

Effects of Electronic Communications on Interview Techniques in Requirements Engineering

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Abstract

Entire world is joining the global electronic community, and all the credit goes to efficient software solutions; those are expanding this electronic world. Interviewing is one of the famous techniques for requirements elicitation of software development. It is widely acknowledged that during the interviewing process, specialists face difficulties in gathering the knowledge, and this can interrupt the interviewing process. In this research electronic communication tools: podcast, e-mail, chatting and hybrid (a combination of podcast + E-mail + Chatting) had been studied as moderating variables, to discuss the interview agenda in details, for the elicitation of tacit knowledge in interview techniques for software development. Results have revealed that the moderating variables in the form of these electronic communications have positively affected the requirements elicitation process in retrieving the information from the interviewees.

Keywords: *Tacit knowledge elicitation, Requirements Engineering, Interview techniques, E-communications, Podcast, E-mail, Chatting*

1. Introduction

We are living in a digital world, based on computers, and these machines have become a vital part of our daily life. If the computer systems all over the world are switched off even for a short period of time, unbelievable tragedies would arise, as today, our banks, satellites, shops, airplanes, superstores, communication and security systems are based on these computer systems. The key of success for these computers are the proper software, used by computer machines or users to perform different tasks.

Software specialists initiate the software development process through the practice of interviewing for requirements elicitation from the users. Elicitation is a word in requirements engineering which is used to endorse the fact that the precise and detailed requirements can be extracted from the user. The Success of a software system depends on the elicitation of right requirements [1, 2, 3, 4]

However, analysis states that one of the major cause of project failure is weak requirements elicitation [5, 6] and the cost of software failure ranges around 50 to 80 billion dollar annually [7]. It's really challenging to make sure that all the requirements have been gathered from the user. How should this challenge be taken up?

This research study will attempt to assess the effects of electronic communications (using Podcasts, E-mails, Chatting, and Hybrid [Combination of Podcast + E-mail + Chatting]) as moderating variables, separately, on four different groups, for the elicitation of tacit knowledge through Semi-structured interview techniques.

Interviews are mostly used in the collection of data, as the process of interviewing is easy to implement, and has the capability to conduct in-depth exploration of the participant's experience. During the process of elicitation, there are two types of knowledge; tacit and explicit, tacit knowledge deals with the density and difficulty of intangibles, whereas explicit knowledge is detailed, precise, and apparent. Tacit knowledge creates main amount of our understanding, but it's difficult to get full advantage from this valuable asset, as the tacit knowledge is fundamentally indescribable [8].

Through a thorough literature review, it has been observed that electronic communication tools like Podcast, E-mail, Chatting have been used for conducting the interviews but the use of these e-communication tools is purely to conduct the interviews or online interviews, for asking the interview questions (e-mail interviewing, chatting interviews), or an agenda of interview could be handed over or sent (posted or e-mailed) to the interviewee, before the interview, for reading and getting interview related information, to enhance the interview

output. There appears a research gap in testing the usage and effects of the electronic communications to discuss the agenda of interview in detail, to enhance the understanding between interviewer and interviewee towards a common goal, during the process of interviewing for the elicitation of tacit knowledge.

Keeping in view the enormous benefits of electronic communications (Podcast, E-mail, Chatting,), this research study has used the electronic communications tools to discuss the interview agenda with interviewee in more details, instead of providing the interview agenda, for reading only, and making their own ideas.

This research study is based on quantitate data, and has tested the effects of electronic communications as moderating variables on the elicitation of tacit knowledge sharing process of interview techniques on six major key areas, showing the participant’s approach towards the use of electronic communication tool; whether “Friendly”, “Comfortable”, “Essential”, or not, and helped the participant in “Understanding”, and “Learning” the interview process, or not, and finally the effects in helping the “Tacit knowledge Elicitation”.

2. Literature Review

2.1. Research Background

Elicitation is one of the major phases in requirements engineering [2, 4, 9]. During the process of software development, elicitation of requirement is the most critical factor or CSF (Critical Success Factor) for the project [2, 4]. For the success of a project the requirements should be specific, and perfectly detailed [2, 10]. In the process of elicitation, Explicit and Tacit knowledge are two types of knowledge, as the required knowledge could be unclear or undefined and the dichotomy of tacit or explicit is used to streamline a complex area [10, 11]. Tacit knowledge can be defined as personal belief, or perception of an individual, whereas explicit knowledge is easily describable [8, 10, 12]. Tacit knowledge can be best shared by the people, whereas, machines or mechanisms are best source of sharing the explicit knowledge [10, 13]. All experts experience Explicit and Tacit knowledge [4, 10, 12]. The capacity of an individual to keep the knowledge is, more than what he or she can tell [10]. People have their own terminologies, and cannot find appropriate way or words to explain it [13].

Understanding the user requirements and ideas are the main challenges for the requirements elicitation [14, 15]. If requirements are weak and not elicited properly, unexpected work has to be done, later to fix the problems [15, 16], and the analysis state that weak requirements elicitation is a major cause of software project failure [5, 6], and because of these weak requirements failure rate of software projects is around 60% to 80% [7].

In the field of elicitation, some of the common forms for Explicit and Tacit Knowledge are as following:
Tacit Knowledge: Facial recognition, Rule of thumb, Trade tricks, Workarounds, Undocumented processes, Gut Feel, Know-how, Expertise, Perception – Intuition

Explicit Knowledge: Written Reports, Manuals, Forms, Standard Operating Procedures (SOPs), Directions – Instructions, Check Lists – Task lists, Hierarchal Structure, Workflow diagrams, Observational video, Rules – Guide Lines, Policies

This research was inspired by two primary drivers:

- 1). Tacit knowledge elicitation is a challenge for the practitioners [13, 17].
- 2). There are always opportunities for the researchers to suggest different elicitation techniques selection methods for a known problem [18, 19].

Following ‘Table 1’ explains the renowned Nonaka’s Model of Knowledge Creation and Transformation [8].

Table 1: Nonaka’s Model of Knowledge Creation and Transformation

TACIT TO TACIT (SOCIALIZATION) e.g., Individual or Team Discussions	TACIT TO EXPLICIT (EXTERNALIZATION) e.g., Documenting a Meeting
EXPLICIT TO TACIT (INTERNALIZATION) e.g., Learn from a report or document and Comprehend new ideas	EXPLICIT TO EXPLICIT (COMBINATION) e.g., Create a Website from some form of explicit knowledge

Elicitation is a practice in which one or more techniques or methods are used to gather the requirements [4].

Table 2: shows the Elicitation Methods

Method	Description
Interviewing	Interview provides rich qualitative data. A range of techniques including questions being asked to an interviewee (an individual or a group) and the gathering of responses [20].
Observation	Process to observe the actions and activities of the individual with enhanced understanding of behaviors and activities, in a natural way, and the act of watching and capturing the actions [21, 22].
Protocol Analysis	Noticing an individual or participant performing an action and the person simultaneously thinks and speaks aloud about their thoughts and understood process while performing the task [23].
Repertory Grid Analysis	A method of thorough collection of data, its elements and constructs of an individual. Capturing and examining the individual’s rating of items or objects and the assessment and evaluation of those items to one another in a specific domain [24].

Brainstorming	An activity for getting ideas that generates concepts or reveals further knowledge. This is a group based activity and ideas of all the participants have to be documented in a free-form manner with few restrictions [25, 26].
Group Support Systems (GSS)	Use of ICT - Information and Communication Technology for the creative production of ideas to ease, streamline and simplify the contribution of group in the process of knowledge capturing [27, 28].

The meaning of usability in website development is to design efficient and effective products, and a User Centred Design process in website development is the most important feature [29, 30]. Content of the website is a key factor that enables the users to enjoy the benefit of the website [31, 32].

One of the major factors for the development of a website is the gathering of information about the content and functionality [33]. Functional requirements help in meeting the needed requirements and define what the website should do [33, 34].

The assessment of performance and effects of any electronic tool can be made on the factors like; Comfortability, essentiality or importance, feel at ease or friendly, help of e-tool in understanding and learning towards a specific area or goal [35, 36, 37].

There are number of benefits in using the electronic communication tools, like Podcast, E-mail and Chatting. Podcast has the potential to enhance and enrich the learning experience and is useful for the participants' engagement [38].

E-mail is an easier way for the dissemination of information, and also makes people reachable [39]. E-mail is as essential as any other medium of communication like phone, fax, paper, or mail [40]. Chatting creates ideas, and ideas turn in to projects [41]. Online chat sessions are useful in improving and refining the outcomes of the participants [42, 43]. The virtual (computer-generated) learning resources corresponding to the electronic communications could be more effective and efficient than conventional methods [44, 45]. Information Technology can play an important role in the process of knowledge sharing process [46]. Engaging the individuals in electronic participation produces optimistic results [47].

During the process of interviewing, providing an interview agenda to the interviewee, for reading the information can be useful for the development of clear understanding between the interviewer and interviewee towards interview questions [48, 49]. Researchers have done interviewing through these electronic communications like Podcast, E-mails, and Chatting; for asking the interview questions. Podcasts are very good electronic tools for sending the interview questions to interviewee [50]. Interviewing through e-mail is a novel technique having number of benefits over traditional interviewing [51]. E-mail interviewing provides useful understanding and is potentially a very strong tool for the interviewing [52]. Participants found online interviewing through chat sessions as a convenient way, and maintain that online interviewing is an effective way for interviewing [53].

Although the electronic communication tools like Podcast, E-mail, and chatting have number of benefits, yet all these studies were carried out purely for conducting the interviews using the electronic communications tools, and the communication tools were merely used to inquire the interview questions, and the interview agenda was merely provided to the interviewee for reading. Yet, no study has looked, and there is no technique, or method that has been tested specifically in the usage and effects of these electronic communications for discussing the interview agenda in detail through these e-communications, to enhance the understanding between interviewer and interviewee towards a common goal, during the process of interviewing for the elicitation of tacit knowledge, and this seems a research gap. Therefore, this is the major area this paper has addressed.

2.2. Hypothesis

As per the literature review; the usage of electronic communication (like Podcast, E-mailing, and online Chat session) was just for conducting the interviews. Hence, the usage of electronic communication as a moderating variable for discussing the interview agenda in detail is not a common practice in the field and hence this gap needs to be filled.

Therefore the purpose of this study is to test the following four major hypotheses for the four types of e-communications (Podcast, E-mail, Chatting and Hybrid), as in 'Table 3':

Table 3: Major Hypothesis

H ₁ Electronic communication through "Podcast", a one way asynchronous tool as a moderating variable positively affects the elicitation of tacit knowledge sharing process for the interviewing
H ₂ Electronic communication through "E-mail", a two way asynchronous tool as a moderating variable positively affects the elicitation of tacit knowledge sharing process for interviewing

H ₃ Electronic communication through “Chatting”, a two way synchronous tool as a moderating variable positively affects the elicitation of tacit knowledge sharing process for interviewing
H ₄ Electronic communication through “Hybrid (Combination of Podcast + E-mail + Chatting)”, a combination of asynchronous one way + two way, and synchronous two way tool as a moderating variable positively affects the elicitation of tacit knowledge sharing process for interviewing

Following six well known key areas for the questionnaire had been selected to be filled in by the participants to test each of the hypotheses:

The e-communication tool (Podcast/or E-mail/ or Chatting/ or Hybrid) as a moderating variable is:

- 1). Friendly. 2). Comfortable. 3). Essential (Part of interview process). 4). Helped in “Understanding” the interview requirements. 5). Helped in “Learning” the interview requirements. 6). Helped in “Elicitation of Tacit Knowledge” sharing process.

Participants had contributed in the process of interviewing for the development of their course website for the course “Computing Skills” offered at Sultan Qaboos University. This research study is based on Quantitative data. For the data collection: a well-organized 10 point Likert scale questionnaire through a thorough literature review had been designed to gather the relevant data. Mid value is 5 and the standard symbol for the mean of Electronic Communication Tool (Podcast/E-mail/Chatting/Hybrid) is μ , therefore our general hypothesis was:

$$H_0: \mu \leq 5 \qquad H_1: \mu > 5$$

As, this was important in testing e-communications to get the details of each key area, therefore, the quantitative data (Questionnaire – Appendix A) following Hypothesis had been tested separately for each of the six key areas (Friendly, Comfortable, Essential, Understanding, Learning, and Elicitation of Tacit Knowledge) for each of the moderating variable (Podcast/E-mail/Chatting/Hybrid) as a communication tool, in ‘Table 4’:

Table 4: Hypothesis testing for six (6) key areas

<p><u>Friendly:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Friendly’ H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Friendly’</p>
<p><u>Comfortable:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Comfortable’ H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Comfortable’</p>
<p><u>Essential:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Essential’ H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Essential’</p>
<p><u>Understanding:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Understanding’ the interview requirements H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Understanding’ the interview requirements</p>
<p><u>Learning:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Learning’ the interview requirements H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Learning’ the interview requirements</p>
<p><u>Elicitation of Tacit Knowledge:</u> H₀: There is no effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Elicitation of Tacit Knowledge’ sharing process H₁: There is positive effect of the (Podcast/E-mail/Chatting/Hybrid) tool usage on the key area ‘Elicitation of Tacit Knowledge’ sharing process</p>

3. Research Design

Following is the research design of this study:

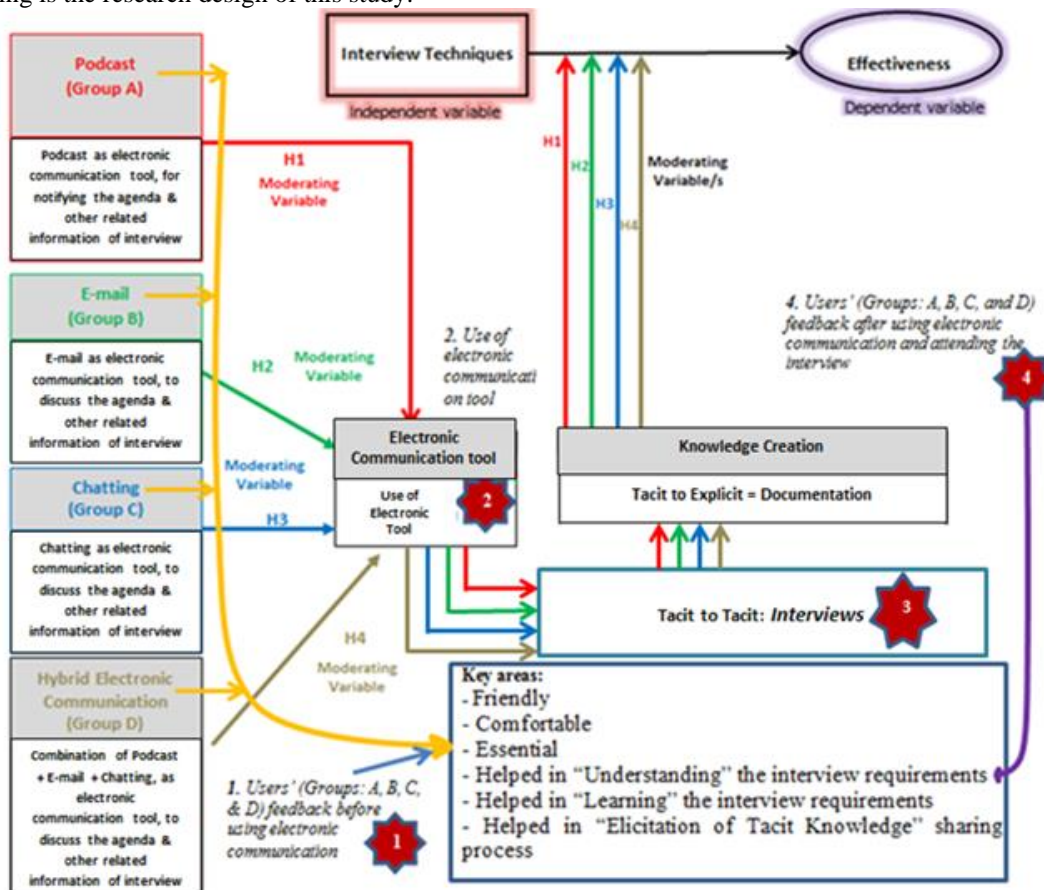


Fig. 1. Research Design

This research design in Fig.1. had four major steps including *i*). users' feedback (*Appendix - A*) of each group, before using the electronic communication tool, *ii*). Use of electronic communication tool to discuss the interview agenda *iii*). Attending the interview (*Appendix B*), *iv*). Furnishing again the after e-communication usage feedback (*Appendix - A*).

4. Methodology

This study had been tested through introducing the course website development process of a blended learning environment, for the students of Sultan Qaboos University studying the course "Computer Skills". The educational backgrounds of these participants (i.e. 4 groups) were similar, and belong to same age group of around 19 years. They had a very good knowledge of the website usage, as they had already used computers, e-mails, search engines and many other educational related websites for other courses and throughout their educational journey, to get the help in their studies. These participants had hardcopies of their course material and were facing difficulty in receiving the supported and associated course material for further exploration and study for their course. Their demand was to provide them the supported material and associated resources to lend a helping hand for their course, through the website. Hence, this was a practicable environment to test the hypothesis of this research. Interviews had been conducted with these participants for the need analysis.

They had been divided in four groups:

I). Group A (PODCAST): (30 participants)

II). Group B (E-MAIL) (30 participants)

III). Group C (CHATTING) (30 participants)

IV). Group D (HYBRID)(30 participants)

Three preliminary lectures/sessions had been arranged for each of the four groups (A, B and C and D), regarding the development process, and their part in the need analysis phase as an interviewee.

During these preliminary sessions the participants of these groups had been informed generally, about the following:

- Purpose of interview.
- General agenda of interview.

- Process of Interview.
- Boundary of interview requirements.
- Outline of components/specifics of the interview.
- Definitions and brief information about the components/specifics of interview, to drag the attention of interviewee towards the requirements of interview.
- Rough estimate about the expected time and duration of interview, and place.

Then each of the group had been informed about the detailed discussion of the interview agenda for one month, using a different communication tool for each group, decision about non recording of interview (as most of the participants were reluctant for their interview to be recorded), taking notes during the interview process, the presence of a helper for taking the notes, and confidentiality of the collected information to be used for the research purposes only. The agenda was divided in four parts for discussion during four weeks (except PODCAST, as it is one way communication, for listening the audio files only): **Week1:** General, **Week2:** Functional requirements, **Week3:** Usability requirements, **Week4:** Content requirements. Quantitative data gathering method had been used for the study:

Quantitative data collection: a well-organized 10 point Likert scale questionnaire had been designed to gather the relevant data (**Appendix A**). As this research was focusing on better understanding of the interview using agenda for the tacit knowledge elicitation, so as per known fact, we had designed the questionnaire after a comprehensive literature review mainly concerning to the six domains for the comparison purpose, as following: For the interviewing process the Electronic Communication tool “Podcast/E-mail/Chatting/Hybrid” as a moderating variable for discussing the interview agenda, in the views of participants:

Participants feeling towards the e-tool:

i). Friendly ii) Comfortable iii) Essential

Participants’ feedback in terms of e-tool helps in Understanding and learning:

iv) Helped in Understanding the interview process v) Helped in Learning the interview process

Participants’ feedback about the e-tool’s help in the process of elicitation:

vi) Helped in the Elicitation of Tacit knowledge

At the end of testing, the gathered data for the each group had been analyzed in terms of “t-Test: Paired Two Sample for Means” towards above mentioned six key areas, to test the hypothesis. As the p-value is the probability of noticing an effect, therefore to test the hypothesis, we had achieved the statistically significant result through the comparison of p-value with significance level.

5. Results

5.1 t-Test: Paired Two Sample for Means, for the Moderating Variables: “Podcast, E-mail, Chatting & Hybrid”

Following tables ‘5, 6, 7 and 8’ are the results of t-Test: Paired Two Sample for Means:

Table 5: Summary of t-Test: Paired Two Sample for Means (for Electronic Communication tool: *Podcast*)

Key areas	P-Value	Outcome	Comments		Effect of Podcast
Friendly	6.51233E-20	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Comfortable	9.00697E-19	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Essential	6.0233E-21	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Understanding	2.02E-23	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Learning	2.46544E-18	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Tacit knowledge elicitation	5.36508E-20	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Overall Key areas for Podcast	Overall Average of P-Value 5.81826E-19	<0.5 (Significant)	Overall Reject H₀	Overall H₁ : μ >5	Overall Positive

Table 6: Summary of t-Test: Paired Two Sample for Means (for Electronic Communication tool: *E-mail*)

Key area	P-Value	Outcome	Comments		Effect of E-mail
Friendly	9.392E-22	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Comfortable	3.108E-22	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Essential	9.066E-21	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Understanding	1.56E-23	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Learning	1E-24	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Tacit knowledge elicitation	8E-25	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Overall Key areas for E-mail	Overall Average of P-Value 1.722E-21	<0.5 (Significant)	Overall Reject H₀	Overall H₁ : μ >5	Overall Positive

Table 7: Summary of t-Test: Paired Two Sample for Means (for Electronic Communication tool: *Chatting*)

Key areas	P-Value	Outcome	Comments		Effect of
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					Chatting
Friendly	1.2E-27	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Comfortable	4.2E-23	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Essential	9.68E-25	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Understanding	5E-28	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Learning	1.67E-22	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Tacit knowledge elicitation	1.8E-27	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Overall Key areas for Chatting	Overall Average of P-Value 3.49E-23	<0.5 (Significant)	Overall Reject H₀	Overall H₁ : μ >5	Overall Positive

Table 8: Summary of t-Test: Paired Two Sample for Means (for Electronic Communication tool: Hybrid)

Key areas	P-Value	Outcome	Comments		Effect of Hybrid
Friendly	4.6E-28	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Comfortable	1E-29	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Essential	2.117E-26	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Understanding	9E-29	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Learning	8.7E-28	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Helped in Tacit knowledge elicitation	7.78E-27	<0.5 (Significant)	Reject H ₀	H ₁ : μ >5	Positive
Overall Key areas for Hybrid	Overall Average of P-Value 5.06E-27	<0.5 (Significant)	Overall Reject H₀	Overall H₁ : μ >5	Overall Positive

The results of the t-Test (Paired Two sample for Means) with the P-values are presented in the above ‘Tables 5, 6, 7, & 8’. Participants were requested to furnish their feedbacks after using the moderating variables “PODCAST, E-MAIL, CHATTING & HYBRID”, for the key areas “Friendly”, “Comfortable”, “Essential”, “Helped in Understanding”, “Helped in Learning”, “Helped in Tacit knowledge elicitation”. The results of hypothesis in the above tables indicate that the P-value for each of the key areas is <0.5, therefore H₀ has been rejected for the hypothesis testing for all the key areas and it has been verified that there is a positive effect of the usage of “PODCAST, E-MAIL, CHATTING & HYBRID” communication tool on all the key areas.

The overall results of t-Test (Paired Two sample for Means) of electronic communication as moderating variables have proved positive effect on major six key areas, therefore the research study has verified the novel results of moderating variables positively operated on the effectiveness of interview results, for these six key areas “feeling **Friendly** while using moderating variables, feeling **Comfortable**, considering moderating variable as **Essential** for interview, moderating variables helped in **Understanding** the interview requirement, helped in **Learning** the interview requirements, and helped in **Tacit Knowledge Elicitation**”.

6. Conclusion and Future work

This paper has debated on the Electronic Communication (Podcast, E-mail, Chatting and Hybrid) as moderating variables for the Elicitation of Tacit Knowledge in Interview Techniques for six major key areas, feeling **Friendly** while using moderating variables, feeling **Comfortable**, moderating variables are an **Essential** part of interview process, moderating variables helped in **Understanding** the interview requirement, moderating variables helped in **Learning** the interview requirements, and moderating variables helped in **Tacit Knowledge Elicitation**”. The results of Hypothesis have proved effective, and optimized novel results, and verified that these moderating variables worked as catalysts on the interview technique and consequently caused performance up gradation for the interviewing process.

We envisage that this study will help to enhance the tacit knowledge elicitation process for the interview techniques of software development. All four e-communications can be used, keeping in view the detailed conditions for the software development projects. If the project condition allows, Hybrid is the best combination in terms of effectiveness, or else, any one of the three other types can be used as per requirement, as all types have showed positive effects, or the choice of selecting the option can be offered to the interviewee, to choose the e-communication type as per convenience.

Results reveal that these moderating variables will help in developing a better understanding between the interviewer and interviewee towards the themes, areas, and topics to be covered during the interview. The interviewer can get the advantage from these moderating variables because the ideas carried out from the interviewee could be strengthen in advance with a clear understanding and common interview vocabulary that is going to be used during the interview process. The first moderating variable “Podcast” that has been verified with a positive effect, is a one way asynchronous communication (for listening the podcast, any time using the portable devices), can be used effectively for interviewing the participants those are unable, reluctant or have the time constraint, to use the other communication technologies like E-mails or Chatting. The second moderating variable is “E-mail” that is a two way asynchronous communication (a two way communication tool, mode for reading and replying any time), and can be used to help the interview participants those don’t have time to meet

online, or unable to have a real time communication like chatting. The third moderating variable is “Chatting” that is a two way synchronous communication that can be used for the participants those are able to have a real time communication, can spare the time and are able to join the online communications. And the fourth moderating variable is “Hybrid”, is the combination of all three variables (Podcast + E-mail + Chatting, i.e. asynchronous + synchronous communication). The finding and analysis from this particular study verify that this study may facilitate the Software Experts in conducting the interviews for the requirement elicitation phase during the software development process for bridging the gaps, and receiving the correct requirements. Therefore these moderating variables could be the most effective keys to convert the tacit knowledge to explicit, and subsequently the process of elicitation could be supported for the successful projects, is in agreement with the declaration of [1, 2] that the largest essential activity in software development process is gathering the right requirements, and converting the maximum amount of tacit knowledge to explicit results in successful projects, which in turn saves the time and cost of overall projects. Further experiments can be conducted on different combinations and types of e-communications like Blogs, Wikis, Voice mails, Video Chats.

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Appendix A

QUESTIONNAIRE FORM

Effect of the Electronic Communication on the Elicitation of Tacit Knowledge on Interview Techniques for Small Software Developments

Please Tick

Male

Female

Electronic Communication tool: Podcast/E-mail/Chatting/Hybrid

Dear Student:

The function and intention of this form is to obtain your opinion regarding the Electronic Communication tool used for interviewing (Podcast/E-mail/Chatting/Hybrid). Your input will help out in understanding the effects of electronic communication on the elicitation of tacit knowledge on interview techniques for small software development process and will not at all affect the evaluation of your work. Assess the following statements by selecting:

1	2	3	4	5	6	7	8	9	10
1=Strongly Disagree					10=Strongly Agree				

Please encircle your answer;

Thanks for your help.

Before Interview / After Interview

		1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
01.	I think Electronic Communication tool is friendly.		
02.	I think Electronic Communication tool is comfortable, while using.		
03.	I feel that Electronic Communication tool is an essential part of this interview.		
04.	On the whole, Electronic Communication tool helps in understanding the interview requirements.		
05.	On the whole, Electronic Communication tool helps in learning about the interview requirements.		
06.	On the whole, Electronic Communication tool helps in the elicitation of tacit knowledge sharing process.		
07.	I wish this interview to be conducted by the interviewer only.		
08.	I wish this interview to be conducted by Interviewer and supported through Electronic Communication tool.		
09.	I will recommend my friends, to the use of Electronic Communication tool for interviews		
10.	I think the Electronic Communication tool is helpful in the collection of ideas in mind.		
11.	I think the Electronic Communication tool is helpful in the organization of ideas in mind.		
12.	I think the Electronic Communication tool is helpful in the presentation of ideas in mind.		

Appendix B:

Requirements and Tacit Knowledge Elicitation:

One-on-One Semi-Structured Interview

Warm up questions:

Welcome to the interview, how are you.....etc.

Feel free to ask any question during interview.....etc.

Note: Further follow-up questions (Probing) will be asked, as appropriate, with each interviewee/participant to gain further response, and (Prompting) the pushing of participant in the right direction, as appropriate.

You may be asked to review your answer, if required, to add more clarity.

Questions about General, Functionality, Usability, and Content requirements and Tacit Knowledge Elicitation

Interview Questions	<i>This column is for interviewer's use only</i> Rate the knowledge level of the interviewee from 1 to 5, after asking the relevant question
General Requirements:	
1. Define the term WWW?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
2. Please explain what your problem statement is?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
3. a). Can you explain the role of interviewee (i.e. your role) for this interview? b). Can you explain the role of interviewer (i.e. my role) for this interview?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
4. a). List the name of Modules (or Components) you want to add to your educational website: b). Explain the existing Grading System, and your website requirements for the grading system:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
5. What are your expectations from an educational web site?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Functional Requirements:	
6. Explain the difference between "Static Website" and "Dynamic Website"	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
7. a). Which one of the following site fulfills your requirements? o Static site o File based dynamic site o Database driven dynamic site b). Explain the detailed reason, why have you selected the above mentioned site format?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
8. Do you have any experience in using the about the above mentioned site format? Describe your overall experience, briefly.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
9. Do you need to add User Interaction Feature to your educational website? o Yes o No If Yes, explain the benefits of and impacts of this feature to your website:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
10. Do you have any other final thoughts or suggestions in terms of functional requirements of the website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Usability Requirements:	
11. a). What is your requirement about font size and font spacing for your website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
b). would you like to share your experience about the impacts of font size and its spacing on a website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
12. a). What kind of overall format, you want to have for your website? o Consistent o Inconsistent b). How do you explain the role of your choice (Consistent or Inconsistent) in the performance of a website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
13. What is your requirement about the load time of the home page of your website? o Long time o Short time Explain why?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
14. What do you think about the impact of the text-to-background contrast?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
15. What are the other special features in terms of usability, would you like to add to your course website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Content Requirements:	
16. Explain, the term 'FAQ':	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
17. How do you explain the importance of 'FAQ' for your website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
18. State the requirements of important contents you want to have in your website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
19. State the format of the documents (files) along with their extensions you want to see in your website:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
20. Anything else would you like to say, to be added as content requirements to your course website?	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Many thanks for your contribution in this interview.	
<u>Overall interviewer's observations and opinions about the interview:</u>	
<hr/> Overall prompting was done for this participant, during the interview: <input type="radio"/> Yes <input type="radio"/> No	