Appendix 1 - Technology and Design usability characteristics

|  |  |  |
| --- | --- | --- |
| Usability | Characteristic | Article |
| Technology | Consistency | Ku et al. (2013) |
|  | Speed, error recovery, reliability, control, error prevention, | Huang and Benyoucef (2013) |
|  | Performance, screen resolution | Zhou (2011) |
|  | Efficiency | Alnawas and Aburub (2016) |
|  | Productivity | Hsu and Lin (2016) |
| Design | Clarity, ease of reading, arrangement of information, layout | Ku et al. (2013) |
|  | Simplicity, appearance, aesthetic | Huang and Benyoucef (2013) |
|  | Navigation | Cuddihy and Spyridakis (2012) |
|  | Graphics and colors, interface | Hernández, Jiménez, and Martín (2009) |
|  | Visual appeal | Chen, Huang, and Davison (2017) |

Appendix 2 - Sample of Institutional Website usability studies in diverse contexts

|  |  |  |  |
| --- | --- | --- | --- |
| Context | Specific context Description | | Article |
| Business | Loyalty | Role of perceived usability, reputation, satisfaction and familiarity on the website loyalty formation | Casaló, Flavián, and Guinalú (2008) |
|  | B2C | Interface design and emotions on B2C websites | Éthier, Hadaya, Talbot and Cadieux (2008) |
|  | Internet banking | Impact of customer’s personality and perceptions on Internet Banking use | Yoon and Barker (2013) |
| Demography | Age impact | The impact of age on website usability | Wagner, Hassanein, and Head (2014) |
|  | Generation Y | Gen y customer loyalty in online shopping | Bilgihan (2016) |
| Education | Interaction | Learning attitudes through page-flipping attitudes | Oh, Robinson, and Lee (2013) |
|  | Web-based education | Web-based education for low-literature parents | Choi and Bakken (2010) |
| Health | eHealth accessibility | Website accessibility on Iberian eHealth accessibility compliance | Martins, Gonçalves, and Branco (2017) |
|  | Disease management | Usability of type 2 diabetes mellitus websites | Davis and Jiang (2016) |
| Marketing | Advertise | Pop-up windows that motivate and evoke a positive experience | Bittner and Zondervan (2015) |

Appendix 3 - Sample of Social Media usability studies in diverse contexts

|  |  |  |  |
| --- | --- | --- | --- |
| Context | Specific context | Description | Reference |
| Business | Purchase Intention | Generating user resonance for purchase intention on social media | Shang et al. (2017) |
|  | Relational outcomes | Impact of Social media on word of mouth and loyalty | Risius and Beck (2015) |
| Demography | Digital natives | Teenager consumption user experience | Mäntymäki and Salo (2015) |
|  | Family communication | Family communication among grandparents and grandchildren | Tsai, et al. (2016) |
| Education | Digital literacy | Youtubers as digital educators | Choi and Behm-Morawitz (2017) |
|  | eLearning | eLearning in medical education through usability testing | Sandars and Goh (2016) |
| Health | Interactive technologies | Development of an Interactive technology to reduce concerns about vaccination | Shoup et al. (2015) |
|  | Mindfulness | Learning safe sex via Social Media | Hong et al. (2016) |
| Marketing | Brand community | Flow experience in social media | Kaur et al. (2016) |
| Nutrition | Weight management | Social media intervention for weight control | Laranjo, et al. (2017) |
| Physical Activity | Increase physical activity | Effectiveness of web 2.0 to increase physical activity | Caperchione et al. (2014) |

Appendix 4 - Sample of Mobile Application usability studies in diverse contexts

|  |  |  |  |
| --- | --- | --- | --- |
| Context | Specific context | Description | Article |
| Business | User experience | Success, approaches, and future of mobile application stores | Cuadrado and Dueñas (2012) |
|  | Productivity | Mobile tablet computing on providing productivity | Schooley, Walczak, Hikmet and Patel (2016) |
| Demography | Older adults | Mobile application for older adults | Gao et al. (2017) |
| Education | Learning services | Technical aspects of mobile learning | Sarrab, Elbasir, and Alnaeli (2016) |
|  | Student satisfaction | Student satisfaction in management education | Rueda et al. (2017) |
| Health | Patient guide | Mobile patient guide system for a patient-centered smart hospital | Yoo et al. (2016) |
|  | Disease management | Modular information and communication technology for self-management | Lamprinos et al. (2016) |
| Nutrition | Weight management | Weight loss intervention for adults with obesity | Matthews et al. (2017) |
|  | Food measurement | User-centered and visual-based aids for dietary food measurement | Liu et al. (2016) |
| Physical Activity | Increase workout | Smartphone application to increase physical activity | Gao et al. (2017) |
|  | Monitoring | Smartphone Application for Recording and Monitoring Physical Activity Levels | Kirwan, Duncan, Vandelanotte and Mummery (2013) |

Appendix 5 - Search queries

|  |  |  |
| --- | --- | --- |
| Scope | Query | Source (adapted from) |
| Institutional Website | ("website" OR "web site" OR "web browser" OR "internet site" OR "web page") AND | Fernandez, Insfran, and Abrahão (2011) |
| Social Media | (social media" OR "social network site" OR "online communities" OR "social computing" OR "virtual communities" OR "web 2.0) AND | Ngai, Tao, and Moon (2015) |
| Mobile Application | ("mobile app" OR "mobile application" OR "mobile phone app" OR "mobile phone application" OR "smartphone application" OR "smartphone app" OR "smart phone application" OR "smart phone app" OR "mobile device application" OR "mobile device app" OR "tablet application" OR "tablet app") AND | Zapata, Fernández-Alemán, Idri and Toval (2015) |
| Usability | (“usab\*” OR “understandab\*” OR “learnab\*” OR “operab\*” OR “attractiv\*” OR “user experience”) | Zapata, Fernández-Alemán, Idri and Toval (2015) |

Appendix 6 - Search results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Institutional Website | | Social Media | | Mobile Application |  |
| Journal | Articles | Journal | Articles | Journal | Articles |
| Journal of Medical Internet Research | 71 | Journal of Medical Internet Research | 28 | Journal of Medical Internet Research | 26 |
| Computers in Human Behavior | 44 | Computers in Human Behavior | 24 | International Journal of Medical Informatics | 13 |
| International Journal of Medical Informatics | 14 | Plos One | 12 | Plos One | 7 |
| IEEE Internet Computing | 12 | International Journal of Information Management | 4 | BMJ Open | 4 |
| Electronic Commerce Research and Applications | 4 | Decision Support Systems | 3 | Computers in Human Behavior | 4 |
| Journal of Systems and Software | 4 | BMJ Open | 2 | Journal of Biomedical Informatics | 4 |
| Journal of Biomedical Informatics | 3 | Journal of the American Informatics Association | 2 | IEEE Pervasive Computing | 3 |
| ACM Computing Surveys | 1 | American Journal of Public Health | 1 | Communications of the ACM | 2 |
|  |  | Electronic Commerce Research and Applications | 1 | IEEE Communications Magazine | 2 |
|  |  | International Journal of Medical Informatics | 1 | British Journal of General Practice | 1 |
|  |  | Health Education and Behavior | 1 | Frontiers in Psychology | 1 |
|  |  | Medical Teacher | 1 | Health Education and Behavior | 1 |
|  |  |  |  | IEEE Journal of Biomedical and Health Informatics | 1 |
| Total | 153 | Total | 80 | Total | 69 |

Appendix 7 - Institutional Website, Social Media and Mobile Application usability dictionaries

|  |  |  |  |
| --- | --- | --- | --- |
| Reduced term | Similar terms or from the same domain | | |
| Institutional Website | Social Media | Mobile Application |
| business | internet recruiting, internet recruitment, e-commerce, electronic banking | business implications, business model, business value, social commerce | N/A |
| communication | multimedia, eWOM | communication, C2C communication, mass media, television | N/A |
| demography | adolescent, aging, baby boomer, demographics | older adults, teenager, gender, gender differences | adolescent, adolescents, aging characteristic factors, children |
| design | designers, interface design, inclusive design, clarity, navigation, arrangement of information, appearance | design, user-centered design, simplicity, interface, interactivity, visual appeal, layout, aesthetic | user centered design, design science, participatory design, ease of reading, graphics, colors |
| education | bereavement education, classroom instruction, continuing medical education | academic performance, education, education technology, higher education | digital literacy, education, formative evaluation, mobile learning |
| health | alzheimers disease, amyotrophic lateral sclerosis, asthma | cognitive deficits, cognitive training, case management, asthma, clinical | visual impairment, basic life support, bls, cancer prevention, cpr |
| innovation | automated testing, natural language processing, test-driven development | absorptive capacity, natural language processing, open innovation | N/A |
| marketing | postmarketing, online marketing, e-marketing, emarketing | internet marketing, advertising, advertising value, brand awareness | N/A |
| mobile device | cellular phone, iOS, smartphone, mobile development platforms | cellular phone, smartphone, mobile devices, mobile phone, iOS | cellular phone, mobile device, mobile computing, mobile phone, smartphone, iOS |
| nutrition | macronutrients, micronutrients, hypertension, salt intake, sugar, celiac disease | obesity, overweight, hypertension, salt intake, sugar, celiac disease | dietary intake, nutrition, obesity, overweight, diet, nutritionist |
| physical activity | exercises, motor activities, physical activities, workout, fitness | training, sport, formal physical activity, informal physical activity, sports | exercise, motor activity, physical activity, physical fitness |
| technology | computer security, biobanking, bioinformatics, information system, consistency, error prevention | digital music, gps location, information technology, podcasting, download delay, resolution, error rate | automatic capture, communication technology, computers, gamification, performance, control |

**Appendix 8**

1. **Institutional Website usability results**

Table 1 presents the correlation between the most relevant topics for IW usability. The results for the number of articles published between 1994 and 1996 were zero and these columns were excluded for space enhancement purposes. Beginning in 1997, four time-frames were created. On the first topic, “Communication”, “Marketing”, and “Design” are matched with 8 articles. “Communication” and “Marketing” have a significant low β value, 0.65 and 1.50, respectively. “Design” has a high β value (2.16). These results provide evidence that the relation between the terms communication and marketing with the topic are strong, and that the usability characteristics of design is under the focus of communication and marketing.

Topic number two provides consistent β values between the three terms meaning its solid connection. “Design” has a significant low β value (0.38), followed by “Mobile Device” (1.35) and “Technology” (3.31), revealing that both design and technology usability characteristics are relevant within the research of the mobile device context to optimize IW satisfaction, efficacy and efficiency. The third topic provides a significant low β value for the dominant term, “Physical Activity” (0.64), and a close affinity with the second and third terms, “Technology” (1.64), and “Nutrition” (2.55). The technology usability characteristics are understood as relevant for the domains of physical activity and nutrition.

There is a strong correlation between the terms of topics one, three and six, considering their β values. Besides “Technology” and “Design”, that are part of usability concept, “Communication” is the most represented term in Table 1, with two matches revealing the importance of usability principles for researchers in the IW technology and design knowledge development to enhance communication, such as electronic word of mouth and online reviews (Chen, Nguyen, Klaus, & Wu, 2015). A total of seven out of ten areas have findings on the technology characteristics of IW usability, although four areas revealed interest of researchers in the design characteristics of usability. “Demography” and “Innovation” do not have representativeness within the most relevant topics. The topic most represented by means of published articles, with 64 papers, was topic 5. The distribution along the years of topic 5 had a continuous growth of published papers since 1997 with a peak in the time-frame 2009/2013, with 23 articles.

In general, a trend has started in 1997 with the growing interest of researchers for the characteristics that highlighted the usability principles of IW in assorted contexts. The highest period with the most papers published was in 2014/2018, with 60 articles published. In fact, there are almost three times the number of articles published in comparison with the first time-frame.

1. **Social Media usability results**

The correlation between the most relevant topics, is presented in Table 2. Following the approach of Moro et al. (2015), to assist the visualization of this table, time-frames were created. On the first topic, with 5 matching articles, “Business” has a significant low β value (0.43). “Technology” and “Innovation” terms have low β value, 1.78 and 1.88 respectively, implying that there is a close relation between the terms and the topic, acknowledging the development and findings in the usability technology setting of business and innovation fields. Topic number five, with 29 matching articles, has “Health”, as the term with the closest relation with the topic. This term has a significantly low β value (0.08), albeit second and third terms, “Technology” (3.57) and “Education” (4.43), had a significant higher β value, distancing the relation between these two terms and the topic, providing evidence of the technology usability principles in the fields of health and education. The topic with most matching articles is number five, with 29 articles. “Health” (0.08) has a strong correlation with the topic, albeit the second and third terms, “Technology” (3.57) and “Education” (4.43), have a significant higher β value, distancing their relationship with the topic. The topic with the highest correlation between the terms and the topic is number seven. The terms “Technology”, “Communication” and “Education” have a significant low β value showing a strong correlation.

Excluding “Technology” and “Design”, that belong to the usability context, the most referenced term is “Business”, with 3 matches, suggesting the investigation of usability in the business contexts, namely at social commerce (Moore, Raymond, & Hopkins, 2015). Seven out of nine areas have developments in the SM usability in the context of technology. Demography and Mobile Device have significant breakthroughs on the usability characteristics of design. From the list of terms of Appendix 7, “Nutrition” do not show evidence of having relation with any of the most relevant topics.

The time-frame 2014/2018 provided the highest contribution to the results of Table 2 with 60 articles. The interest for this topic has highly increased after 2014. In general, the interest in SM satisfaction, efficiency and efficacy aspects have been considerably growing. From one article in the time-frame 2004/2008, there was an abrupt growth to the time-frame 2009/2013, and another to 2014/2018. This interest might be connected to the boom and widespread of SM platforms, promoted by the development of Web 2.0 technologies who allowed the increasing speed of the Internet, higher broadband, ease of use of web applications and social commerce (Zhou, Zhang, & Zimmermann, 2013).

1. **Mobile Application results**

The correlation between the most relevant topics and the corresponding terms that best characterize them is presented in Table 3. To assist the visualization of this table, three time-frames were created (i.e., 2010/2012, 2013/2015 and 2016/2018).

The first topic, with 4 matching articles, provides evidence that “Demography” (0.46), “Design” (2.22), and “Health” (2.28) have a positive correlation with MA usability studies. This is the topic with the most consistent β values between the three topics, meaning a robust correlation between the terms and the topic, revealing developments on the health and demography fields to understand which design characteristics have influence on the MA usability. Topic number three, with 38 matching articles, has “Health” as the dominant term with a significant low value (0.12). “Technology” (3.16) and “Mobile Device” (3.24) have high β values, providing evidence that their connection to the topic is not so strong. This is the topic with the most matching articles and revealing breakthroughs in the fields of health and mobile device in terms of technology characteristics that influence MA usability.