Generation Y: Communication in engineering project teams

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***Abstract**: Generation Y engineering students use e-techniques very efficiently both in personal communication and professional engineering work. This paper will discuss some of the modern techniques used by engineering students in project communications as well as the advantages and disadvantages of these methods. For the investigation, a group of approximately 60 third year, final year and graduate engineering students have been questioned, and the answers have been statistically analysed. The results show that a generation Y student is able to more quickly and effectively establish contact with peers for discussing project work and that the modern techniques are used to supplement and not replace face-to-face meetings. It is also evident that the engineering curriculum needs to more readily incorporate these e-techniques into the subject structure as well as continue to promote effective group meeting techniques.*

Introduction

Project work is an integral part of engineering both in the educational and professional arenas and the ability to communicate effectively and efficiently within these groups is an essential attribute for engineers today. Poor communication techniques can lead to misunderstandings and errors in the design and manufacturing processes and the failure to win a client or tender, ultimately resulting in a financial loss for the engineering company. To increase the communication skills of new graduates the Engineers Australia Accreditation Board have developed a set of 'generic attributes of a graduate' which must be met in any accredited university programme. Two of these attributes directly relate to engineering communication:

- *[The] ability to communicate effectively, not only with engineers but also with the community at large;*
- *[The] ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member; (Bradley, 2006)*

The Accreditation Board also requires that 20 percent of the university program consist of engineering design and projects *(Bradley, 2006)* to prepare students for their professional careers. In response to these accreditation requirements the University of Adelaide has integrated many design, communication and project based subjects into the engineering degrees. These university group projects provide students with an opportunity to apply the theoretical knowledge to a more realistic problem and ease the transition from university to professional "team project based" life. With the high rate of technology development in the past 10 years the communication methods within the university project teams is varied and the project communication structure utilised 20 years ago is very different from that used by today's generation known as 'Generation Y'.

Depending on the source, Generation Y is defined as having been born after 1976 and before 2001. For this paper the Generation Y birth range has been defined as between the years of 1978 and 1994 in accordance with Generation Y expert Peter Sheahan (Sheahan, 2009). Thus Generation Y or 'Gen Y' today range between the ages of 15 and 31 and constitute the majority of final year students and recent graduates at the University of Adelaide.

According to Think Fresh Contemporary Marketing and Training (2006) Generation Y account for 20.5% of the Australian population and are 'social junkies'. This generation has grown up using computers, mobile phones and the internet as the primary methods of research and communication and thus have adapted these sources to allow quick and easy communication for both professional and personal usage. Due to the availability and ease of these techniques many Generation Yers are able to communicate with multiple people on different subjects at one time through Skype, Instant messaging (IM), Gmail, MSN and Facebook chat. Generation Y is used to instant communication via mobile phones and the internet and talk to people on the other side of the globe just as easily as to the person standing next to them. These instant communication techniques, along with current technology, are being utilised with more proficiency within university project groups, for example it is possible for a Gen Y project member to be sitting at their computer working on calculations while IMing another member, co-editing a Google document and Skyping a third member, organising meeting times via shared internet calendars, getting data in text messages, and using their mobile to photograph hand calculations and email them to another member for review.

Problem Explanation

Modern communication sites such as Facebook, MySpace, Twitter and internet blogs enable information to be posted by individuals for their 'friends' to access, thus less communication is required to keep up to date with friends' activities and current events. The speed, accessibility and international outlook of these communication forms means that Generation Y are very well connected and have very large social networks (Raines, 2002). Fresh (2006) states that 92% of Generation Y use online communication regularly, and 80% use their mobile phone more than once a day. These methods are being incorporated into the way Generation Yers communicate in project groups both at University and in the professional workplace; by using IM, Skype, Google groups and Google calendar they feel they achieve a more efficient communication method. They are used to working in large and diverse teams for both work and social activities and prefer electronic methods for both communication and learning opportunities (Raines, 2002).

There are many advantages and disadvantages of utilising these communication techniques within engineering project groups. It has been questioned whether groups utilising these techniques as the primary communication methods suffer from the loss of face to face contact and whether these methods are being used to replace the more traditional communication methods. Questions have also been raised about the effectiveness of using these modern communication methods within engineering project teams. These and many similar questions have lead to Generation Y being accused of having poor interpersonal skills due to the low usage of fact-to-face and verbal (telephone) communication skills (Sherman, 2008). On the other hand the ease communication via modern communication techniques is said to increase the confidence but reduce the efficiency of individual thinking and decision making and increases the level of expectation.

There is also a growing trend of universities developing the management and interpersonal skills of engineering graduates through dedicated subjects, involvement in nation wide group design programs and involvement in extracurricular activities (King, 2008). The importance of these skills is sometimes disregarded by the engineering graduates and depends on the student's involvement in the learning process (King, 2008). In trying to increase the level of student involvement and interpersonal skills some lecturers are incorporating these modern communication techniques into university subjects with various levels of success.

Research Method

Research was performed in an attempt to address the questions about Generation Y's lack of interpersonal skills, lack of face-to-face interaction, and the effectiveness of modern communication techniques when utilised within an engineering project team and university courses. The Research was primarily conducted through a questionnaire (questions provided at the end of this paper) answered by past and present university engineering students and graduates of the University of Adelaide who are classed as Generation Y. The questions were based on determining the different communication methods used by Generation Y in major engineering projects at a university level and aim to determine

how effective/advantageous these methods are from a Generation Y point of view. The questionnaire also assessed whether these communication methods are being supplemented by more traditional methods and if this level needed to change. Finally the questionnaire enquired about the types and effectiveness of techniques that have been incorporated into University subjects, and whether these methods should be incorporated into the official teaching curriculum.

The questionnaires were sent and completed via email, Facebook messages and face-to-face contact. The face-to-face contact consisted of personally asking friends and colleagues, asking students studying in the University's Engineering computing suites and having graduate students complete the questionnaire during a lecture. Closer to the required completion date text messages were sent via the Skype system to remind people to return the questionnaires via email and Facebook.

Research Results:

In total over 70 students and graduates completed the questionnaire, however only 63 of the returned questionnaires were completed to a useful degree and were used for analysis. The participants ranged in age from 20 to 31 with 65% being between the ages of 21 and 24 inclusive, however 15% did not provide their age, see Figure 1a. The education level of participants was divided into 6.3% at a third year Bachelor of Engineering (B.Eng.) level, 38.1% in final year B.Eng. and 49.2% were graduates some of which had continued with higher studies, again 6.3% did not answer this question, see Figure 1b. The participants were requested to relate their answers to a past engineering group project where possible, in particular to refer to their final year engineering honours project if applicable. The project groups ranged in size from two to fifteen people with the majority, 26.9% being groups of four to 6 people, however 58.7% did not provide data on their group sizes, Figure 1c.

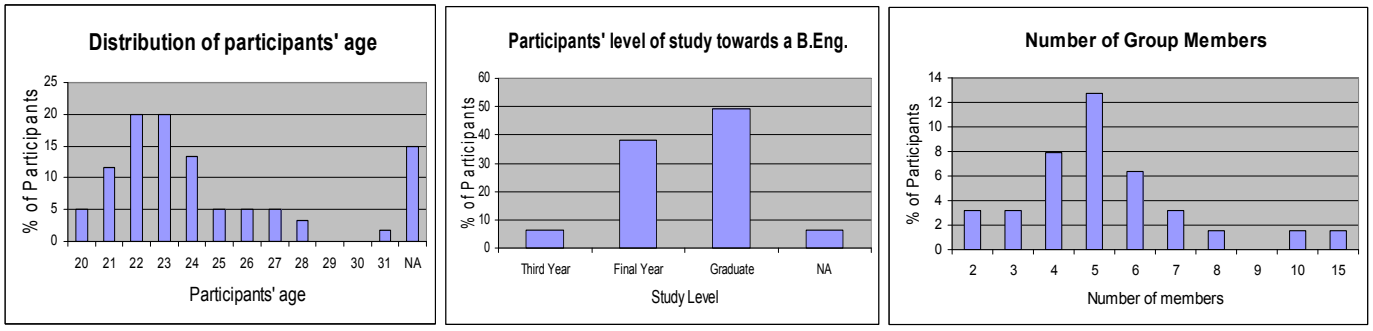

Figure 1: Statistics on participants' (a) age, (b) study level, and (c) number of group members

When asked about the different modern communication techniques used in the participants' engineering project groups 14 different techniques were compiled. All participants answered this question and the most common communication method was found to be via mobile phone calls or text messages used by 81.0% of participants. Instant Messaging via MSN, Yahoo, Gmail and Facebook was the second most commonly used technique at 73.1% followed by email at 55.6% and Facebook at 23.8%. The techniques and the percentage of participants who used them can be seen in Figure 2. It was also found that participants used up to seven of these techniques within their groups with 47.6% using a combination of two to four techniques (two = 12.7%, three = 23.8%, four = 11.1%). These techniques were used via up to 4 different access points for each participant with primary access via laptop computers, 71.4% and mobile phones 74.6%, however 3.17% also used their mobile phone to access email and Facebook. These results show that modern communication techniques were highly utilised by the Generation Y project teams. A note should also be made that many of these techniques such as Facebook and Skype have only been well known in Australia for a few years and few of the older participants mentioned that they would have better utilised these techniques had they been available at the time of their projects.

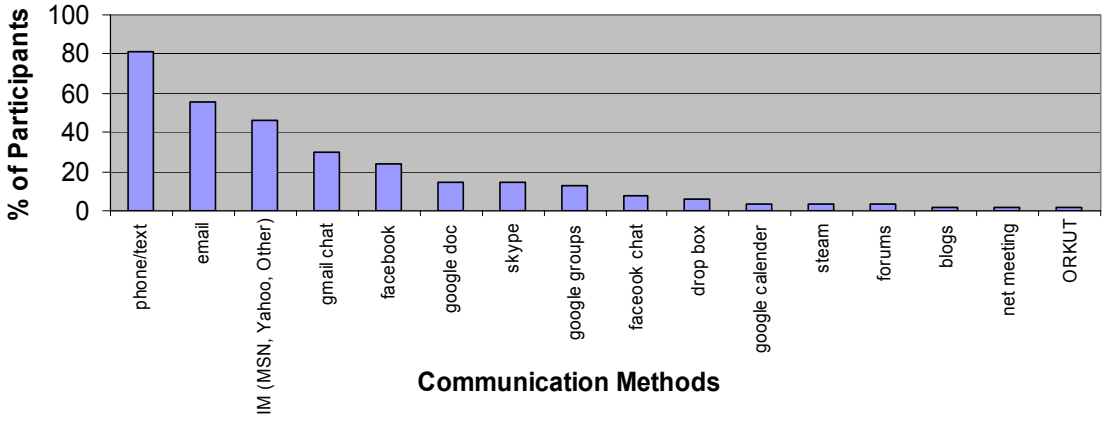

Figure 2: Modern communication techniques used by Generation Y participants within engineering project groups

Although these modern communication methods were highly utilised by the participants many advantages and disadvantages were identified. The primary advantages were as follows:

- The methods enabled very quick and easy communication between members and encouraged greater interaction within the engineering groups.
- Some methods such as Google calendar and mobile phones decreased the time and confusion associated with organising group meetings.
- Mobile phones and emails were very easy to access, especially for those with email capabilities on their phones, allowing information to be obtained at any time.
- Some methods, especially email, made it very easy to convey clear and precise information to many different people simultaneously with minimal hassle, ensuring that team members had accurate and up to date information on the project.
- Email allows all members to easily see the history of communications that have occurred, thus it is easier to keep people informed.
- Email, chat and SMS conversations can be easily documented, saved and referred to at a later date, thus helping with proving or verifying communication and information.
- Email and Skype allow relatively easy and cheap contact with overseas suppliers and researchers, both for information and acquisitions purposes.
- Methods such as email, Google Groups, Google Documents, My Uni Wiki and the University Drop Box allowed documents to be easily stored and shared, ensuring that all team members had copies of important documents and that there was at least one backup copy online.
- Online document sharing enables the documents to be accessed from any computer with internet access and reduced the risk of data being lost.
- Methods which allowed live editing to be made on documents ensured that the teams were much more organised and efficient.
- The cost of modern communication techniques was varied as the setup cost of computers, laptops and mobile phones was high however some techniques were free to use excepting cheap internet download costs, whilst others such as mobile phone calls were very expensive.

Many of the identified disadvantages were another view on the above advantages, however there were also many new and interesting views raised. The primary disadvantages that were identified include:

- Due to the ease of access, a large number of emails and calls would be made and received by each member, making it hard to work and causing numerous interruptions.
- The ease of access was sometimes abused as it was easier to call someone rather than work through a problem individually.
- The constant communication can become an invasion of privacy, especially when interruptions to family events or breaks occur.
- Problems occur when people turn off their mobile phones and don't regularly check emails, leading to delays regarding important information.

- It was difficult to know when team members would receive emails and thus it was common to have a turn around time of a day for an email to be answered.
- Many techniques such as email and text messaging were not always reliable, leading to miscommunication issues.
- Lack of reliability is used as an excuse to ignore other members or as a cover for work not being performed as requested.
- Conversations and information can be easily miscommunicated due to the lack of verbal and physical language prompts and the extra effort required to clarify issues.
- Modern techniques were seen as a waste of time if design decisions were required due to the inability to convey information via sketches and drawings.
- Voice/video methods such as Skype become low quality when more than two people are in the communication and that it was often hard to keep track of who was speaking in large chat groups.
- Not all members had access to some methods such as Skype and that some methods were blocked by the University's system.
- Chat and text messaging were informal and impersonal.
- Many techniques require a high quality and fast internet connection.
- There are health concerns associated with mobile phones.

To determine whether modern communication techniques were supplementing or replacing the traditional face-to-face group meetings, the participants were asked how many group meetings were held per week. The majority of participants officially met one to two times a week, 44.4% and 31.7% respectively, however more meetings were held as required. Most participants mentioned that many unofficial or working meetings were also held throughout the week and the frequency of these meetings increased towards the end of the projects. When asked whether the participants would have changed the number of meetings the majority indicated that the meeting frequency should either remain the same 25.4% or increase 27%, only 4.8% wanted the frequency to decrease, however 42.8% failed to comment on this question. These results showed that a healthy balance between face-to-face contact and modern communication techniques were being utilised. The high number of participants who wanted an increase in meeting frequency indicates that Generation Y engineering students are aware of the importance of face-to-face communication in ensuring a successful project with many participants stating that this was the best and most effective method of communication. Overall these results indicate that in an engineering project environment, modern communication techniques are being used to supplement rather than replace meetings, thus contradicting the views that the high usage of modern techniques are leading to a lack of face-to-face interaction.

The Final component of the research focussed on the modern communication techniques used by lecturers and tutors in university subjects and how effective they were in this environment. The techniques that were identified as being used were: My Uni; My Uni forums and discussions; Wiki Systems allowing easy document collaboration and editing; email; Gmail chat; podcasts, vodcasts, Flying Fish online assignment system; The University's Drop Box – softcopy assignment submission; Blogs; voting in in-class quizzes via mobile phone; lecture recording; interaction via internet; phones/text messages; explanations about group meetings, minute taking, and documentation; and structured tutorials. The most highly used techniques were email and My Uni discussions/forums, both of which were identified by 17.5% of participants, followed by email at 19.0% and My Uni at 11.1%. Whilst many different communication methods were identified, 12.7% of participants stated that no techniques were utilised within the subjects they had taken and 31.7% did not submit an answer. When these methods were utilised within the subjects the majority of participants 28.6% rated them as highly effective, again 61.9% did not answer. These results indicate that more modern communication techniques should be incorporated into or taught in university subjects, this view was shared by 41.3% of participants. On the other hand 22.2% disagreed (36.5% did not answer), stating that lecturers don't have enough time to be worrying about incorporating these methods and that students should use their own initiative and learn about these techniques themselves.

Conclusion:

The research has shown that Generation Y engineering students use many different modern communication techniques to quickly and efficiently communicate within an engineering project group. The majority view these techniques as essential in ensuring a highly organised and well informed team, with the advantages of these techniques outweighing the disadvantages. These modern techniques are viewed as being quick and easy to access, allowing clear and precise information to be distributed to many people simultaneously with minimal hassle. However disadvantages were also identified relating to the reliability and turn-around-time of these techniques and the cost of some of these techniques. Contrary to common belief, the Generation Y students see face-to-face communication via regular meetings (both official and unofficial) as an integral part of group projects and see meetings as the best and most efficient way to communicate information, especially design details. Generation Y students have also noted that modern communication techniques are being incorporated into the some university subjects and that when this occurs the results are highly effective. However the students do not see the need for the lecturers to promote these methods and prefer information about effective meeting structure and organisation. Overall it has been shown that through a combination of modern communication techniques and face-to-face meetings a Generation Y engineering student is able to communication with their team members in a highly efficient and organised manner which may be adapted to many different situations.

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