An App to Support Yoga Teachers to Implement a Yoga-Based Approach to Promote Wellbeing Among Young People: Usability Study

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Abstract. Many young people suffer from chronic stress and other issues that inhibit the functioning and development of the prefrontal cortex, and this also affects their intrinsic motivation to engage in any activity. In short, unless their well-being is addressed, they cannot engage effectively. The HIPPOCAMPUS project aims to address these issues by promoting the well-being of young people through the practice of a range of techniques derived from yoga. Yuva Yoga app is part of the approach to support the yoga-based practices with young people. It is a multiplatform mobile app developed as Backend as a Service both for Android and iOS. The first public version of the mobile app is part of the pilots implemented in the schools involved in the project, but there is not a special focus on the usability of the app. This work presents the heuristic evaluation of Yuva Yoga for iOS carried out by four experts as part of a major usability study that combines heuristic techniques, both iOS and Android, and empirical methods with users. Some problems were detected during the evaluation, but more of the problems have a low priority rating. They are mainly cosmetic problems that do not need to be fixed unless extra time is available on the project, or minor usability problems. The results have provided an important input to develop a new minor version of the mobile app, in order to improve the user experience in the pilots at schools.

Keywords: Mobile app · Heuristic evaluation · Yoga · Mental health · Wellbeing · Usability · European project

1 Introduction

Mental health is a key issue facing adolescents across Europe. The CAMHEE Child and Adolescent Mental Health in Europe report of 2009, stated that one in five children and adolescents in the EU suffers from developmental, emotional or behavioural problems, and these data do not take into account those who while not yet exhibiting

clear mental health issues suffer from chronic stress or anxiety. These issues tend to fall under the statistical radar but appear to be endemic among today's young people.

Many young people suffer from chronic stress and other issues that inhibit the functioning (and indeed the development) of the prefrontal cortex, and this also affects their intrinsic motivation to engage in any activity. This is a problem that affects all young people to a greater or lesser degree. Though the family environment can provide support to help, unfortunately not all family environments do, which makes it especially important to provide children and young people with approaches to self-management of stress. Unless their well-being is addressed, they cannot engage effectively.

The HIPPOCAMPUS project (https://hippocampusproject.eu) aims to address these issues by promoting the well-being of young people through the practice of a range of techniques derived from yoga. Though the benefits of yoga have been researched extensively, and in some places, these practices are used with young people, they are not always accessible to all sectors of society. Disadvantaged young people mainly are less able to participate, for a variety of financial and other reasons. The Hippocampus programme, though it is available to all, focuses primarily on the needs and requirements of these groups. This project is funded by the Erasmus+ Programme and coordinated by the GRIAL Research Group of the University of Salamanca (Table 1).

Table 1. Project details

Title	Promoting mental health and wellbeing among young people through yoga
Acronym	HIPPOCAMPUS
Funding entity	European Union
Call	European Union. Erasmus+ KA2 – cooperation and innovation for good practices. Strategic partnerships for youth
Reference	2017-2-ES02-KA205-009942
Project leader	Francisco José García-Peñalvo
Coordinator	University of Salamanca (Spain)
Partners	Teen yoga foundation (United Kingdom) IES Venancio Blanco (Spain) Youth for exchange and understanding international (Belgium) Oxfam Italia (Italy) Norges Teknisk-Naturvitenskapelige Universitet (Norway)
Budget	192.914€
Start date	01/10/2017
End date	30/11/2019
Web	https://hippocampusproject.eu

The project has two main outputs. First, a programme to introduce yoga-based practices in youth contexts such as formal education contexts or associations. On the other hand, a mobile app both for iOS and Android in order to give yoga teachers a way to help their students maintain their practice between sessions.

The app, named Yuva Yoga (https://yuvayoga.org), was developed during the first year of the project. The alpha version was launched in March 2018 in order to be validated by the project consortium, in which there are several yoga experts, both yoga teachers and yoga practitioners. The beta version was available in July 2018, and finally the first public version was available on December 2018. The app is part of the pilot experiences carry out in different schools involved in the project to test the programme and use the app to support the yoga-based practices with young people. In particular, it is part of the last phase in which teachers introduce yoga techniques in their daily classroom activities.

The pilots have a set of tasks focused on the evaluation of the HIPPOCAMPUS programme. The evaluation aims to provide empiric data to get a final version flexible enough to adapt to different contexts, mainly schools, across Europe. Although the app is considered part of the processes defined in the programme, it is not directly part of the evaluation methodology. For this reason, there is a need to carry out in parallel an evaluation focused on usability.

The usability study is carried out after launching the first public versions, both iOS and Android. The study combines heuristic techniques with experts and empirical methods with users. This work is focused on the first part of the usability study, the heuristic evaluation by experts in order to apply the heuristic rules defined by Nielsen [1]. The results of this evaluation have been used to develop a new minor version to be tested as part of the second part of the study, to collect empirical evidences.

The work is set out as follow. The second section introduces the multiplatform mobile app. The third section describes the methodology used to study the system's usability. The fourth describes the heuristic evaluation. The sixth section presents the discussion, and the last section concludes the work with its more significant contributions.

2   Yuva Yoga App

The HIPPOCAMPUS mobile app is one of the main outputs of the project. The programme and the app constitute an integral part of the approach proposed in the project. Although it is possible to introduce yoga practices without technological support, experience with other similar social software indicates that this helps to maintain interest and motivation [2–4], and recent research has indicated that it enriches and consolidates the participant's progress [5, 6]. In this sense, the app is a tool for supporting the programme and providing opportunities for participants to continue their practice at home, in addition to the sessions contained in the programme. The app also provides the resources of the programme, and the reminders continue suggestions for activities so that the content is regularly refreshed. A particular requirement was to make the app compatible with different types of devices, taking into account the heterogeneity of young people, also those in disadvantaged situations. For this reason, the app was developed for Android, the most popular smartphone operating system (OS) in the world, and iOS, the second most popular according to the global mobile OS market share report [7].

A native development approach was selected, to ensure a certain quality and the proper functioning of the app. In particular, the development was based on Backend as a service (BaaS), also known as a Mobile Backend-As-A-Service (MBaas), a service that provides a way to link applications to backend cloud storage while also providing features such as user management, push notifications or integration with social networking services [8]. There are two client applications with a cloud server that allows to manage security issues, storage (data and videos), push remote notifications, among other functionality required to ensure the proper functioning of the app. Figure 1 shows the main architecture components. Moreover, to support all offline content related to yoga practices, it was necessary to use local offline databases in client applications. It has been used Realm (in the Android client) and CoreData (in the iOS client).

Regarding the functionality, it is designed to be used to guide personal yoga practice with appropriate yoga sessions and activities. On the other hand, it is also focused on giving teachers, educators and yoga instructors a way to help their students maintain their practice between sessions. With it, you can recommend appropriate sequences of yoga activities for students, depending on their needs.

Fig. 1. Architecture based on Backend as a Service model

The main elements of the app are yoga activities that are postures (*asana*), meditations, reflections and breath (*pranayama*). Each activity has a description and a video without audio in which a yoga expert shows how to do it (Fig. 2a). Inside the app, there is a catalogue composed of more than 100 yoga activities. Although it is possible to have access to a single activity, usually they are organized in yoga sessions (Fig. 2b). The first public version has 15 sessions available. Finally, programs are related to the project aims, promoting the well-being of young people through the practice of a range of techniques derived from yoga. A program is a set of sessions to achieve a set of objectives, such as reduce stress, getting stronger and more relaxed, or waken the body.

The project raised the need to create communication spaces between teens and (yoga) teachers. In response to this need, the app has transferred the classroom concept to support the communication of teachers, educators or yoga instructors with young people. They can create a virtual space for each group of students that they work with and send them different kind of sessions that they must practice at home depending on their needs.

Regarding the language, the first public version was only in English while partners translate the contents and the interface to their languages: French, Italian, Norwegian and Spanish.
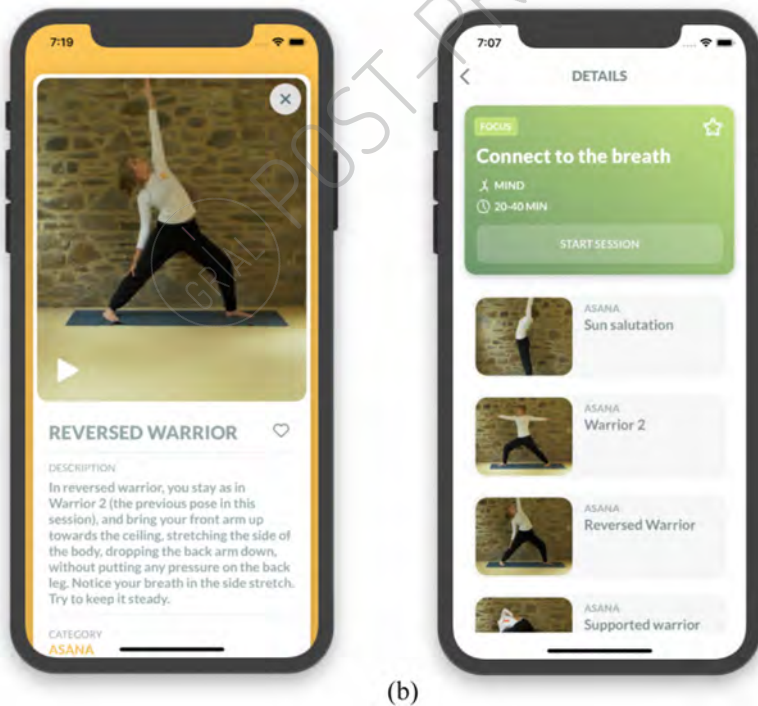

Fig. 2. Example of yoga activity interface (a) and yoga session interface (b). Source: screenshots from Yuva Yoga app.

3 Methodology

The heuristic evaluation is a usability engineering method for finding the usability problems in a user interface design so that they can be attended to as part of an iterative design process; it involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics") [1, 9].

In this study, the heuristic evaluation was divided into two phases, one focused on iOS client and other on Android client. The following sections are dedicated to the results obtained after analysing the iOS version available in the App Store in January 2019.

3.1 Participants

The heuristic evaluation of iOS client was carried out by four experts, one woman and three men between 32 to 55 years old. None of the experts had used the Yuva Yoga app previously due it was available publicly less than one month before carried out the evaluation. One expert is involved in the HIPPOCAMPUS project, so it can contribute a different point of view than experts that are not familiar with project aims. One of them has participated in yoga sessions, one practices sports frequently, and the rest are sedentary. In addition to these characteristics, the criteria used to select the experts was based on their professional profiles:

- E1: A web developer, mainly focused on frontend, and researcher with ten years of experience whose main research line is the development of technological ecosystems for knowledge and learning processes management in heterogeneous contexts.
- E2: A Java developer expert and professor of human-computer interaction through a human-centred approach with more than 30 years of experience.
- E3: A professor with more than 20 years of experience in teaching and developing graphical user interfaces, from desktop applications for Linux and Windows to mobile apps for Android and iOS, with special emphasis on iOS apps during last 8 years.
- E4: A professor and researcher with 20 years of experience in human-computer interaction, and data visualization in different fields such as cinema and digital humanities.

Furthermore, all experts understand English and use an iOS smartphone daily. Although they are not yoga practitioners, this not influence the usability from a heuristic point of view. The usefulness of the app to practice yoga will be part of the empirical study with final users.

3.2 Instrumentation

The process to carry out the heuristic evaluation was provided to the experts through an electronic document accompanied by HIPPOCAMPUS project description and objectives of the app. A template was provided to the experts in order to get the reports to perform the heuristic evaluation. The template is composed of three fields to collect the name of the evaluator, the name of the tool evaluated and the operating system in

which was carried out the evaluation; and a table with one row per each of the heuristic rules proposed by Nielsen [1] and two columns to give a value between 1 to 10, and comment the detected problems or explain the value assigned to the heuristic rule.

3.3 Study Design and Data Collection

The study was developed in three main blocks: preparation, research and evaluation. Each of these blocks has phases which define different tasks of the heuristic evaluation carried out in HIPPOCAMPUS project (Fig. 3).

Thus, the first block is preparation. It consisted of the pre-evaluation training. It has two phases focused on communication between experts and researchers. Only one expert had information about the project before carrying out the study, so the first phase was focused on share information about the project and the main scenarios to use the app. According to Nielsen [1] the evaluators decide on their own how they want to proceed with evaluating the interface, but in this process, the researchers provided a set of guidelines and a report template.
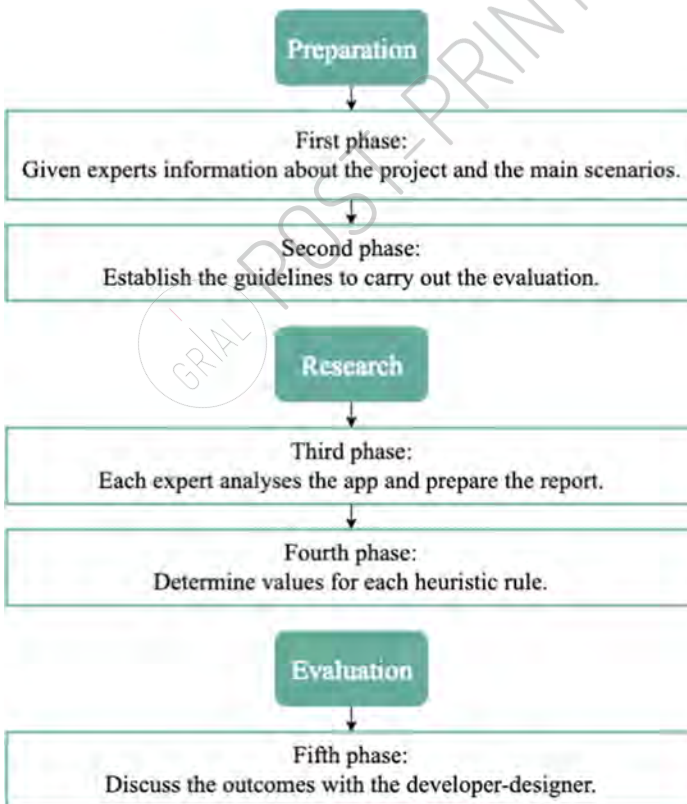

Fig. 3. Work phases

Once the desired information was shared, the second block was conducted. It was characterized by two phases associated with the evaluation itself. First, each expert reviewed the app and took notes about the usability problems detected. The heuristic rules used were those proposed by Nielsen [1]: (1) visibility of system status; (2) match between system and the real world; (3) user control and freedom; (4) consistency and standards; (5) error prevention; (6) recognition rather than recall; (7) flexibility and efficiency of use; (8) aesthetic and minimalist design; (9) helping users to recognize, diagnose, and recover from errors; (10) help and documentation. Data was collected through shared documents in Google Drive. During the second phase of this block, each expert reviewed the problems detected to each heuristic rule and assigned a value from 1 (major usability problems) to 10 (no usability problems).

This study did not have a phase in which each evaluation estimated the severity rating for each problem. On the other hand, they provided a global value for each heuristic and the responsibility to organize how to fix the problems fell in the developer associated with the project. Although a group analysis of the severity rating can provide an input to decide which problems should be solved before, in the project, it is not too much important the severity but the impact to use the app during the pilots.

Finally, in the third phase the heuristic reports were discussed with the developer and designer in order to organize the development of a set of one or more minor versions.

4 Heuristic Evaluation

Experts were identified by a number associated with the profiles provided in the methodology section (E1, E2, E3, E4). Table 2 summarizes the values for each heuristic rule, where 1 indicates that the expert detected a huge amount of serious problems and 10 no problems were found. The average of each heuristic was calculated in order to get a final value for each heuristic, so this value reflect where it is required to prioritize (Fig. 3).

Experts detected problems associated with all heuristic rules. The heuristics that presents the worst value is HR4 (*Consistency and standards*) with 7 points and HR10 (Help and documentation) with 7.5 points. In this sense, 16 usability problems were detected, most of them are inconsistences related to yoga terms and words used to talk about the contents. It should be pointed out one of the main problems identified by E1: "The classroom screens have different design than other parts of the app". This part was added to the app before launching the beta version; it is not designed at the same time than the rest of the app. Also, E3 identified an issue related to the good practices of iOS interaction, the configuration icon should be always available, not only inside one screen.

On the other hand, highlight the low values associated to most of the heuristic, HR8, HR2, HR7, HR3 and HR9, ordered from highest to lowest. All of them are over 9 points and have the lowest number of usability issues detected. Most of these problems are cosmetic or minor, but there is one major problem identified by E4 "The user can start and stop sessions at will. It seems there is no possibility to resume an interrupted session". This problem also was associated to HR4 by E1.

Finally, although it has not the worst value, the heuristic HR1 (*Visibility of system status*) has associated several usability problems with different severity rating according to the time needed to solve them. For example, a major problem is that "the user does not have a notion of the elements of a session. When the cards are piled, there is no way for the user to understand how many parts of the session have been completed and how many are remaining" or "it is not possible to control the videos player inside each activity"; a minor problem, "the visualization of activity stats in the profile is useful but if you want to know exactly which is the percentage of activities that you practice is not possible"; and a cosmetic problem, "it is not possible to know if an activity or session is flag as favorite without entering inside".

Table 2. Assigned values to each heuristic by each expert

| Heuristic rule	E1	E2	E3	E4
HR1: Visibility of system status	9	10	6	8
HR2: Match between system and the real world	10	10	9	8
HR3: User control and freedom	10	10	8	8
HR4: Consistency and standards	3	10	8	7
HR5: Error prevention	7	10	10	7
HR6: Recognition rather than recall	9	8	10	7
HR7: Flexibility and efficiency of use	10	10	10	7
HR8: Aesthetic and minimalist design	9	10	10	10
HR9: Help users recognize, diagnose, and recover from errors	10	10	10	6
HR10: Help and documentation	5	10	10	5
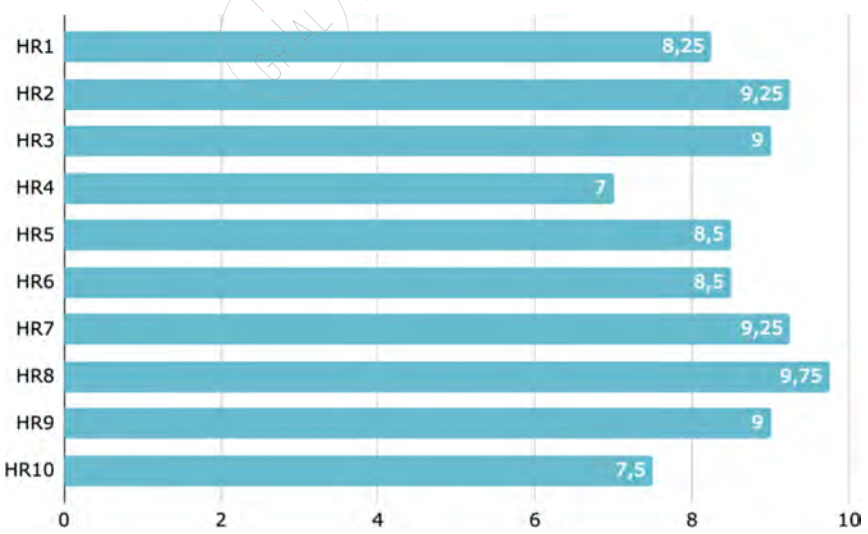
Fig. 4. Final value for each heuristic rule

5 Discussion

Each evaluator identified a set of usability problems, but it is important to highlight some differences between the evaluation carried out by each expert. Figure 4 shows a column graph was prepared in order to compare the values proposed by each expert. First, there are experts that have assigned pretty similar values for some heuristic. This occurs in HR2, HR7 and HR8, although there was no communication between experts during the evaluation.

On the other hand, the lower values and the more significant number of problems were detected by E4, the expert in human-computer interaction and data visualization. Conversely, E2 - Java developer and expert on human-centred design - discovered the lower number of usability problems and assigned the highest score.

It is essential to take into account the low score assigned to HR4 (*Consistency and standards*) by E1, a researcher and web developer mainly focused on the frontend. When the average is calculated, the difference disappears, but the new version of the mobile app should take into account this big difference. Most of the problems are cosmetic and minor usability issues, it is not required to much time to fix them. This evaluator is involved in the HIPPOCAMPUS project, so this experience could influence in the evaluation results.

Finally, there is other important difference between the values assigned by E2 and E3, and E1 and E4 in the HR10 (*Help and documentation*). Both experts agreed that there is not help information associated to the app, such as the meaning of "programs", "sessions", or a frequently asked questions section accessible through the app website (Fig. 5).
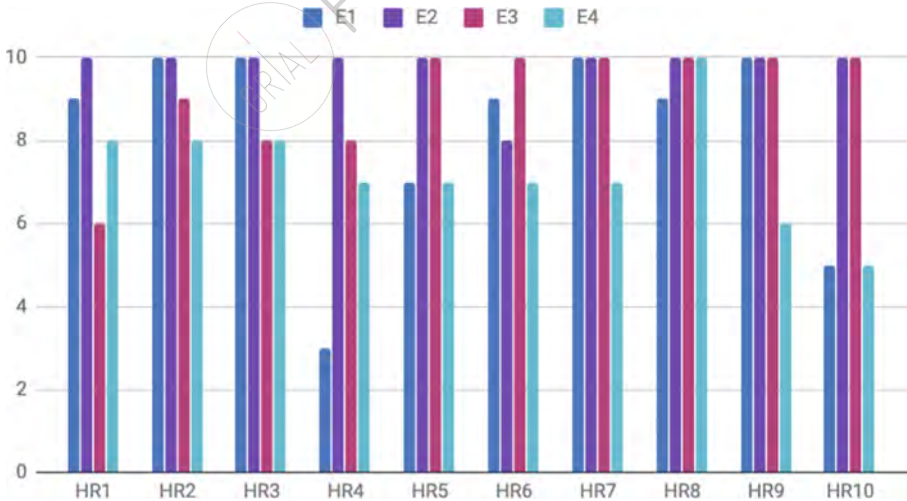

Fig. 5. Distribution of assigned values by usability experts

According to [10], in some areas, the perception of evaluators in using heuristic evaluation method is not consistent with the users' experience with a system. The problems detected by experts can help to improve the usability of the Yuva Yoga app, but it is also required to apply an empirical method to get information about the use of the app by the final users (teachers, yoga instructors, educators and young people).

6 Conclusions

The Yuva Yoga app aims to support teachers and educations to introduce yoga practices as part of school contexts. This app, available for iOS and Android, helps to keep yoga going between sessions. It is designed to be used to guide personal yoga practice with appropriate sessions and activities. Although the app is not associated directly to any yoga teachers, it is important to practice yoga under the supervision of yoga teachers. In this sense, yoga teachers can also use the app to help their students maintain their practice between sessions.

The usability evaluation of Yuva Yoga app combines heuristic techniques with experts and empirical methods with users. The present work is focused on the heuristic evaluation of Yuva Yoga for iOS. In particular, four experts were involved in the evaluation, all of them with different profiles although most are related to human-computer interaction field. More experts could be involved to get different perspective, but the information provided by this study will be completed with the final users' experience.

Although experts did not provide the severity rating for each usability problem detected, the low number of problems have been taken into account to develop a new minor version of the Yuva Yoga app. It is important to highlight that the heuristic evaluation for iOS has influenced in the Android client, because the functionality is pretty similar, although interfaces in iOS and Android have differences.

The results of the heuristic evaluation have provided an important input to develop a new minor version of the app, in order to improve the user experience in the pilots at schools.

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