

INITIAL VALIDATION OF PERSUASIVE MODEL FOR WEB-BASED LEARNING

¹NOR AZIAH DAUD, ²NORAIDAH SAHARI @ ASHAARI, ³ZURINA MUDA

¹ Fakulti Sains Komputer dan Matematik, Universiti Teknologi MARA, Shah Alam, Selangor

^{2,3} Fakulti Teknologi dan Sains Maklumat, Universiti Kebangsaan Malaysia, Bangi, Selangor.

E-mail: ¹aziah@fskm.uitm.edu.my, ²nsa@ukm.edu.my, ³zurinam@ukm.edu.my

ABSTRACT

Web-based learning (WBL) has many advantages and its usage has extended from time to time. However, WBL also has its limitations, thus an innovative design should be provided to complement the existing design. This research proposes the appropriate persuasive features of WBL. Those features are then adapted into WBL to encourage adult learners to engage and use the WBL approach in Islamic education (WBL-IE). In prior work, an initial persuasive model for Islamic education was constructed. Experts in the appropriate domains of expertise were identified to evaluate the persuasive features, and the Delphi technique (DT) was used to implement the verification process. Therefore, this paper also discusses the Delphi process and analyses the results. The process began by establishing preliminary priorities among the persuasive features that include dimensions, components and elements. To accomplish the process, an instrument in the form of a questionnaire based on five levels of agreement was created. The questionnaire was used by the Delphi experts to evaluate the persuasive features and the median score of the evaluation was analyzed using median score determination. The results from the first cycle of the Delphi process showed that all three dimensions, 23 components and most of the proposed elements should be accepted as persuasive features in the WBL design. The features were further discussed in depth in the second cycle of the Delphi process. The discussion covered comments and suggestions from experts regarding the agreed features. The redundancy of components and support elements when applied in a Web environment were identified. The experts concluded that three dimensions should remain in the model and only 18 components together with appropriate support elements should be included in the persuasive design model for WBL-IE.

Keywords: *Persuasive, Web-based learning (WBL), Delphi technique, Initial persuasive model, Islamic education*

1. INTRODUCTION

Web-based learning (WBL) is part of online learning. The acceptance of WBL is increasing over time, among many internet users. Some improvements have been made with integrated multimedia features. Interaction is also one of the driving factors that increases acceptance of the WBL approach [1]. The advantages of online learning include convenience, flexibility and performance, as online learning can be offered anytime and anywhere, and this frees up students' time for other activities [2]. Online learning gives students the ability to work at their own pace, which is particularly important for certain groups of students.

In contrast, there are some views that WBL is ineffective because online classes lack face-to-face interaction as compared to traditional classes [3]. The disadvantages of online learning include the feeling of isolation among students and the lack of facial expressions. Contemporary Web applications place little importance on interface usability and user requirements, and as a consequence, many Web applications are rejected because they fail to meet their users' expectations. These problems have also been confirmed by experts in the Islamic education environment who are concerned about maintaining some of the features of the traditional approach in the teaching and learning process.



In addition, online learning systems rarely detect any inadequacies when using the application. Moreover, interaction has become a key factor in online learning because the cultivation of social interaction among groups of adult learners is considered to be a motivating factor [2]. Therefore, in order to develop an effective design for WBL, the interface users' requirements need to be taken into account as a priority so that the WBL environment can create the feelings and atmosphere similar to the classroom environment.

The shortcomings of WBL need to be addressed. WBL has various advantages and is having a significant impact on education. Thus, this approach should be given added value. To begin with, some advantages can be contributed through WBL with improvements through persuasive features can build new experiences in online education. An online system is expected to facilitate users' experiences of social influence not only from the people surrounding the user but also through the system with the appropriate selection of persuasive design principles [4]. Persuasive systems are potentially relevant and useful in a wide range of contexts including business and education. In terms of education, it could boost students' satisfaction, engagement and positively impact their learning [5].

2. BACKGROUND

The use of computers has expanded from research labs to desktops and later into daily domestic use: computers have become more persuasive by design. According to [6], computers are now taking on "a variety of roles as persuaders, including roles of influence that were traditionally filled by teachers, coaches, clergy, therapists, doctors and salespeople, among others".

Persuasive technology is associated with "computer software or information systems designed to strengthen, or change attitudes or behavior or both without the use of coercion or deception" [4]. Through either computer-human persuasion or computer-mediated persuasion [7], computer functions are transformed to be more persuasive in ways that are similar to the face-to-face environment. Many researchers have shown their interest in this area. For example, [6] proposed seven principles of persuasion, namely, reduction, tunnelling, tailoring, suggestions, self-monitoring, surveillance and conditioning. [8] conducted 30

years of research in the area of persuasion and influence and proposed six principles of persuasion, namely, reciprocation, social proof, commitment (and consistency), liking, authority, and scarcity. In relation to the Web, six components are considered to persuade people to engage in websites: informativeness, usability, credibility, inspiration, involvement, and reciprocity [9].

Framework [6] is widely utilised and provides a useful means for understanding persuasive technology. However, the framework was seen to be too restricted to be applied directly to persuasive system development and/or evaluation. Persuasive system design (PSD) was developed to overcome the deficiency and weaknesses in the previous model [7]. PSD has been examined in a number of contexts for evaluation purposes [10]. PSD is successfully employed in various contexts such as health [11], safety education [12], and learning [13]. Nevertheless, some of the PSD features are overlapping and difficult to analyse; therefore, new persuasion techniques to evaluate and strengthen persuasive components have been identified [14]. Since not all the persuasive components could be applied in every case or could fit in other areas of study, the PSD model should be reviewed to overcome its limitations. The components must be selected based on a thorough understanding of a given problem domain and underlying theories [7]. Even though the applicability of the PSD model is wide and highly suitable, but it is can not promise the success of any behavioral change support system [15].

Reaffirming that the persuasive characteristic could have impacts in the WBL environment and based on previous success in other areas of studies, the objective of the present study is the adaptation of persuasive features into WBL to encourage adult learners to engage in and use the WBL approach in Islamic education (WBL-IE).

3. DEVELOPMENT OF INITIAL PERSUASIVE MODEL

This paper focuses on the identification and confirmation of persuasive features. For the purpose of this research, the persuasive features refer to the dimensions, components and elements of WBL. The feature identification is generally based on the PSD model which is an extended version of [7] framework. The new model was developed to counter the weaknesses of the previous model. In order to ensure the inclusion of

comprehensive persuasive components, other related models [7][8] are among the essential references. Nevertheless, PSD remained the main reference for the persuasive model for WBL because it is the latest model and has been extensively tested in several domains [10][16].

The dimensions in PSD are divided into four groups, which are the primary task support, credibility support, social support and dialogue support dimensions, each with seven components. After performing analyses of some pertinent studies, an initial persuasive model (IPM) for WBL has been developed [17] as shown in Figure 1. The model consists of three dimensions (D1, D2 and D3) and 23 persuasive components (C1 to C23) with appropriate support elements. The three dimensions were created to suit the learning environment. The 23 persuasive components were then selected with the aim to identify the support elements for each component. These components and support elements were evaluated by experts in the Delphi process as elaborated upon later in this paper. These support elements will then be applied in website development to help achieve the research aims to persuade users to learn using WBL (which is represented as G in Figure 1). The persuasive components that were proposed to be included in the primary task support dimension were: tailoring [7][18], tunnelling [7][18], reduction [7][18], self-monitoring [7][18], simulation [7][18] and usability [9]. The components considered in the credibility support dimension were: informativeness [9], trustworthiness [18], surface credibility [18], real-world feel [18], expertise [8][18], verifiability [18] and third-party endorsements [18]. The components included in the learning support dimension were: learning style [19][20], suggestion [7][18], praise [7][18], rewards [7][18], recognition [18], liking [8][18], competition [18], social learning [18], social comparison [18] and social facilitation [18].

The IPM was used in this research and underwent an evaluation process in order to arrive at a valid persuasive model for WBL. Islamic education was selected as the study background because it shows a high concern with regard to similarity between WBL approaches and traditional classroom approaches.

DT was used throughout the process until a persuasive model for WBL-IE was finalised. The agreed components and appropriate support elements will then be used in the development of

the WBL-IE website. This process will take place in the next stage of this study.

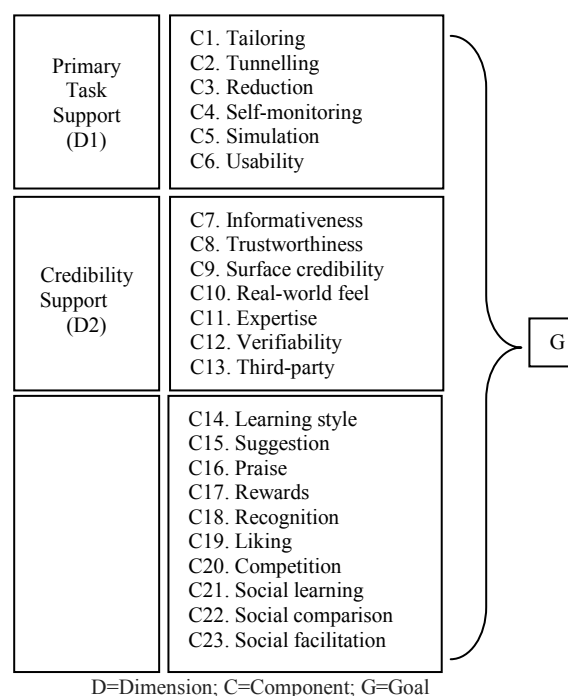


Figure 1: Initial Persuasive Model (Nor Aziah et al., 2013)

4. MODEL VERIFICATION PROCESS

As mentioned above, the IPM was used as a source in the development of a final model for WBL in Islamic education. This section provides a general overview of DT before discussing how the procedure took place in the present study.

This section also explains the first and second cycles of the Delphi process and the steps that were taken to ensure that the selected features were appropriate and acceptable for the WBL-IE environment. All the agreed persuasive features will be applied later in the WBL-IE environment in order to investigate the effectiveness of the features.

4.1 Delphi Technique

The Delphi technique (DT) was chosen to be employed in the model verification process. The technique was developed by [21] who defined the DT as a combination of qualitative and quantitative processes that draw on the opinions of experts from several disciplines and professions. The DT is a widely used method for gathering data from respondents within their domain of expertise. The technique was designed as a group of communication processes that aims to achieve a

convergence of opinion on a specific real-world issue. The rationale for this approach is described as “two heads are better than one, or ... n heads are better than one” [22]. DT is not as common as surveys that try to identify “what is”; rather, DT attempts to address “what could or should be” [23]. Generally, the DT is a group process involving an interaction between the researcher and a group of experts on a specified topic, usually through a series of questionnaires. The DT has been used to gain a consensus regarding future trends and projections using a systematic process of information gathering [24].

DT has been used in various fields of study such as program planning, needs assessment, policy determination, and resource utilisation to develop a full range of alternatives, explore or expose underlying assumptions, and correlate judgments on a topic spanning a wide range of disciplines [25]. The DT is well-suited as a method for consensus-building by using a series of questionnaires delivered using multiple iterations to collect data from a panel of selected subjects [26]. Subject selection, time frames for conducting and completing a study, the possibility of low response rates, and unintentionally guiding feedback from the respondent group are areas which should be considered when designing and implementing a Delphi study.

Theoretically, the Delphi process can be continuously iterated until a consensus has been achieved. Some researchers consider three iterations are sufficient to collect the desired information and reach a consensus in most cases [27][28]. Other researchers recommend four iterations because they have determined that additional iterations beyond three are needed or valuable [25].

The experts' contribution is imperative in the Delphi process because the success of a Delphi study depends on the selection of the experts. There are two important aspects to this matter, namely, panel size and the experts' qualifications. It is clear that there is a wide variation in the recommended number of participants. Panel sizes have ranged from 4 to 3000 [29]. Some researchers have used panels with 3 to 9 members in homogenous groups [30][31][32]. However, representation is assessed by the qualities of the expert panel rather than its number [33].

4.2 Delphi Technique in Verification Process

This section describes round one (DT1) and round two (DT2) of the Delphi iterations in the verification process to show how the DT was applied to achieve the specific objectives.

DT1 – In the first round, the Delphi process began with a semi-structured questionnaire and a discussion was conducted to evaluate the components that were produced by analysing the findings of related previous studies. In this process, the experts were required to choose appropriate persuasive components to be included in the questionnaire. The experts later needed to convert the questionnaire into a well-structured questionnaire. The first round process was an important process in preparing the appropriate survey instrument since the questionnaire was used in the second round of the Delphi process.

DT2 – In the second round, the experts received a questionnaire and were asked to review the persuasive dimensions and components by looking at the definition and suitability of the components to be used as a persuasive component in an online learning environment. In addition, the experts also evaluated the support elements for the components. The experts were later required to rate and rank-order items in order to establish preliminary priorities among the dimensions, components and support elements.

The model development in the present study included two phases, namely, the research theory and the construction of the persuasive model. The output from DT1 was OT1 (DT1 → OT1). DT2 comprised two rounds of discussion (DT2_P1 and DT2_P2) and the output from DT2 was OT2 (DT2 → DT2_P1 & DT2_P2 → OT2).

4.3 Delphi Technique 1

The DT1 process specifically focused on the selection of appropriate persuasive features which were produced from identifying persuasive features in the related previous studies. The features were later used to develop a questionnaire. In order to accomplish the objective, the DT1 process involved four (4) activities. First, an expert panel was selected and the process of DT1 was monitored. Second, the selected experts were involved in the process. Third, the first Delphi questionnaire survey was constructed. Fourth, the questionnaire was validated in terms of the language usage, vagueness and ambiguity of meaning regarding the persuasive terms.

The number of experts in this process ranged from four to eight and their areas of expertise were education, multimedia, online learning, instructional design and Islamic education. The experts were asked to be involved in a series of discussions in the Delphi process and to evaluate the dimensions, components and elements to be used as persuasive features in WBL-IE. A questionnaire survey was then constructed based on the proposed persuasive features, to be used in the next Delphi cycle.

4.3 Delphi Technique 2

In the DT2 process, a questionnaire was given to the experts and they were asked to rate the proposed persuasive features. The answers were then analysed in order to identify the agreed components to be used for WBL-IE.

The experts were asked to consider two important matters in this process: 1) The definition of each dimension and components should be easily understood and clear; and 2) Each support element (as an indicator) should be sufficient when implemented in WBL. In addition, the experts were asked to provide comments about the overall proposed model for the purpose of model validation.

After the first round of discussion (DT1-R1), three dimensions and 23 components with appropriate support elements were considered as persuasive features and suitable to be used in WBL-IE. The components were approved by all the experts and were divided into three dimensions (referred to as D1, D2 and D3) as shown in Table 3. The components (tagged as C1 to C23) had their own support elements that were to be confirmed in the second round of discussion (DT1-R2). The aim of the DT1-R2 process was to re-verify the persuasive components and discuss the details about the support elements to be used in the website development.

5. RESULTS AND DISCUSSION

The Delphi process as described above was used as a validation process focusing on the accuracy and certainty of each constructed persuasive features for the WBL-IE model.

The experts were given a questionnaire with five levels of ratings: 1 = Strongly disagree (SD); 2 = Disagree (D); 3 = Moderately agree (MA); 4 = Agree (A); and 5 = Strongly agree (SA). They were asked to evaluate and rank each dimension, component and element based on their knowledge

and experience in their domain of expertise. The selected dimensions, components and elements were then used to determine the suitable features to be implemented in WBL-IE.

Table 1 shows the three acceptable dimensions (median score=5). All the experts strongly agreed that the three dimensions should be used as dimensions of the persuasive components in the WBL-IE model.

Table 1: Dimension Medium Score

Dimension	Median Score (1*Round)
D1 Primary Task Support	5
D2 Credibility Support	5
D3 Learning Support	5

These dimensions are identical to the dimensions in PSD [7]. For the purpose of this research, dialogue support and social support were combined as a learning support dimension. This combination was done to tailor the dimensions to the development of the learning model.

Table 2 shows the median score of the 23 persuasive components. Two of the components were rated 4 (agree) and the other components were rated 5 (strongly agree).

Table 2: Median Score for Persuasive Components WBL-IE - DT2-R1

Persuasive Components	Median Score (1 st Round)
C1 - Tailoring	5
C2 - Tunnelling	5
C3 - Reduction	5
C4 - Self-monitoring	5
C5 - Simulation	5
C6 - Usability	4
C7 - Informativeness	5
C8 - Trustworthiness	5
C9 - Surface credibility	5
C10 - Real-world feel	5
C11 - Expertise	5
C12 - Verifiability	5
C13 - Third-party endorsement	4
C14 - Style	5
C15 - Suggestion	5
C16 - Praise	5
C17 - Rewards	5
C18 - Recognition	5
C19 - Liking	5
C20 - Competition	5
C21 - Social learning	5



C22 - Social comparison	5
C23 - Social facilitation	5

This was the first output from the DT2_R1 process before the next process was conducted. The output is listed in detail as follows:

Primary Task Support (D1): Tailoring (C1); Tunnelling (C2); Reduction (C3); Self-monitoring (C4); Simulation (C5); Usability (C6).

Credibility Support (D2): Informativeness (C7); Trustworthiness (C8); Surface credibility (C9); Real-world feel (C10); Expertise (C11); Verifiability (C12); Third-party endorsement (C13).

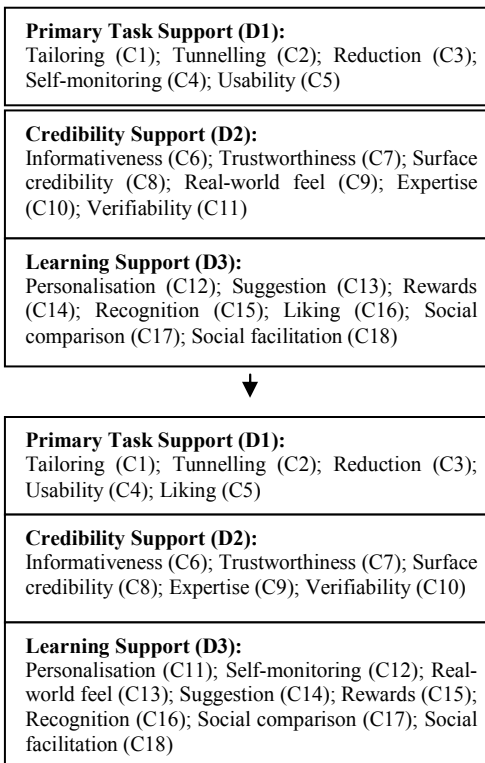
Learning Support (D3): Style (C14); Suggestion (C15); Praise (C16); Rewards (C17); Recognition (C18); Liking (C19); Competition (C20); Social learning (C21); Social comparison (C22); Social facilitation (C23).

Overall, by referring to the median scores, all the proposed components were selected as persuasive components. However, after taking into consideration the experts' comments and suggestions in the second round discussion (DT2_R2), only 18 components were retained to be used in the development of the model. The following five components were removed because of their similarities with other components: C5 (simulation), C13 (third-party endorsement), C16 (praise), C21 (social learning) and C20 (competition).

C5 (simulation) appeared to be appropriate as a support element in C14 (learning style). Therefore, it was excluded as a persuasive component and included as one of the support elements in C14 (learning style). C13 (third party support) was also discarded because it is quite similar to C12 (verifiability) when referring to their support elements. Therefore, after some revision of the support elements, the experts agreed that some of the C13 support elements should be used in C12. C16 (praise) and C17 (rewards) were combined because their aim is quite similar, that is, to give moral support to users. C17 (rewards) was retained and components C16 (praise) was removed. The appropriate support elements for C16 (praise) were used in C17 (rewards). The function of C21 (social learning) appeared to be quite similar to C14 (learning style); therefore, the appropriate elements in C21 (social learning) were combined into C14 (learning style). C21 was removed. C20

(competition) also was removed due to the support elements appearing to be redundant. The support elements of C20 were included in C22 (social comparison). After further discussion and consideration of the support elements of D1_C4 (self-monitoring) and the support elements of D2_C9 (real-world feel), it was agreed to place both components in the learning support dimension. That decision took into consideration the support elements that were relevant to the learning support dimension. C16 (liking) resembles a primary task function, and was therefore placed in the primary task dimension. In the discussion, the experts also suggested that it was better to change the wording of C14 (learning style) to "personalisation" which more closely represents persuasion. The final arrangement of the dimensions and components is shown in Table 3.

Table 3: Arrangement of Persuasive Components



The inclusion of the primary task, credibility and learning support dimensions as persuasive features in WBL-IE is irrefutable since these features also have been accepted in other related domains[14] Credibility support also has been identified by [34] as a major influence on purchasing intention and for improving the customers' level of trust while they are using a website [19]. It is believed that learning support can

lead to higher confidence and self-motivation levels because this dimension includes the features of dialogue and social support which are important in the learning environment [17]. The learning dimension is important because people learn through communication with others and learning takes place through students' interactions with their peers, teachers and other experts. Furthermore, the learning environment maximises the learner's ability to interact with others through discussion, collaboration and feedback [35].

The Delphi result showed that the experts in related domains agreed with the use of these components in WBL-IE. These components have been used as a persuasive component in a few cases [4][7][8][18]. Apart from the representation of the 18 persuasive components in the DT2-R2 process, the selection of support elements (E) for each component was also discussed among the experts. The elements were sought to support the components when applied in WBL.

Table 4 shows the final agreed-upon components and support elements that were to be used in developing a persuasive model for WBL-IE. This was the second output from the DT2 process.

Table 4: DT2-R2 Output

Primary Task Support Dimension (D1)	
D1_C1 Tailoring	E1.1 Tailored information E1.2 Knowledge customisation E1.3 Freedom
D1_C2 Tunnelling	E2.1 Learning guide E2.2 Sequence of learning E2.3 Active screen
D1_C3 Reduction	E3.1 Topics follow the sequence of learning E3.2 Easy to use and explore E3.3 Detailed explanation
D1_C4 Usability	E4.1 Content representation. E4.2 Searching information E4.3 Faster download
D1_C5 Liking	E5.1 Present related image E5.2 Users' positive respond E5.3 Experts learning invitation
Credibility Support Dimension (D2)	
D2_C6 Informativeness	E6.1 Useful information E6.2 Adequate information E6.3 Meet user's requirements
D2_C7 Trustworthiness	E7.1 Reliable E7.2 Recognised information E7.3 Reviewed and analysed
D2_C8 Surface credibility	E8.1 Consistent E8.2 No grammatical errors and spelling mistakes E8.3 No element of marketing
D2_C9 Expertise	E9.1 Popular E9.2 Bibliography provided E9.3 References

D2_C10 Verifiability	E10.1 External sources E10.2 Related logo E10.3 Declaration
Learning Support Dimension (D3)	
D3_C11 Personalisation	E11.1 Knowledge presentation E11.3 Social communication E11.4 Simulation;video;audio;etc
D3_C12 Self-monitoring	E12.1 Self-evaluation E12.2 Cumulative mark E12.3 Achievement level
D3_C13 Real-world feel	E13.1 Know instructor/organisation E13.2 Two-way communication E13.3 Choose instructor
D3_C14 Suggestion	E14.1 Syllabus E14.2 Learning schedule E14.3 Proposed learning approach
D3_C15 Rewards	E15.1 Praise E15.2 Prize E15.3 Stars
D3_C16 Recognition	E16.1 Student achievement E16.2 Certificate E16.3 Winners
D3_C17 Social comparison	E17.1 Online contest E17.2 Total visitors/users E17.3 Active users
D3_C18 Social facilitation	E18.1 Journal section E18.2 Article section E18.3 References book

The support elements refer to the suggested design principles that can and should be transformed into software requirements and further implemented as actual system features [36]. In PSD, these elements refer to system implementation and are useful in giving ideas on how persuasive components can be applied in a system [7]. In the case of the present study, the focus is on implementation of the components in the WBL-IE website.

6. RESULTS AND DISCUSSION

A review of the literature led to the identification of persuasive features and models that have been developed for the general environment. Most of the persuasive models provide a useful overview of significant components of persuasive features, but they do not completely provide a model of persuasion that is specific for WBL in general and Islamic education as a focus of study. We believe that the findings of the present study can facilitate the development of a comprehensive platform for users to explore and experience WBL without feeling it is very different to traditional approaches. The evaluations done using the DT on the survey instrument can ensure that the developed tool is comprehensive and complete. The results showed that the experts generally agreed with all the persuasive features including the dimensions,



components and support elements. Based on the comments and recommendations from experts, the pool of persuasive features was refined and restructured.

The verification process used in this study proved that the proposed persuasive model for WBL-IE is acceptable and valuable to be used. The selection of experts with expertise in their domains and with significant working experience also can be considered as the major strength because their ideas increased the richness of the developed model.

The proposed model comprises 18 accepted components to be used as persuasive features in WBL-IE. These components will later be applied and matched in WBL with appropriate support elements to represent each persuasive component. There is a process to be finished in order to have an overall view of the implementation of the features in a real system. For that reason, we will provide a prototype for the model development and go through a valid process as a final round which will be the third round of the Delphi process (DT3). This round will be conducted with a group of user experts in order to finalise and validate the persuasive model. In this round of discussion, the experts will have a final opportunity to revise their evaluations. They will be given a questionnaire and prototype website to see the effectiveness of the persuasive features being implemented. In addition, the experts will be asked to make further evaluations and judgments about the relative importance of the persuasive components and also to give their opinion on the accuracy of the component implementation.

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