

# A Web-Based Requirements Elicitation Tool using Focus Group Discussion in Supporting Computer-Supported Collaborative Learning Requirements Development

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## Abstract

*Developing correct requirements for any application is vital for the success of the application in any field. Computer-supported collaborative learning (CSCL) has becoming an important tool for enabling collaborative learning (CL) in education. In Malaysia for instance CSCL has been chosen to be a technology enabler to support Smart School project whereby CL has been identified as one of its learning strategies (MOE, 1997). However, the project will not come true if the lacking of CSCL application is not overcome. The situation is more acute as the existing applications are not only general in nature but yet to exhibit collaborative characteristics. This problem is due to many reasons. From the software engineering point of view, first and foremost, the problem is introduced during the elicitation of users needs. A survey carried out by the author had been identified that users are not the first people consulted by courseware developers in eliciting requirements. Furthermore, the courseware developers have no support in carrying out requirements elicitation activity. In conjunction to this, a review was also carried out in requirements elicitation techniques and process. Many methods have been identified and implemented to support requirements elicitation activity. Most of them are group-based, which support the*

*cooperativeness of the requirements elicitation activity. However, the existent of these tools are not recognized in the Malaysian context. Due to this, a new requirements elicitation tool using Focus Group Discussion (FGD) technique is developed based on the survey done and the literature survey carried out. The tool is called FGD-RElicit stands for Focus Group Discussion technique in Requirements Elicitation. This paper focuses on the development of FGD-RElicit from its technique used in supporting elicitation, analysis model, design and architecture. Results of evaluation by the users are also included the paper is wrapped up.*

*Keywords: requirements elicitation tool, focus group discussion, requirements elicitation, collaborative.*

## 1. Introduction

The trend of group-based requirements elicitation tools in recent years that has some bonding with the use of World-Wide-Web (WWW) as a standard medium has added more supports especially in its collaborative nature of requirements engineering (Annie et al, 1996; Robertson and Robertson, 2005). Many techniques have been incorporated the collaborative nature for various reasons; i) ensure all stakeholders' participation, ii) achieve comprehensive requirements

document and iii) get requirements easily and quickly. Although, accurate delivery time is important, comprehensive requirements document is much more significant and a strategy that can ensure all stakeholders involved is in need.

In a case of CSCL applications in Malaysia, the fact that CSCL applications are still lacking (Zarinah and Siti, 2003). But, the existing applications seem do not support the intended one. This could be due to many reasons. However, it clearly shows that the functionalities exhibited do not fulfill users needs. Hence, a survey on how courseware developers in Malaysia perform the requirements elicitation was carried out. The result showed that FGD technique has obtained the highest percentage in terms of the elicitation technique used for requirements elicitation activity. This result is analogous with the technique that the user (teachers) most preferred if they are to be consulted in another study conducted by the author on collaborative learning among schoolteachers.

Another important finding from the first survey is, the courseware developers do not have many choices of requirements elicitation supports to carry out requirements elicitation activity. Review on existing tools showed that most of the available tools requirements management tools or general requirements tools (Kotonya and Sommerville, 1998). Assuming that group-based technique is better than stand-alone and using the preferred technique would promote comfortability, a new requirements elicitation tool is developed to provide support for requirements elicitation activity. So, Focus Group Discussion for Requirements Elicitation or FGD-RElicit is realized to help courseware developers in eliciting requirements for the application they intend to develop such as CSCL. By using FGD-RElicit, project members can

work collaboratively to specify concerns and viewpoints important for the courseware under development. The identified concerns and viewpoints can be discussed, shared, changed, refined and finally integrated using the tool which basically applied the FGD technique among project members, who are located anywhere around the world.

This paper discusses some aspects of FGD-RElicit in the context of its features that are suitable for web-based applications development. The tool is useful to identify, elaborate, refine and integrate concerns and viewpoints for draft of requirements document (URD). The following section gives an overview of the FGD technique. It will be followed by the FGD-RElicit tools features, short evaluation and conclusion.

## **2. Focus Group Discussion Technique**

FGD is a facilitated brainstorming and discussion technique which rooted in market research. It is a structured group process conducted for the purpose of obtaining detailed information about a particular topic, product, or issue (gwbweb, 2003). The FGD technique is less formal compared to a meeting. It is an ideal method for generating and exchanging ideas compared to interviews or surveys.

In requirements elicitation activity, the use of web-based FGD is able to exhibit the following advantages (gwbweb, 2003):

- It is an efficient method to interview a number of people at the same time, and results can be obtained in a reasonably short time span.
- Social interaction within the group yields freer and more complex responses.
- The stakeholders can probe for clarification or greater detail, or

unanticipated but potentially fruitful lines of discussion can be pursued.

- Responses have high face validity due to the clarity of the context and detail of the discussion.
- Focus groups can work well with any particular population and with a diverse population. This includes people who may have limited education, modest verbal skills, low self-esteem, and lack of prior experience expressing personal views.

However, a list of tasks needs to be carried out in the implementation of the face-to-face FGD (Lauesen, 2005). It includes:

- Inviting participant
- Opening the session
- Sharing bad experience using the existing applications
- Discussing future issues of the intended application
- Listing all the issues
- Prioritizing the issues
- Reviewing the list
- Closing the session

Here, some of these subtasks are implemented for a web-based FGD, which will allow participants from anywhere to join the discussion at anytime within the FGD duration.

Several online FGDs have been developed such as IntFG (Montoya-Weiss et al, 1998). IntFG or Internet Focus Group is a very basic online FGD whereby a moderator and participants are involved. A question raised by the moderator is the main thing, which then the participants involved will respond to it by submitting their feedbacks. The tool records who is participating by capturing the IP address of the computer used by the participants. As an early tool, it enables future empirical exploration of

online focus groups. Another electronic focus group is online focus group (Rezabek, 2000). The online focus group is used like a brainstorming based on an initial question. The focus group members will discuss and respond to the question. They were also asked to react to the responses given by the various members of the group. It is basically developed to identify questions to be used in an interview with distance learning students to probe their reason for and other factors relating to their decision to enroll in distance learning courses in an Iowa community college.

As far as the study is concerned, there is no specific FGD tool, used in requirements elicitation activity though FGD has been identified as one possible technique in eliciting requirements. From the literature review done, the multi-perspective approach by Sommerville et al (1998) would ensure the comprehensiveness and completeness of a requirements document. In the multi-perspective approach; the participant will first identify a particular concern, then followed by the identification of viewpoints particular to the concern. Each concern needs to be elaborated to reduce ambiguity and confusion. Finally, all the concerns together with the viewpoints are integrated to be included in a draft of user requirements. In the existing approach, Hence, the FGD tool would incorporate this approach with slight modifications. The next section elaborates in detail a new requirements elicitation tool using FGD or FGD-RElicit from the user's (courseware developers) perspective.

### **3. FGD-RElicit Tool**

FGD-RElicit supports requirements elicitation using FGD technique. The tool serves as a medium for project team members that are working from different locations to participate in identification,

elaboration and integration of requirements for an application that they are developing. As they come from different background and level of education, they will have different viewpoints and concerns. By using the tool, it enables them to work collaboratively, give rationale to their viewpoints and concerns and make decisions of functionalities and constraints of the system going to be developed despite of their geographic and time differences.

### 3.1 Users

The users of FGD-RElicit are all stakeholders involved in the application under development. We assume that FGD-RElicit users will work from existing similar systems documentations (if any), textual statements of need and / or additional sources of information such as the organization practices, standards and policies. With the available information, they can share their viewpoints and concerns using FGD-RElicit as described below.

### 3.2 Tool Features

The following are the 12 features of FGD-RElicit

#### 3.2.1 Authorized Participants Joining the FGD Forum

FGD-RElicit tool handles three different categories of roles namely teachers, developers and facilitator with an additional of administrator role who handles the setting up of 'project' for which the requirements will be elicited. Each role has different default page with different tasks that they can perform:

i) The teachers and developers are allowed to involve in the discussion. They can open the page, poll, post and reply message depending on which stage at the particular time they logged in. It also lists all viewpoints suggested by all involved and replies to any viewpoints posted. They are responsible to give, elaborate and justify their suggestions.

ii) The facilitator is allowed to involve in the discussion, set viewpoints and concern for polling, send and reply message to/from the group as well as to individual participant. The facilitator also sets for integration all viewpoints and concerns that are agreed by all participants.

iii) The administrator is in charge of various roles including commencing a project, setting the start and end of a project and setting the FGD group. The administrator also manages the whole FGD-RElicit database.

#### 3.2.2 Session Commencement and Maintenance

Session commencement for the FGD indicates the start of the discussion. The administrator will first assign a facilitator to the group. The step is followed by the facilitator assigning participants to the FGD group set up. In the physical grouping, one usually tends to work with the same gender or their colleagues. However, this kind of division does not always produce optimal result [8]. For that reason, a random assignment of all participants using first come first serve basis is adopted in FGD-RElicit. The participants are grouped in seven to form an ideal group of FGD. The duration of individual phase for each forum is set by the administrator, and this activity which subsequently activates the forum.

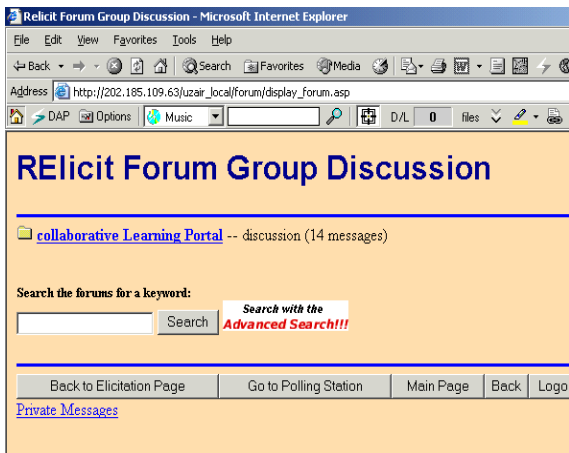


Figure 1: The Forum Group Discussion

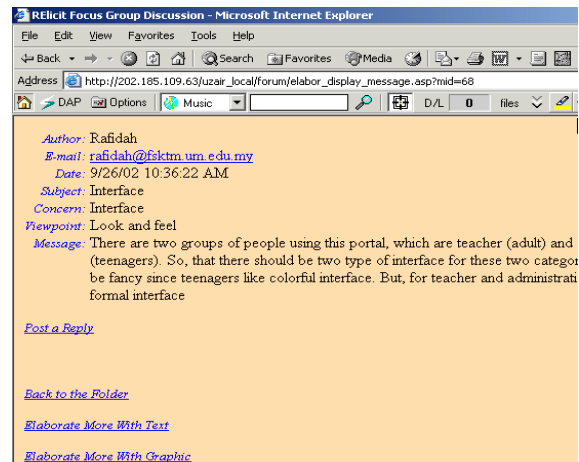


Figure 2: The Elaboration Session Page

### 3.2.3 Focus Group Discussion

Identification phase started once the FGD is activated. The participants can start posting messages to the assigned forum. The forum provides place for the participants to share their viewpoints and concerns. The sharing concept means all the participants can post their messages, see others' messages, give rationale to their messages if any misunderstanding arises, respond to others' messages and send private messages to others. The facilitator's guidance and the time frame specified reduces the possibility of over-scheduled discussion as often happened in traditional forums. As shown by Figure 1, from this activity, the developers and the teachers can go back to the elicitation page or straight to the polling station depending on the time they log in and the forum that they are assigned to.

- **Identification**

The new FGD forum starts with the elicitation phase. In this phase, participants are allowed to submit their concerns and viewpoints. However, if the elicitation period has ended, they will be directed to the elaboration page. Once the elaboration period has ended, they are only allowed to involve in polling which is an important activity in the integration phase. The

developers and the teachers can also quit from the session anytime, at their own preference.

- **Posting and Replying Message**

The main activity involved in the identification of concerns and viewpoints is sending or posting message to the assigned FGD forum. The message sent contains either totally new message or as a response to previous submitted message. In the later case, the participants are considered replying a message.

- **Elaboration**

Members of the discussion forum have to elaborate the viewpoints that they have submitted during the identification session. As it is common for people to elaborate via sketches together with text, FGD-RElicit tool provides alternative option to elaborate with some graphics besides text. Figure 2 shows the options for elaboration of viewpoints.

- **Elaboration in Visual Representation**

Members of the discussion forum have to elaborate the viewpoint that they have submitted during the identification session. As it is common for people to elaborate using some sketches together with text, FGD-RElicit tool also provides alternative options to elaborate with some graphics

besides merely using text. As shown in Figure 2, there is an option for elaboration of viewpoints visually.

- **Drawing and Uploading concept map**  
FGD-RElicit uses the concept map and for this a third party freeware, called Axon is used in the tool to create visual representation of viewpoints. After the map is drawn, it is saved into a file and the file is uploaded and attached to the appropriate viewpoint.
- **Sending Private Message**

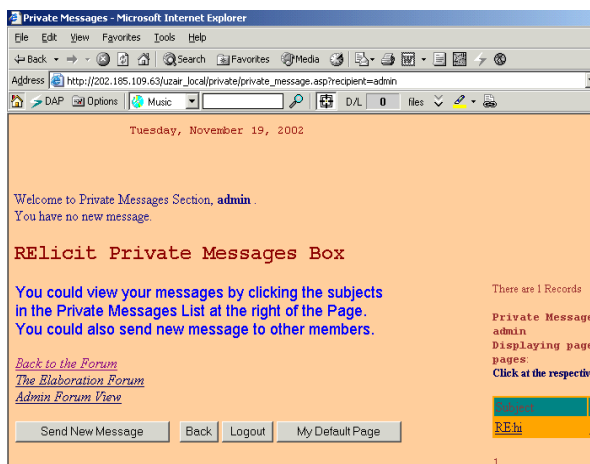


Figure 3: The Private Message Facility

### 3.2.4 Concern-Viewpoint Polling

Not all concerns and viewpoints look fine to all involved at it is first proposed. While some do not distinctively clear to be included, the other may also be overlooked. By using consensus, this activity is to decide certain concerns and viewpoints to be integrated into the draft of URD. The FGD technique provides equal time to all the participants to poll whether to agree or to disagree with the viewpoints. Figure 4 above shows the number of participants agreed and disagreed after the polling date ends, to several viewpoints. Only viewpoints with

Besides, responding and replying through the discussion forum page, the developers, teachers and facilitator can interact among each other by using Private Message Facility. The page as shown by Figure 3 displays any message sent to the participant on the right side of the page. While, the left side provides all the links and buttons back to the forum. This facility is provided particularly for the facilitator to encourage any non-active members to participate in the discussion forum.

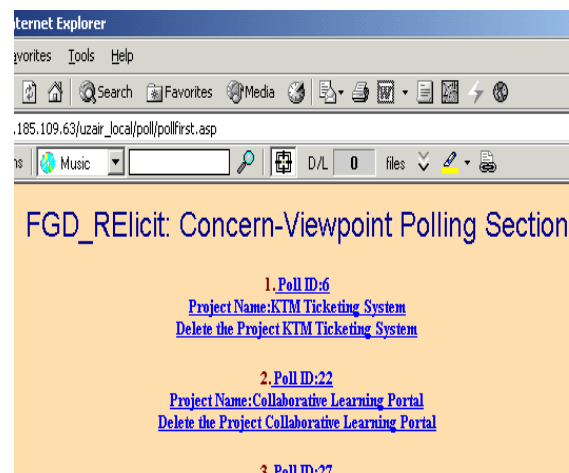


Figure 4: The Concern-Viewpoint Polling Section

more participants agreed are set for integration into the draft of URD.

### 3.2.5 Concern-Viewpoint Integration

The third activity of FGD is concern-viewpoint integration activity. It takes place after the elaboration activity has ended. During this activity, all the agreed concerns and viewpoints are integrated. As shown by Figure 5, the list of concerns and viewpoints are sorted under the title of the particular forum. Any concept maps attached to the particular viewpoint can also be viewed. As long as the period of integration is not due, members of the discussion can highlight any

missing viewpoints (already suggested in the identification and elaboration phases) for

inclusion. This can be done through the polling activity.

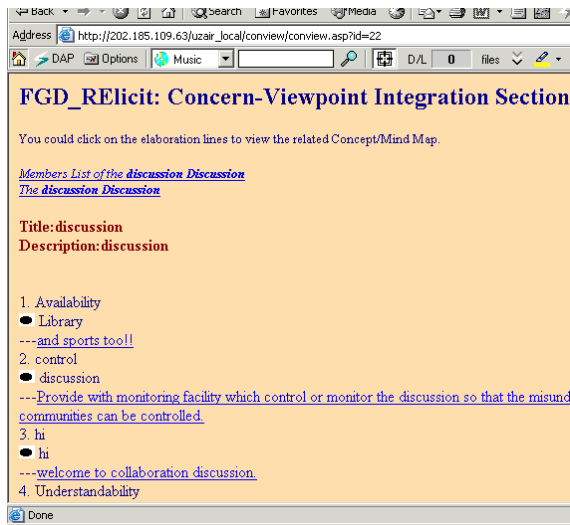


Figure 5: The Concern-Viewpoint Polling Section

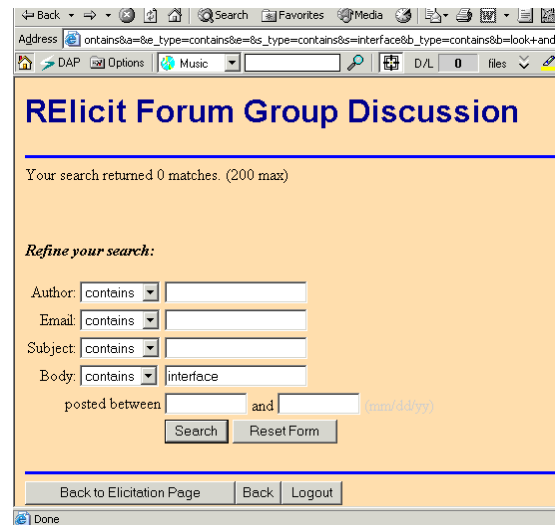


Figure 6: The Concern-Viewpoint Search

### 3.2.6 Concern-Viewpoint Search

The large document of concerns and viewpoints can be searched to find any interested topic by the participants. The search can be done according to author, subject or body keyword. As shown by Figure 6, it can also be searched through the date posted.

## 4. Evaluation

An evaluation was carried out by five groups of teachers and postgraduate students in which the later represents the courseware developers and facilitator. Each group comprised of two teachers, two developers and one facilitator. The groups were assigned a task to elicit requirements for “Examination Question Preparation System”. At the end of the task, they are asked to fill in one testing evaluation questionnaire to examine the tool’s functionalities and usability. Based on the usability questionnaires (Lund, 2001; SUMI, 2007), the results indicated that all the functionalities included have shown its

usefulness in terms of fulfillment of the development objectives. In particular to the drawing and uploading concept map module, the respondents highlighted that the FGD-RELICIT can be enhanced and expanded to achieve its outmost capabilities in giving platform to support elaboration using visual representation.

## 5. Summary and Conclusions

The work has illustrated the implementation of requirements elicitation tool using FGD technique. The tool adopted the multi-viewpoint approach whereby the stakeholders involved are able to share their bad experiences of the existing applications and suggest issues related to the application to be developed. The issues are suggested in terms of concerns and viewpoints. By using this approach, each concern and viewpoint(s) are identified, elaborated and later integrated. The realization of the detailed features of the tool is given from the users’ perspective. In summary, FGD-RELICIT supports the collaborative nature of requirements engineering using interactive

WWW technologies. By using FGD-RElicit, all stakeholders especially teachers and courseware developers who are located anywhere around the world are able to participate in the requirements elicitation activity in developing requirements for CSCL application.

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