


Factors influencing sustainability of online platforms for professionals: a mixed-method study in OECD countries

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Summary

Online platforms can support health and educational professionals in their daily work; however, it is challenging to keep online platforms sustainable. This paper aims to indicate the most important factors of platform sustainability from the perspective of professionals involved in online platforms. Further, it aims to understand how these factors operate. A mixed methods study was carried out among professionals from Europe, Australia, the USA and Canada. In the first phase, the importance of 54 factors from the literature was assessed with a questionnaire among 17 professionals. The relative importance of the factors and the consensus regarding this importance were calculated using median scores and interquartile deviations. In total, 19 factors were selected representing general characteristics, characteristics related to the platform, communication, visitor and context. In the second phase, insight was gained regarding the experiences with those factors through 12 individual Skype interviews. The most frequently mentioned important factors of platform sustainability were (i) having sufficient time, resources and expertise, (ii) user friendliness and (iii) creating a sense of belonging. Platforms should use a planned approach to address a combination of factors directly from platform development. Gaining long-term resources is challenging and should be considered from the start of a project by building partnerships. To promote user friendliness, platforms should be simple, have a clear set-up and provide high-quality tools. Finally, establishing a sense of belonging could be supported by branding and face-to-face networking activities. For all aspects, involving visitors and stakeholders is essential.

Key words: sustainability, online platform, health promoting schools, professional

Lay summary

Health and educational professionals use online platforms to share and obtain knowledge and tools with and from other professionals for use in their daily work. Platforms are often developed with temporary project funding, which challenges their long-term sustainability. This article aims to understand why platforms survive or not. It reports the findings from a questionnaire study and an interview study among professionals who are involved in the coordination of online platforms. They indicated that it was important (i) to have sufficient time, resources and expertise to keep the online platform alive and updated, (ii) to keep attracting visitors by creating a user-friendly platform and (iii) to create a sense of belonging among the platform's visitors. Platform developers should keep this in mind at all stages of the development process by working closely with visitors and stakeholders.

INTRODUCTION

Online platforms provide health professionals with unlimited access to information on a domain of interest and the opportunity to interact with others of any region at any moment (Sundar *et al.*, 2011, Aarts *et al.*, 2013, Vona *et al.*, 2014). In contrast to informative websites that use unidirectional communication methods to share information with visitors, online platforms apply bidirectional methods (OECD, 2019). On the one hand, they allow developers to share content; on the other hand, they allow visitors to respond to that content, for example in discussion groups, but also to adapt and share content, such as adapted tools and programme materials. In the field of health promotion, platforms are often initiated through project funding, making sustainability challenging. Some platforms become a static representation of what a project once was as soon as the project ends, while others remain a valuable updated resource. Which factors determine the sustainability of these online platforms? And how can sustainability be promoted? These are the topics addressed in this article.

This article reports on a study conducted as part of the European HEPCOM project (Promoting Healthy Eating and Physical activity in local COMMunities) (<http://hepcom.org>). HEPCOM focused on strategies of the Health Promoting School (HPS) and communities targeting school-aged youth. Since the start of the Schools for Health in Europe Network in 1992 (Turunen *et al.*, 2017), many regional tools and best practices, such as guidelines for conducting evaluations, have been developed to support the implementation of the HPS (Simovska *et al.*, 2012; WHO, 2013). Research findings from health promotion projects are often disseminated through peer-reviewed scientific publications, but the programme tools developed in these projects mainly exist on project websites and cannot always be found by other professionals. The HEPCOM project

aimed to develop an online platform for sharing these types of tools and knowledge from EU-funded public health programmes for health promotion professionals and policy makers from local communities (Goelitz *et al.*, 2014). During the project period, platform tools such as planning tools for obtaining funding, but also tools to involve target groups, such as children, in the intervention development process (Eskola *et al.*, 2018), were tested in 45 local communities. The platform allowed professionals to share their experiences working with the tools. From the start of the project, an important question was how to sustain the platform after the initial project period.

Sustainability is important to guarantee that investments are not wasted and to move the field forwards by optimizing the potential benefits from existing knowledge and tools (Glasgow *et al.*, 1999, Pluye *et al.*, 2004, Scheirer and Dearing, 2011; Schell *et al.*, 2013). Sustainability has been operationalized as continued programme activities, continued programme outcomes in terms of health benefits, continued capacity building of a community or the interaction between these three operationalization's (Shediak-Rizkallah and Bone, 1998; Scheirer, 2005; Wiltsey Stirman *et al.*, 2012; Schell *et al.*, 2013). Although empirical research on sustainability factors of public health and health promotion programmes is a growing field (Wiltsey Stirman *et al.*, 2012; Bodkin and Hakimi, 2020; Herlitz *et al.*, 2020), still little is known about the sustainability of online platforms for health promotion and educational professionals, such as HEPCOM.

Literature review

At the start of the HEPCOM project, a narrative review¹ was conducted to identify factors related to the sustainability of online educational and/or health promotion platforms for professionals. [The narrative review was

conducted between November 2014 and February 2015 by the first, second, fourth and fifth author. Searches were conducted in Eric, Google Scholar, Proquest, PubMed and Web of Science. Search terms were limited to the title, abstract and keywords: ('online platform' or virtual platform or electronic platform or 'web-based platform' or 'online community' or 'virtual community' or 'electronic community' or 'web-based community') AND (health*). Inclusion criteria were that the described platform was bi-directional and targeted health promotion professionals or education professionals in either schools or community settings in OECD countries. No quality assessment instrument was used to interpret the findings.] Eleven papers reported on initial and sustained platform activities, including platform use and revisits by professionals, active contributions to the platform, but also the successful implementation and adaptation of the platform (Cuthell, 2008; Todorova and Osburg, 2009; Hardman, 2011; Harley, 2011; Sundar *et al.*, 2011; Holt *et al.*, 2013; Anderson, 2014; Barnett *et al.*, 2014; Farrell *et al.*, 2014; Petric, 2014; Vona *et al.*, 2014). The papers operationalized sustainability at platform level and at visitor level. At platform level, sustainability referred to the successful maintenance and adaptation of the platform by initiators from the field of education or health, after the initial project funding had ended. At visitor level, it referred to continued involvement on the platform through regular platform visits, continued use of platform tools and continued active contributions to the platform. In total, 54 factors were retrieved and grouped into five categories (see Table 1).

First, *general platform characteristics* ($n = 7$) relate to the functioning of the platform itself. The literature indicated the importance of having time, resources and expertise to keep a platform online, taking into account legal responsibilities such as copyright and privacy (Anderson, 2014) and having a credible owner (Harley, 2011; Barnett *et al.*, 2014). The set-up of the platform should be user friendly (Barnett *et al.*, 2014) and free of technical problems (Sundar *et al.*, 2011). Relevant platform stakeholders (e.g. policy makers, funders and users) should be involved in platform development (Harley, 2011; Barnett *et al.*, 2014).

Next, *content-related characteristics* ($n = 13$) relate to the type and form of information on the platform. Platform content should fit with the platform goals (Barnett *et al.*, 2014; Farrell *et al.*, 2014) and visitors' needs (Cuthell, 2008; Sundar *et al.*, 2011; Anderson, 2014; Vona *et al.*, 2014). Information should be available for different types of visitors (e.g. in terms of

Table 1: Factors related to sustainability-related outcomes retrieved from the literature

General platform characteristics are related to the functioning of the platform itself and include factors related to the technical issues, legal aspects and credibility of the platform but also resources needed for maintaining the platform	
1	Time, resources and expertise to keep the platform online and up to date
2	Taking into account the legal/formal responsibilities, such as the privacy of visitors, no disclosure of confidential information, prevention of religious or racial vilification and the protection of copyright
3	Credible owner of the platform, for example an official organization offering the platform instead of a private platform of an individual
4	User-friendly technical set-up and support
5	Visitors have the opportunity to participate in the decision-making process, for example on what topics to discuss
6	Owner of the platform (organization) provides institutional structures to support the platform, such as IT specialists
7	Involvement of stakeholders (organizations which have interest in the existence of the platform such as visitors, funders) during the development stage of the platform
8	Involvement of diverse visitors with different levels of experience and backgrounds in the information exchange on the platform
Content-related characteristics are related to the type and form of information on the platform	
9	Information fits the needs of the visitors
10	Clear communication of the platform goals
11	Limited irrelevant information
12	Clear goals and structure information in line with the goals
13	Information is available for several types of visitors (such as visitors who regularly post content and visitors who do not, visitors who are experienced and less experienced in the field)
14	Adaptability of the programmes or materials on the platform to the local context
15	News value, regular supply of new and up-to-date information
16	Platform arranges specific methods such as providing online tools
17	Platform provides information on professional development opportunities
18	Platform arranges access to online trainings or workshops
19	Platform provides access to research databases and journals
20	Platform collaborates with or provide links to other relevant websites or platforms

(continued)

Table 1: Continued

Communication-related characteristics relate to supporting platform communication and social interaction	
21	Platform creates a supportive environment to encourage communication and trust between visitors
22	Platform ethics (such as rules and consequences of deviant behaviour) are explicitly defined in norms such as FAQ and terms of use
23	Platform ethics are implicitly defined in norms, for example unwritten expectations regarding appropriate behaviour on the platform (such as emerging through interactions among members)
24	Platform assures living up to the sanctioning of deviant behaviour from the norms, provides opportunities to report inappropriate behaviour and rewards behaviour related to norms
25	Platform has a closed forum for members
26	Platform arranges specific methods such as online meetings and chat sessions
27	Platform has a moderator (someone that leads and monitors discussions and keeps the forum clean)
28	Platform moderator has an active role related to platform content (such as checking information, adding and changing content such as comments, publications and links)
29	Platform moderator has an active role in supporting practical issues (such as user support, subscription, checking if all functions work correctly are the functions user friendly)
30	Platform moderator has an active role in communication (such as leading discussions, reframing questions, finding professionals to answer questions, providing access to resources and trainings)
31	Limited input from platform moderator in discussions
32	Platform visitors have the opportunity to build their own networks within the community, for example in a private space on the platform
33	Platform stimulates the exchange of social support
34	Platform arranges specific methods such as offering prizes or other incentives to active visitors
35	Platform arranges specific methods such as sharing documents, experiences and promoting discussions
36	Platform clearly communicates the advantage of using the platform
37	Platform provides communication and face-to-face engagement, for example by offline events or webinars
Visitor-related characteristics reflect the characteristics of the professionals who visit and engage in the platform	
38	Visitors perceive benefits using the platform outweighing the costs
39	Visitors are willing, motivated and comfortable using an online platform for retrieving information and online tools
40	Visitors are willing, motivated and comfortable using an online platform for information sharing

(continued)

Table 1: Continued

41	Visitors have positive experiences with collaborating with other visitors on the platform
42	Visitors have sufficient expertise to be able to participate and use the tools
43	Visitors have prior positive experiences with other online platforms
44	Visitors have sufficient digital literacy skills
45	Visitors have sufficient time to participate in the platform and use the tools
46	Cultural differences in using online platforms for information sharing (for example more common among specific groups than others)
47	Number of years of working experience as a professional in the field the platform is targeting
48	Visitors are also involved in offline activities related to the platform
Context-related characteristics reflect the characteristics of the organization and the broader context the visitor operates in	
49	Participation in the platform as a vital part of one's job, i.e. contributing to tasks, relevant for one's career and the objectives of an organization
50	Compatibility of the platform with tasks the professional needs to fulfil for the job
51	High proportion of colleagues from the own organization using the platform
52	No interference with one's position at work, for example sharing information is not allowed in a specific function
53	Provision of time for engaging in the platform during work hours
54	Provision of social support within the organization (from colleagues, management) to engage in the platform

experience) (Vona *et al.*, 2014), but the group should not be too broad (Barnett *et al.*, 2014). Preferably, professionals should be able to adapt platform tools to their own needs, the local target group and context (Cuthell, 2008). Further, platforms should promote active involvement of professionals with different backgrounds in the information exchange (Harley, 2011). Some studies reported on the importance of providing new information on a regular basis (Anderson, 2014; Barnett *et al.*, 2014; Vona *et al.*, 2014). Others reported on specific functions such as access to professional development programmes or databases (Anderson, 2014).

Third, *communication-related characteristics* ($n = 17$) include factors supporting contributions to and interactions on the platform. Platforms should clearly communicate interaction norms (Petric, 2014) and support an environment of respect and trust between visitors (Barnett *et al.*, 2014). A platform moderator should provide administrative and practical support, but should

also have sufficient knowledge on the content, and look for a balance between facilitating communication and actively participating in discussions (Hardman, 2011; Anderson, 2014; Barnett *et al.*, 2014; Petric, 2014). Platforms should incorporate multiple strategies to engage visitors (Farrell *et al.*, 2014), such as using incentives (Anderson, 2014) and involving visitors through social media, email and other websites (Holt *et al.*, 2013). Finally, sustainable platforms should use face-to-face activities, such as professional development programmes, complementary to online communication (Sundar *et al.*, 2011; Anderson, 2014; Petric, 2014).

Fourth, *visitor-related characteristics* ($n = 12$), represent specific characteristics of the professionals visiting and engaging in the platform. The literature pointed towards motivational factors, such as attitude towards platform use (Todorova and Osburg, 2009; Anderson, 2014) and willingness to collaborate online (Hardman, 2011; Anderson, 2014). Further, previous positive experiences with platforms (Todorova and Osburg, 2009) and feeling comfortable using a platform (digital literacy) (Todorova and Osburg, 2009; Sundar *et al.*, 2011) were important. Finally, visitors should have time to contribute to a platform (Todorova and Osburg, 2009; Barnett *et al.*, 2014).

Finally, *context-related characteristics* ($n = 6$) reflect factors in the organization and context of the visitor. A facilitator was when a platform contributed to the visitors' job (Anderson, 2014), tasks or profession (Todorova and Osburg, 2009; Barnett *et al.*, 2014) and the institutional or national goals (Todorova and Osburg, 2009). A final factor was having support for platform use within the visitor's own organization, for example from a supervisor (Todorova and Osburg, 2009; Anderson, 2014).

The list of factors possibly contributing to platform sustainability is quite long, but does not distinguish between essential and subordinate factors, nor does it reveal how to promote platform sustainability. The aims of this study were to specify the most important factors as perceived by health promotion and/or educational professionals involved in online platforms and to provide more in-depth insight in how these factors could contribute to platform sustainability.

METHODS

Design

A sequential, explanatory, mixed methods design was carried out (Creswell, 2009). In the first phase, the importance of 54 factors from the literature was assessed

by questionnaires. The factor list was then narrowed down to a feasible list of most important factors. In the second phase, in-depth insight was gained regarding the experiences with strategies supporting the narrowed list of factors using individual Skype interviews.

Phase 1: Questionnaire study

Procedures and participants

In the summer of 2015, 51 international health promotion and/or educational professionals were invited to participate in the online questionnaire study. To start, first authors from papers from the literature study were contacted for participation in the study. Second, as many relevant platforms are not described in papers in scientific journals, the 20 European partners involved in the HEPCOM project, were asked to identify contact persons from online platforms in their own country and/or in their own field of research and practice. For comparability issues, we specifically targeted professionals involved in health promotion and/or education platforms that targeted professionals in OECD countries. All proposed professionals received an email with a link to the online questionnaire with a decline option. Non-responders received a reminder after 2 and 4 weeks. The response rate was 33.3% ($n = 17$).

Questionnaire and data analysis

The questionnaire was sent to two professionals involved in online platforms for feedback and some minor textual changes were made before its finalization. The final questionnaire presented the 54 factors from the literature categorized as general platform-, content-, communication-, visitor- and context-related characteristics. Participants rated the importance of each factor on a Likert-scale ranging from not important at all (1) to very important (7). In addition, respondents could indicate additional factors in an open-ended question. The online questionnaire was distributed through the survey tool Qualtrics. Descriptive statistics were used to describe the background characteristics of respondents. The relative importance of each factor and the consensus between professionals regarding this importance was calculated using the median scores and the interquartile deviations (IQDs) in IBM SPSS Statistics (version 21). A low IQD indicated a high degree of consensus between professionals. Next, 16 factors on which full or high consensus was reached (median score of ≥ 6.00 and IQD of ≤ 2.00) were selected for the second phase of the study. Three new factors from the open-ended answers were included.

Phase 2: Interview study

Procedure and participants

From November 2016 until January 2017, 69 health promotion and/or educational professionals involved in online platforms were invited for a Skype interview. In addition to the list of 51 professionals from the first study phase, 18 new network contacts from HEPCOM partners and participants were contacted. Again, these were professionals from OECD countries. Twelve interviews were conducted until data saturation was reached.

Interview route and data analysis

Participants were asked to indicate the most important factors of platform sustainability from the list of 19 factors retrieved from the questionnaire study. The other questions elaborated on the interviewee's experience with the factors and how these had contributed to the sustainability of the platforms they had been involved in. The interviews were recorded and transcribed verbatim. Texts were coded and analyzed with NVIVO (version 11.0) by the first author and checked by the third author. Emergent findings were further discussed and refined until consensus was reached. Codes were formulated around the factors and inductive child nodes were formulated around derived strategies.

RESULTS

Study population of study phase 1 and phase 2

The 17 participants in the questionnaire study were from the Australia ($n=3$), Denmark ($n=3$), USA ($n=3$), Italy ($n=2$), Canada ($n=1$), Germany ($n=1$), the Netherlands ($n=1$), Slovenia ($n=1$), Spain ($n=1$) and the UK ($n=1$). They were involved in platforms in the roles of facilitator of content ($n=16$), developer/researcher ($n=14$), director or coordinator ($n=11$), participant ($n=2$) and/or advisor ($n=1$). Together they were involved in 39 online platforms, of which 32 were still active at the time of data collection. The 12 professionals in the interview study were from the USA ($n=4$), Denmark ($n=3$), the Netherlands ($n=2$), Italy ($n=1$), Belgium ($n=1$) and the UK ($n=1$). They were involved in platforms in the roles of director or platform coordinator ($n=8$), facilitator ($n=3$) or webmaster ($n=1$). Together they were involved in 15 online platforms of which nine were still running at the time of the interview.

Phase 1: results questionnaire study

The most frequently selected factors on which high consensus was reached were respectively, most often related

to general platform prerequisites, platform content, communication, visitor and context (see Figure 1). The characteristics of the platform, content and communication, which are displayed in the middle of the figure, relate primarily to the sustainability at platform level: the maintenance and quality assurance of the platform itself by the platform coordinator. The characteristics of the visitor and context are shown in the outside circles in the figure and primarily relate to the sustainability at visitor-level: visitors visiting the platform, coming back to the platform after initial use and using the tools that are shared on the platform in practice. The dotted boundary lines indicate that the categories of factors are interrelated and imply commonality.

Table 2 shows the relative importance and degree of consensus on the 16 individual factors within these categories and shows three additional factors suggested by the respondents.

Phase 2: Results interview study

The most frequently mentioned essential factors from the list of 19 factors as indicated by the interviewees, were *creating a sense of belonging* and *having sufficient time, resources and expertise*, followed by *user friendliness of the platform*. A few participants indicated the importance of *information fitting the needs of visitors*, adaptation to *local contexts* and providing *valuable online tools*. All other factors were mentioned only once or not at all.

Elaboration on the importance of and experiences with all factors

Further, the interviewees elaborated on their experiences with all 19 individual factors and how these had contributed to the sustainability of the platforms. These findings are presented below per category.

General platform characteristics

Regarding time, resources and money (factor 1), most platforms had been developed with grant funding as part of a project and had experienced challenges finding funding for the platform after the project period. Some had successfully integrated the platform in an existing structure (e.g. within a research group or project), retrieved industry funding or asked for a user's fee. Some coordinators maintained the platform on a voluntary basis, either out of idealism or as a win-win situation. Feedback and connections to the field were considered to be of tremendous value to some of the teams behind the platforms. However, especially for more interactive

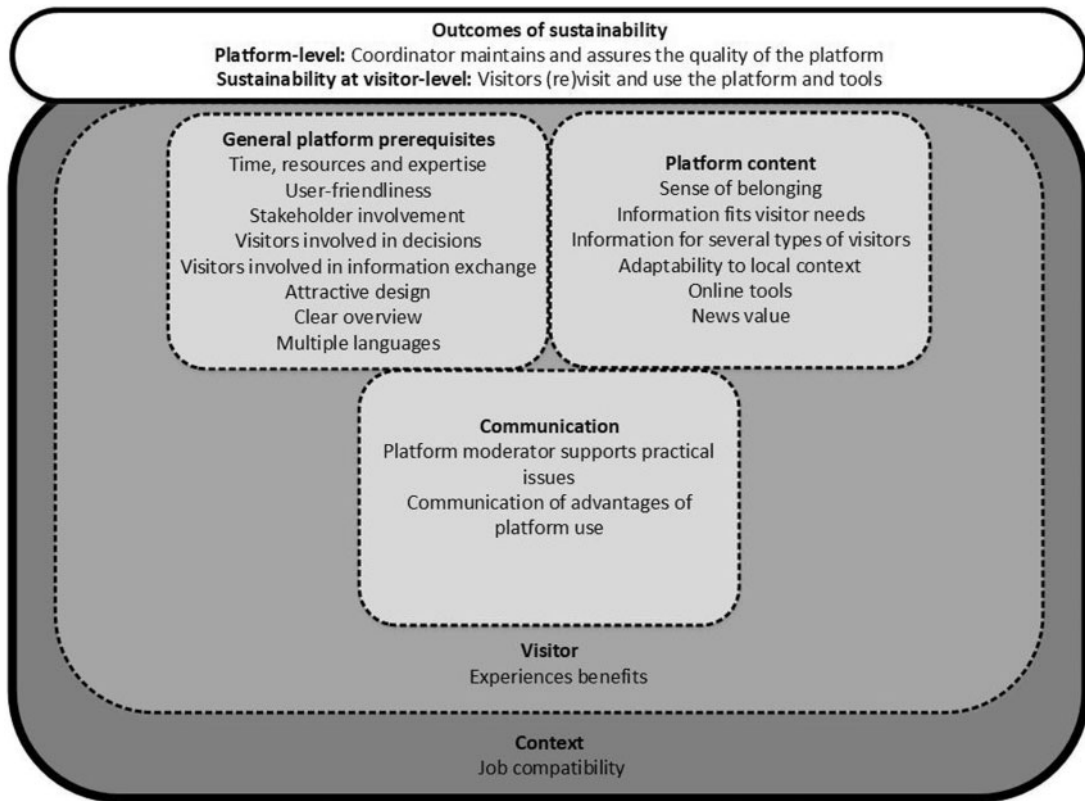


Fig. 1: Framework with factors related to the sustainability of platforms.

platforms, keeping a platform alive and running was very time consuming.

Further, in online platforms, *visitors should be involved in the decision-making* on the content of the platform (factor 3), for example through surveys or case studies. To attract visitors to revisit the platform, the platform should be *user friendly* (factor 6) in terms of appearance, navigation and uploading content. A general platform style should be created and applied consistently throughout the platform. Information paths should navigate specific visitor groups to relevant information and platforms need to be light and suitable for mobile devices. Also, platforms should be simple, information should be briefly summarized and, if provided, full texts should be downloadable for visitors looking for more information. Overall, interviewees agreed that simplicity increased the attractiveness of the *platform design* (factor 18). All interviewees agreed on the importance of *involving stakeholders* (factor 7) during the development phase to create relevant content and establish long-term support. But also, when the platform was operational, the *involvement of visitors with different*

backgrounds and different roles in the information exchange was important (factor 8), although only a few had focused on this. Finally, when there was a growing demand for resources abroad, some platforms made their *content available in other languages* (factor 19), as English was not the official language of all targeted countries.

Content-related characteristics

Most platforms reached *different visitors* in terms of expertise, but also in the level of active contribution to the platform (factor 2). From one perspective, this could stimulate contributions to the platform. *I think that the plurality of perspectives is motivating for the visitors and thereby contributes to platform sustainability.* (Project coordinator). From another perspective, it was challenging because the information should meet many needs (factor 5) and that was essential *If you don't give the visitor what he wants, he is not going to come back. You have to get off your high horse, you can't dictate people what they should and shouldn't do. Listen to their information needs.* (Head of communication)

Table 2: Most important factors of sustainability as perceived by professionals in the questionnaire study ($n = 17$)

Category	Factor		Median	IQD
General platform	1	Time, resources and expertise to keep the platform online and up to date	7	1
Content	2	Information is available for several types of visitors (e.g. visitors who regularly post content and visitors who do not, visitors who are experienced and less experienced in the field)	6	1
General platform	3	Visitors have the opportunity to participate in the decision-making process, e.g. on what topics to discuss or what topics training is provided on	6	1
Visitor	4	Visitors perceive benefits using the platform outweighing the costs	6	1
Content	5	Information fits the needs of the visitors	7	2
General platform	6	User-friendly technical set-up and support	6	2
General platform	7	Involvement of stakeholders (organizations which have interest in the existence of the platform such as visitors, funders) during the development stage of the platform	6	2
General platform	8	Involvement of diverse visitors with different levels of experience and backgrounds in the information exchange on the platform	6	2
Content	9	Adaptability of the programmes or materials on the platform to the local context	6	2
Content	10	Platform should arrange specific methods such as providing online tools	6	2
Content	11	News value, regular supply of new and up-to-date information	6	2
Communication	12	Platform moderator has an active role in supporting practical issues (e.g. user support, subscription, checking if all functions work correctly, are the functions user friendly)	6	2
Communication	13	Platform clearly communicates the advantage of using the platform for visitors	6	2
Visitor	14	Visitors have sufficient time to participate on the platform and use the tools	6	2
Visitor	15	Visitors are willing, motivated and comfortable using an online platform for retrieving information and online tools	6	2
Context	16	Compatibility of the platform with tasks the professional needs to fulfill for the job	6	2
Content	17	Establishment of a sense of belonging ^a	—	—
General platform	18	Attractive design of the platform ^a	—	—
General platform	19	Diversity in languages ^a	—	—

^aThree factors were added to the list based on open-ended answers from the questionnaire study.

Reducing jargon and providing examples on different contexts increased the relevance for more visitor groups. Some interviewees pointed to the importance of *cultural adaptation of tools and materials to the local context* (factor 9). Some platforms added general tools that could be applied in the local context, while others used examples reflecting different backgrounds. Further, visitors were more committed to platforms with easy to use *high-quality tools* (factor 10). It encouraged them to come back to gain new experiences and to learn new aspects. Finally, for some platforms, news value was crucial (factor 11): *If you don't get news and update it regularly, then it is just not alive. It becomes a picture of what once was. So perhaps you have to set a goal, what*

is the aim of this information and what differences will it make to make it alive. (Director) However, adding up-to-date information was considered challenging for project-based platforms: *After the project of which it was part had stopped, there was no news to add and the number of visits dropped.* (Director) Finally, interviewees who had been involved in research tools or projects brought up the importance of sharing information of public interest.

Only a few interviewees explained that they had deliberately worked on *creating a sense of belonging* (factor 17) for platform visitors. One interviewee explained that they had loyal members who had come back on a regular basis for more than 20 years. *We want to be in*

touch with people we belong to and feel comfortable with. If people feel that they belong and contribute to it and gain some inspiration, they will be more likely to come back. (Head of communication) A sense of belonging was created by supporting interaction, for example with a member database, a responsive moderator, or by organizing additional offline local face-to-face meetings.

Communication characteristics

Further, *moderators needed skills* in terms of communication, technical assistance and content (factor 12). Interactive platforms required an active moderator engaging in the dialogue, but this was also time consuming. Only a few platforms specifically *communicated the advantages* of using the platform (factor 13) with messages on usefulness, via other media channels as well. This was considered most important for platforms that asked for a user fee and least important for platforms within a specific niche.

Visitor- and context-related characteristics

Revisiting visitors should *experience benefits* from the platform (factor 4). Other visitor-related characteristics, such as having *sufficient time* (factor 14), were more difficult for platform developers to change. An important barrier for platform contribution was that potential *visitors were reluctant to put their opinions 'out there'* (factor 15), especially for professionals who dealt with confidential information. This issue could be addressed by a safe closed membership. Finally, platforms should appeal to the *needs of their profession* (factor 16). *The more central it is to people's jobs, the better for sustainability.* (Project coordinator)

DISCUSSION

With this explorative study, we aimed to identify the most relevant factors as perceived by health promotion and/or educational professionals involved in online platforms and to get in-depth insight in how these factors could contribute to platform sustainability.

First, 54 platform sustainability-related factors were identified and related to general platform characteristics, to the content, communication, visitor and context. Researchers studying factors of sustainability in offline settings or in other fields have categorized factors slightly different, but all emphasize the combination of diverse factors involved in this process (Shediac-Rizkallah and Bone, 1998; Gruen *et al.*, 2008; Wiltsey Stirman *et al.*, 2012; Anderson, 2014; Farrell *et al.*, 2014; Lennox *et al.*, 2018; Bodkin and Hakimi, 2020).

Systematically targeting the combination of relevant factors at multiple levels is likely to enhance online platform sustainability.

Having sufficient time, resources and expertise was a prerequisite for platform sustainability in all parts of our study. The literature on factors affecting the sustainability of online platforms or eHealth in general is scarce, but the literature on the sustainability of onsite interventions shows that this is important in many settings, such as health (care) (Scheirer, 2005; Wiltsey Stirman *et al.*, 2012, Lennox *et al.*, 2018), health promotion (Bodkin and Hakimi, 2020) and school health (Herlitz *et al.*, 2020). More specifically, two recent reviews on the sustainability of healthcare programmes (Lennox *et al.*, 2018) and health promotion programmes (Bodkin and Hakimi, 2020) pointed to the importance of stable resources and suggested collaborating with partners and acquiring multiple sources of funding. However, in practice, professionals in our study experienced that there was often no guarantee for long-term funding of their online initiatives. With this knowledge, platform coordinators should try to develop platforms that can be maintained with a limited amount of resources and that can be integrated in existing programmes and organizations. By building partnerships from the start, a sense of urgency to develop structures for embedment can be created, preferably from multiple and diverse resources (Shediac-Rizkallah and Bone, 1998; Scheirer, 2005, Schell *et al.*, 2013; Lennox *et al.*, 2018). At a structural level, a shift is also needed towards allocating funding for the recurrent costs of maintaining successful online platforms (Shediac-Rizkallah and Bone, 1998; Scheirer and Dearing, 2011).

Further, our findings indicate that user friendliness can be realized in different ways. In line with others, we found that for some platforms it could imply creating valuable tools (Holt *et al.*, 2013), or disseminating information that is personally or professionally appealing (Makkar *et al.*, 2016), while for others the news value (Kowalewski *et al.*, 2014), blogs (Makkar *et al.*, 2016), a clear set-up and easiness of use (Lacasta Tintorer *et al.*, 2018), the possibility to interact (Mwanri and Sarkis, 2013) or the adaptability of tools to the local context, may be more crucial (Cuthell, 2008). Again, to decide how user friendliness could be realized for a specific platform, the involvement of visitors and stakeholders is vital (Barnett *et al.*, 2014; Kowalewski *et al.*, 2014; Bartholomew Eldredge *et al.*, 2016).

Creating a sense of belonging was the most frequently mentioned factor contributing to platform sustainability. Coordinators of interactive platforms had succeeded by branding, sharing a member database,

installing an approachable moderator or by organizing offline face-to-face meetings. Again, the involvement of visitors and stakeholders was crucial to meet needs and create engagement (Sunderland *et al.*, 2013).

Some strengths and limitations of our study need to be addressed. First, in the literature search that fed our factor list, we included heterogeneous studies in terms of design, type of platform, target group and interactivity. The majority of studies used descriptive and qualitative designs, making it impossible to draw straight conclusions on relations between factors and sustainability. Second, the response rates of the questionnaire and interview study were restricted, limiting the generalizability of the results. Next, from a theoretical perspective, the definition sustainability was broad; the professionals who took part in the study focused on different aspects of sustainability, mostly in terms of returned visits by users, but also in terms of keeping a platform operating. This reflects the different levels of sustainability that are closely related and partly overlapping. The same holds true for the characteristics in the proposed framework—these were not mutually exclusive. Still, the results do confirm the complexity of keeping platforms sustainable in a broad sense. A strong point of our study is the mixed methods design that allowed both analysis and more in-depth exploration, as well as a broader perspective on platform sustainability.

CONCLUSION

Although explorative, this study has some preliminary implications for practice and further research. In developing and maintaining platforms, professionals should address a combination of factors. We have tried to abstract the most important factors. However, the specific context of each platform should be considered. Involving visitors and other stakeholders in platform development is crucial to create and sustain a platform that ensures support for long-term funding, fits visitors' needs and creates a sense of belonging. We would like to invite health promotion and educational researchers involved in online platforms to use the factor list, to further study the factors in relation to sustainability outcomes and to report on their findings in mixed method and longitudinal designs.

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