinions, preferences, activities and feelings are shared among friends. Hashtags are used to mark keywords or topics within a microblog and have proven to be useful for many applications (Efron, 2010) or sentiment analysis (Wang et al., 2011; Pilař et al., 2016b). Other authors claim that hashtag can be described as a technomorpheme: it is a linguistic segment as well as a clickable hyperlink, which allows the creation of a network (Giaxoglou, 2018). On Instagram, hashtags are tags or words prepended with '#' used to indicate the content of the picture. The users are using these hashtags among others to express feelings, emotions and characteristics of shared content (Pilař et al., 2017b). A deeper understanding of Instagram hashtags usage is important because it helps us see the social, cultural and environmental issues surrounding analyzed area from the customers' point of view.

Many studies analysing social networks in terms of gamification havefocused on Facebook, Twitter and Youtube (Sheldon and Bryant, 2016). For a deep understanding of people's activities regarding gamification it is important to analyze Instagram, furthering our insights about (trends) in social, cultural and environmental issues (Hu, Manikonda, Kambhampati, 2014). Instagram, an SNS created in 2010, is relatively new and involves posting photos with the option of using enhancement filters, and nonreciprocal followings of other users (Lup, Trub and Rosenthal 2015).This social media platform is a mobile photo sharing application that greatly increased in popularity since its founding in 2010, with over 500 million active monthly users (Jackson and Luchner, 2017). These authors also confirm that like Facebook, Instagram primarily focuses on photo sharing, image enhancement and nonreciprocal relationships.

The popularity of Instagram's social network is continuously growing, as confirmed by recent studies of internet users, who spend more time on Instagram than on other sites (Duggan, 2015). From a businesses point of view, the important characteristic of social networks isthat it is a free public channel of communication (Caixeta, Nascimento and Abreu; 2016). Unlike other social medias, the most common way how to express user´s feelings on Instagram is to use hashtags.

MATERIALS AND METHODS

Research data were gathered using script for capturing communication on social network Instagram Netlytic (Gruzd, 2016). The script has extracted tags from 17,994 media items that were posted between 25.03.2015 - 21.1.2017. In that period, 17,994 contributions (posts and comments) by 9,154 users were published with this hashtag. These contributions

contained the captured messages on Instagram but also comments to this message that doesn‘t have to contain the “gamification” hashtag. From this reason the gamification hashtag is included in a 15,759 messages. The analysis contains 198,850 unique words. In the first phase of data analysis preparation were removed from the messages other words than hashtags (words begin with #). In the following phase data were input into Gephi 0.9.2. program where by using a module for data importing a network was created. This network contained 15,759 nodes (hashtags) and 562,288 edges (hashtags´ connection) see Figure 1.

The Degree

The degree k_i of a hashtag i is defined as the number of ist neighbors, that is, the number of links incident to hashtag i, where a_{ij} of the adjacency matrix $\boldsymbol{A}$ and $\prod(i)$ the neighborhood of hashtag i.

$$k_i = \sum_{j \acute{o} Ð(i)} a_{ij} \tag{1}$$

The Average Degree

The average degree of a graph in (2) is a measure of how many edges there are in a set compared with the number of edges in a set (Carrington, Scott, and Wasserman, 2005).

$$k = \frac{2E}{N}, \tag{2}$$

where E is the number of edges and N is the number of hashtags.

The Graph Density

The graph density in (3) was defined as the number of edges divided by the number of possible edges (Scott, 2000).

$$\boldsymbol{D} = \frac{2(E - N + 1)}{N(N-3)+2} \tag{3}$$

Modularity

The Modularity (4) was designed to measures the strength of the division of a network within modules (also called groups, clusters, or communities). Networks with high level of modularity have dense connections among the nodes (hashtags) within modules, but sparse connections among nodes (hashtags) in different modules (Knoke and Yang, 2008). In addition, a component analysis was employed. Component analysis represents the number of components (number of hashtag groups) that are created on the basis of the modularity detection algorithm method (Blondel et al., 2008). Fundamentally, this is a method that shows groups of hashtags that are closely related to each other, so that individual groups of related hashtags can be identified using this method.

$$\ddot{A}Q = \left[\frac{\sum_{in} + k_{i,in}}{2m} - \left(\frac{\sum_{tot} + k_i}{2m} \right)^2 \right] - \left[\frac{\Sigma_{in}}{2m} - \left(\frac{\Sigma_{tot}}{2m} \right)^2 - \left(\frac{k_i}{2m} \right)^2 \right] \tag{4}$$

Σ_{in} is the sum of weighted links inside community, Σ_{tot} sum of weighted links incident to hashtags in community, k_i sum of weighted links incident to hashtag i, k_i, in sum of weighted links going from i to hashtags in community and a m normalizing factor as the sum of weighted links for the whole graph.

Eigenvector centrality

The most widely used SNA measurement technique is centrality. Among these, Eigenvalue Centrality (EVC) is arguably the most successful and common tool employed for detecting influential nodes and neighborhoods of nodes within a social graph. EVC is considered a relative score recursively defined as a function of the number and relative strength of connections among neighbor centralities (Ilyas and Radha, 2011). We have used Eigenvalue Centrality in this study.

$$x_i = \frac{1}{\lambda} \sum_{j=1}^{N} a_{ij} x_j, \tag{5}$$

where λ is the largest eigenvalue of $\boldsymbol{A}$ and $\boldsymbol{x}$ is the corresponding eigenvector. The i^{th} component of the eigenvector $\boldsymbol{x}$ gives the eigenvector centrality score of the ith in the network (Meyer, 2000).

Visual representation

For the definition of network crowds and their types (visual polarization of individual hashtag groups), Force Atlas 2 was used as a graphical representation method (Smith et al., 2014). For cluster analysis a sample of 15,759 messages was inserted to Gephi 0.9.2, where was created the hashtag interconnection network see Figure 1.

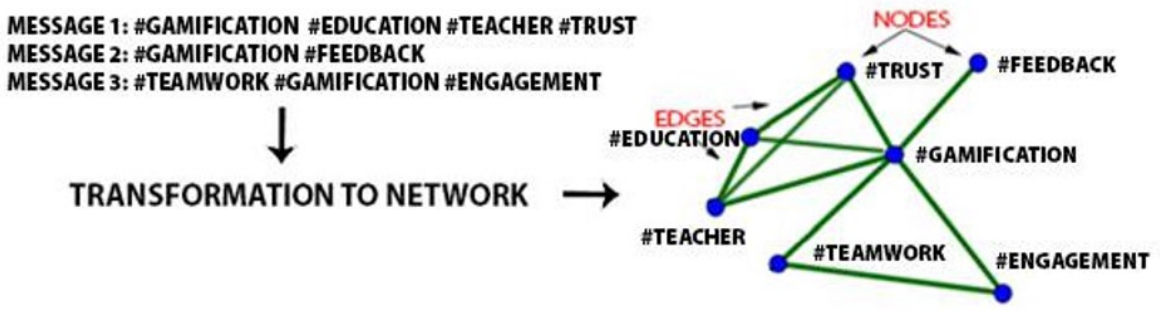

Figure 1: Transformation message to interconnection network (source: own calculation)

RESULTS

As can be seen in Table 1, hashtag #gamification is linked to 15,759 hashtags, which corresponds to the fact that only messages that contain hashtag #gamification are analyzed and so this hashtag is linked to all hashtags based on the transformation to interconnection network.

Based on the value of the degree, it is possible to identify important hashtags in terms of linking to other hashtas. In connection with hashtag #gamification, the following hashtags are listed: #education, #startup, #motivation, #university, #innovation, #business, #marketing, #learning, #design and #inspiration.

Using the value of Weighted Degree, the order is different: #motivation,#business,#university,#entrepreneur,#inspiration, #design, #teacher, #education, #learning, and #startup. Based on the Eigenvector Centrality, the hashtag order is as follows: #motivation, #business, #university, #education, #industry, #inspiration, #design, #startup, #innovation and #teacher.

From this, it can be deduced that there are two large areas that exist in the content of instagram in connection with gamification 1) Education - education, learning, university and 2) Business - startup, business, marketing, innovation, entrepreneurs, innovation.

Order	Hashtag	Degree	Weighted Degree	Eigenvector Centrality
1	#gamification	15,758	1,425.0	1.00000
2	#education	2,703	815.0	0.29221
3	#startup	2,518	689.0	0.26595
4	#motivation	2,508	1,113.0	0.34882
5	#university	2,329	945.0	0.32405
6	#innovation	2,291	657.0	0.25763
7	#business	2,273	1,107.0	0.34027
8	#marketing	2,144	636.0	0.24143
9	#learning	2,041	781.0	0.24850
10	#design	1,813	841.0	0.27159
11	#inspiration	1,674	846.0	0.27219
12	#entrepreneur	1,619	857.0	0.27634
13	#technology	1,557	418.0	0.17710
14	#workshop	1,541	672.0	0.20611
15	#teacher	1,455	824.0	0.25505
16	#training	1,426	385.0	0.16898
17	#work	1,383	622.0	0.22423
18	#creative	1,356	662.0	0.19807
19	#trust	1,292	645.0	0.22893
20	#engagement	1,287	666.0	0.18877

Table 1: Top 20 hashtags sorted by degree (source: own calculation)

ANALYSIS OF INDIVIDUAL HASHTAGS INTER-CONNECTION

When analyzing hashtags, 15,795 hashtags were added to the analysis. Among these hashtags, 562,288 connections were created based on import into the interconnection network.

The basic characteristics of the network are composed of 140 communities. This is due to a large number of hashtags that are used for example only once. The modularity of this network is 0.568, which means that individual hashtags within the community are not as strongly connected to other communities as they are in each community.

To understand the structure of each group, the reduction of individual hashtags was used based on the Average Degree value to 166 - the closest value 1% of the basic set of the Nodes (15,759). Based on hashtag reduction, where hashtags with a grade less than 166 were removed from the analysis, 1,425 hashtags were left with a degree higher than 166. Based on this analysis, 5 strong communities were extracted to explain 100% reduced hashtags, see Figure 2.

Characteristics	Net	Net after reduction*
Nodes (Points)	15,759	1,425
Edges**	562,288	195,993
Average Degree***	71.361	275.078
Graph Density	0.005	0.193
Modularity	0.568	0.506
Number of Communities	140	5

Table 2: The basic networks characteristics (source: own calculation)

Note: * a value of degree higher than 166, ** Connections between hashtags, *** On average, 1 hashtag is connected to another 40 hashtags

After extracting five powerful communities, individual communities can be named based on included hashtags. Due to the size of modularity of 0.506, communities can be considered to be medium polarized and will contain hashtags for one topic, but will be intertwined with other communities (not purely non-profit communities).

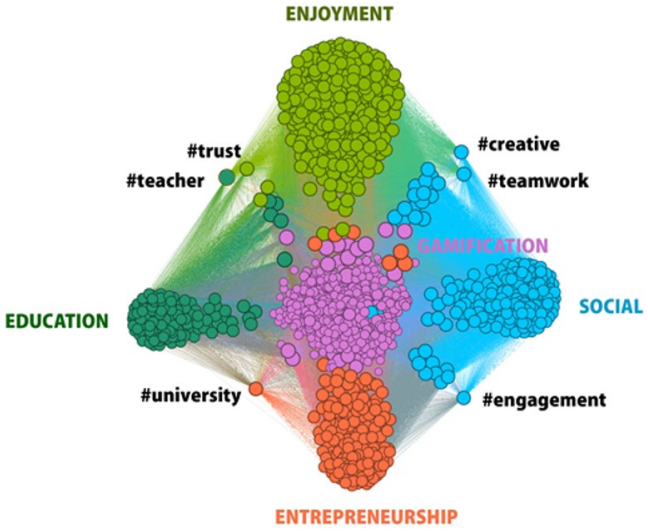

Figure 2: Visual representation of interconnection network based on #gamification at Instagram social network (source: own calculation)

Color	Community	Sample of main hashtags
Dark green	Education	#education #teaching #video #artist #teacher #school #university #students #student #science
Orange	Entrepreneurship	#knowledge #workforce #startups #networking #creativity #entrepreneurship #elearning #entrepreneurs #startup #startuplife #storytelling #feedback #entrepreneurlife #online #meeting #business #company #emprendedor #promotion
Purple	Gamification in general	#gamification #game #fun #play #motivation #instagood #love #entrepreneur #art #learning #design #innovation #marketing #tech #technology #training
Blue	Social	#communication #teamwork #leadership #teambuilding #team #goals #amazing #playing #creative #engagement #challenge #event
Green	Enjoyment	#success #successfulbeautiful #experience #change #skills #reward #friends #winner #win #passion #trust #journey #excited #havingfun

Table 3: Communities (source: own calculation)

DISCUSSION

Based on the analysis, five communities were identified that are relatively well-isolated visually, as can be seen in Figure 2. Based on a visual presentation and modularity value of 0.506, these are not precisely defined groups that do not cross, suggesting the interconnectedness of each community among themselves.

The first community called Education responds to the frequent use of gamification in learning to accelerate the learning curve when it is considered to be a serious approach to the learning process (Harman, Koohang and Paliszkiewicz, 2014), or teaching of gamification to improve business performance (Galan, 2013).

The second crowd of Entrepreneurship responds to the key words associated with business, start-ups, and practical use of business-related keywords, what is also reflected by current studies that confirm the significant use of gamification in business and entrepreneurship (Sarangi and Shah, 2015).

The most general is the third community (Gamification in general), which is generally focused on business, motivation, education and innovation. There are also hashtags from the other four crowds and are often general passwords/keywords. The location of this crowd is at the center, and it is evident that all other communities are intermingled.

The community Social is associated with hashtags #inspiration, #communication, #teamwork, #team identifies communication using gamification in areas associated with teamwork, which is in the line of researches (Marczak et al., 2015; Alhammad and Moreno, 2018) where gamification is used to develop teamwork, leadership and collaboration.

The Enjoyment community is associated with a positive response to gamification. It is basically the feeling that people experience gamification when the growth principle of flow

theory is well set where challenges push their skills (Hamari et al., 2016)
The visual expression clearly outlined the communities Education and Entrepreneurship, which - according to the graphical statement - links the University point. Not only is gaming used in game based learning such as board games, but also virtual environment experiences (Pavlíček et al., 2014; Burguillo, 2010). Universities are also a natural mediator of education and busines. The position of the University in this network is shown in Figure 2. Many universities support entrepreneurship efforts of their students (Fini et al, 2011) Support is not only a background for their own start-up or spin-offs, and the development of expertise and monitoring of new trends in the field, especially through conferences.
Based on the visual interpretation, another five hashtags were identified, including #engagement as a link between Entrepreneurship and Social communities, #creative and #teamwork as a link between Social and Enjoyment and #trust and #teacher as interconnecting elements between Education and Enjoyment communities.
Based on the methods used, it is not possible to create correlations and regressions between individual hashtags and communities, so the impact of these hashtags on individual communities can not be identified. But these hashtags are significant in terms of their positionand linking among communities.
Based on these results, research issues can be defined for further research.
For example, the first link between communities is #engagement. The main objective of gamification is to increase engagement (Villagrasa et al., 2014) so it is possible to ask the folowing research questio: What role does engagement play in the use of gamification in entrepreneurship or education in conjunction with teamwork and leadership?
In the field of #teamwork and #teamwork that connects social and enjoyment communities, a research question can be defined as: How does the teamwork and the creativity affect the enjoyment of gamification in the area of education?
In the #teacher and #trust are area, a research question could be: What is the role of trust in a teacher in the field of enjoyment of education when using gamification?
This research builds on the results of a study focusing on the identification of the most frequent collaborative topics, which has led to the research of gamification in education where the interconnectedness of individual research communities in the field of research and education has been identified (Pilař et al, 2016a). Universities are primarily concerned and interested in gamification‘s education utility. Our research suggests that the subject of gamification is often connected not only with the environment of education and universities, but also with entrepreneurship and start-ups, which leads the authors tosupport further research into the importance of universities in promoting start-ups using gamification.

CONCLUSION

The analysis of the interconnectedness of the individual hashtags involved 15,759 hashtags. A total of 562,288 connections were created between these words. Based on eigenvector centrality values, we can identify the most important hashtags associated with #gamification: #motivation, #business, #university, #education, #industry, #inspiration, #design, #startup, #innovationand#teacher. It is clear that #gamification is tied to two main areas: Education and Business.
The basic characteristic of the network is composed of 140 communities. The modularity value of this network is 0.568, indicating that individual hashtags within the community are linked not only to each other but also to other communities. Net after reduction represents 1,425 nodes, 195,993 degrees, 275 average degrees, 0.193 graph density and modularity 0.506. After the hashtag reduction, five strong communities explaining 100% reduced hashtags have been extracted: Education, Entrepreneurship, Gamification in general, Social and Enjoyment. The most general is the crowd of Gamification, which is universally focused on business, education or innovation. The location of this community is in the center and blends with everyone else.
Education crowd represents concepts related to learning and the school. The Entrepreneurship community responds to key words related to business, start-ups and key words associated with practical business use. Research identified University as a link between Education and Entrepreneurship and Teacher and Trust as a link between education and enjoyment. All these results indicate that the area of gamification is a multidisciplinary issue linking education with the entrepreneurship area, and is also used in areas such as start-up and innovation, which can be considered as an area that is important in teaching and especially in universities. For this reason, gamma should be considered as an additional method of support in teaching management skills.

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