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Considering Complexity in Simple Solutions:
What's So Complicated About Skype?

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ABSTRACT

Video-based communications technologies are not new. However, with increasing drivers for efficiency and cost-effectiveness in higher education, the use of this technology is being explored for what have traditionally been face-to-face activities. This article conceptualises the intricacies of influencing factors affecting the performance of video-based communications in student support activities. Considering video-based communication within student support as a complex adaptive system, the author aims to illustrate how a multitude of intrinsic and extrinsic variables interact and impact upon individual experiences. Using an illustrative diagram, the article explores how psychology and behavioural aspects integrate with communications theory, technological experience, task objectives and social presence theory to necessitate careful consideration of individual need and purpose when planning for technological implementation.

Keywords: Communication, Complex Adaptive Systems, Student Support, Technology, Video Communication

INTRODUCTION

In an environment of increasing reliance upon technology, financial and environmental drivers are leading technological initiatives aimed at increased efficiency and performance (Dos Santos & Sussman, 2000). LEAN principles are commonly being used to investigate improve efficiency of large scale practice (Kouzmin & Korac-Kakabadse, 2000). However, though commonly, a one size fits all approach appears to apply to technological implementation it is felt that individuals' perceptions of new technologies vary considerably.

Whilst technological implementation would seem on face value to be relatively straightforward, it has been found that many assumptions made at the initial outset are often erroneous (Taylor, 2009). Within higher education it is felt that assumptions are made about the abilities and amenability of students to such initiatives. Assuming a uniform audience for a technological initiative ignores the complexities associated with human nature. For example, the myth of the "millennial" child, growing up with technology assumes literacy in all things technological (Oblinger, 2003). However, whilst children are taught to use computers

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as part of the national curriculum, this does not necessarily translate to competence with the tools. Mortimore (1999) uses the concept of the "cognitive apprentice" to illustrate the importance of situation in skills development; demonstrating that transference to a different context is not always possible. In addition, Mortimore recognises the role of relevance to the individual in motivating learning. Whilst young people may be highly adept at the use of Face book for social networking, translation to more formal use may not occur where relevance is unclear. The question is raised as to how often these assumptions underpin implementation policy without thorough investigation.

Whilst not intended to be the focus of this article, empirical research undertaken by the author illustrates how common assumptions negate the complexities of working with individuals (Taylor, 2009, 2011; 2012). In responding to institutional drivers, for decreased costs in the support of individual, placement-based students the author undertook a three-phase action research project aimed at establishing the fitness for purpose of video-based communications. It was assumed that the experience could be made equitable to a face-to-face interaction. However, with previous champions of video communications decreasing their reliance upon the technology (The Open University, 2013) perhaps the question "why" should have been more obvious.

The study aimed to establish the feasibility, purpose and role, and difference between face-to-face and video-based dialogue. In support of earlier work investigating student support via video link (Abbot et al., 1993; Berger, 2009; Collins et al., 1999), project findings indicated the majority of participants found using the medium discomforting and expressed a preference for face-to-face interaction. In particular participants raised concerns over use of the medium for the support of failing placements (where the student is at risk of failing the placement assessment), highlighting the emotive nature of such dialogue (Taylor, 2012). Participant responses, and the concerns raised highlighted the complexity of individual need impacting upon technological implementation. Combined with exploration of wide ranging theoretical influences, from communications theory, to psychology and sociology, the breadth of influencing factors became clear. This article aims to conceptualise the diversity of theoretical influences impacting upon individuals' perceptions of video-based communications technologies (as illustrated in Figure 1). Whilst originally centred in Physiotherapy, the complexities associated with applying this technology are felt to be equally relevant to wider contexts and technologies.

Figure 1 demonstrates the need to consider technological implementation in the context of a complex adaptive system (CAS). Considering video-based communications as a CAS, mirrors work by Beckner et al (2009); exploring the complexity of language and highlights the following key features:

- The system integrates multiple factors that integrate with one another.
- The system is adaptive in that meaningful dialogue between participants is based upon past interactions and adapts in response to context and need, thus, feeding forward into future behaviour.
- An individual's response to video-based technologies is the consequence of wide ranging competing factors (Beckner et al., 2009), from sociological and psychological influences, to behavioural characteristics and communications strategies.

Drawing parallels with adult learning theory (Knowles et al., 2011), implementing technology into education involves acknowledging the influence of psychology and behaviour on core components. A conceptual diagram (see Figure 2) aims to simplify the "mess" of theoretical influences seen in Figure 1; illustrating how central core components of purpose, communications, social presence and technological experience interact and are integrated with wider psychological and behavioural concepts.

Due to the diverse nature of the theories underpinning this conceptual diagram, it is not

Figure 1. A diagram representing the complexity of interactions between theoretical influences when considering the application of video-based communications technologies to the support of individual, placement-based students

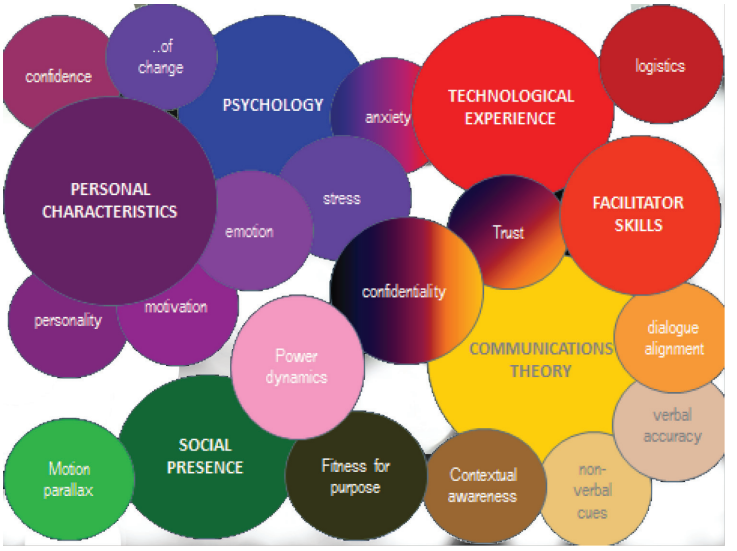
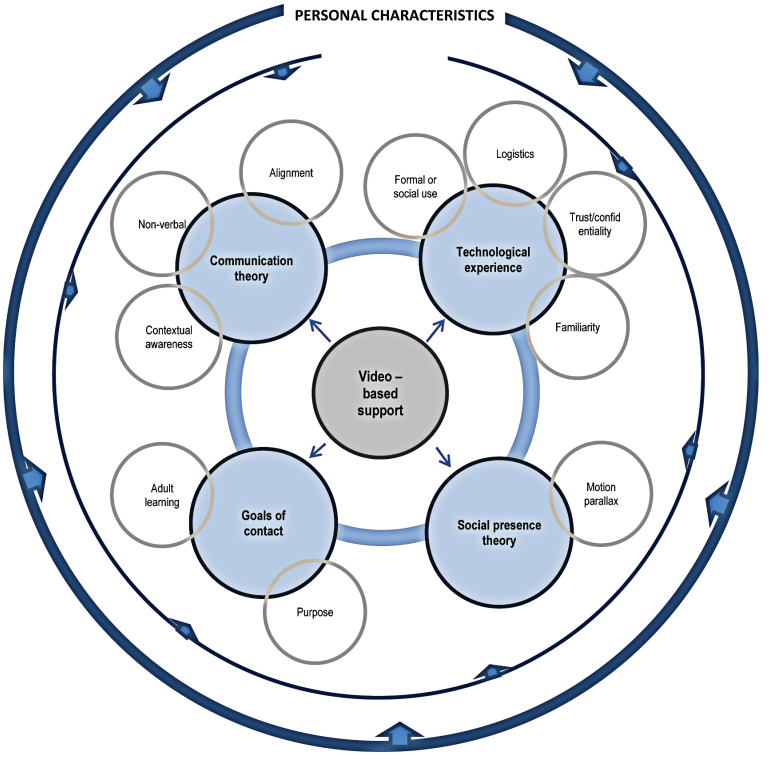


Figure 2. A conceptual diagram illustrating the complex interaction of various theoretical fields on the application of video-based communications strategies to the support of individuals



possible to explore all in depth, neither is the author an expert in all areas. However, through exploration of the manner in which factors integrate and interact, this article the reader is directed to consider factors that are often ignored in planning for change.

CONSIDERING THE GOAL AND PURPOSE OF INTERACTION

Video-based communication is not a new technology. In fact, it has seen considerable research in the area of telemedicine within the last decade, particularly in Australia and the United States where it has facilitated health care in rural or isolated environments. (Matsuura et al., 2002; Rees & Haythornthwaite, 2004; Schopp et al., 2000). Recognising the complexity associated with communications in health, it is surprising to see a rather limited approach to evaluation in this field.

Using matched groups to investigate using video-based communications to complete an initial assessment of psychiatric patients in rural Australia, Rees and Haythornthwaite (2004) demonstrated effectiveness equivalent to that achieved through face-to-face interaction. In addition, study findings indicated that patients receiving video-based assessment were as satisfied with the experience as the face-to-face group. However, as neither group had experience of the opposing communications medium, the study appears to lack rigorous comparison data.

Like other similar studies (Elford et al., 2000; Rees & Stone, 2005), it is felt that the research fails to fairly compare the two approaches or to explore more than the achievement of a specific objective goal. Where face-to-face and video-based communications strategies have been more fairly compared, there is often a failure to clearly outline parameters or methods used to evaluate patient satisfaction (Dwyer, 1973; Matsuura et al., 2002; O'Reilly et al., 2007). However, where comparisons have been explored in more depth, it is interesting to note a common theme; where findings indicate individuals preferring face-to-face contact, or identifying detrimental alterations in interaction via video link (Janca, 2000; May et al., 2000; Rohland et al., 2000; Schneider, 2001).

From experience, it is challenging to define exactly what needs to be measured when evaluating the "impact" of an alternative form of communications. Achievement of an outcome alone is not the sole indicator of effective communication and, therefore, care has to be taken to consider the purpose of a specific interaction. Overall, literature in the field of telemedicine seems to take a very objective approach to the measurement of impact with a degree of ignorance regarding the complexity of communication.

Within both medicine and education, it is felt that effective communications extends beyond the simple achievement of an outcome. De Valensuela (1992.pp 2) defines effective communications as an act by "which one person gives or receives information about their needs, desires, perceptions, knowledge or affective states". In his seminal text, Schramm (1954) discusses the importance of examining both the intentional and otherwise impact of communications on the target in order to fully understand the impact of a communications event. The perceptual element in these definitions questions the omission of data regarding this aspect from much of the health and educational research relating to the introduction of video-based communications.

Within education, the majority of research focuses upon the use of video-based communications where face-to-face contact is not possible. Some distance education research outlines benefits to students of communications via this medium; citing improvements in a sense of connection with university staff and availability of support where previously there had been none, or it had been impersonal (i.e. email) (Panos, 2005)). As such, the author believes that the research mirrors limitations in tele-health literature, in being biased towards a preference of something over nothing. Providing support where not previously available is admirable but

equating it to a face-to-face interaction necessitates more complex consideration of the key components of the experience.

INTRODUCING BEHAVIOURAL CHARACTERISTICS AND INFLUENCE ON PURPOSE

Taylor (2012) identified the perceived purpose of placement support as being pastoral care, academic development and resolution of issues. Pastoral care in itself places emphasis on more than just objective achievement. Whilst concise definitions are rare, pastoral care is defined as, "supporting… the physical, social, intellectual and emotional development" (Australian Department of Education, 2013). The inclusion of emotional, social and moral aspects of care necessitates consideration of individual support need. Concerns over the use of video-based communications for dialogue regarding failing placements in particular, would emphasise the importance of any non face-to-face approach to be able to facilitate emotional support. Emotional support is defined as; "the sensitive understanding approach that helps … accept and deal with their illness, communicate their fears and anxieties, derive comfort… and increase their ability to care for themselves" (The Free Dictionary, 2013).

The initial assessment of a psychiatric patient could be considered more of an information retrieval activity, therefore, potentially not requiring so much interpersonal relationship development. Thus, video-based communications may be fit for purpose, concurring with literature that cites video communications as effective for problem solving, enquiry and information retrieval activities within the corporate business environment (Bailenson, 2002; Crede & Sniezek, 2003; Hayward, 2002). However, when considering undertaking emotional support via video link, the influence of psychology on fitness for purpose becomes evident. Whilst goals and purpose are indicated in Figure 2 as central to planning for implementation, the integration with psychology is fundamental in underpinning an appropriately humanist approach (see "Psychology").

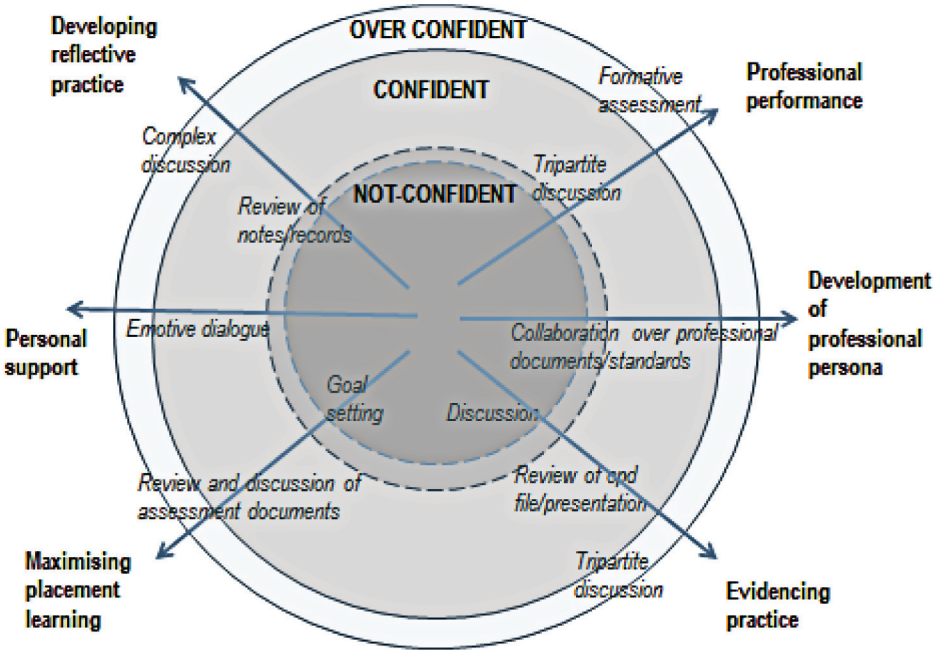
The interactions between goals, purpose and psychology also relate to more practical considerations. Within phase 2 of the author's research (Taylor, 2012), a focus group were asked to discuss potential alternatives to face-to-face support for placement-based learning. The group (n=9) suggested a "menu of options" that might meet the needs of differing individuals. One participant stated that as an under-confident person, she wanted the comfort of a face-to-face visit from a member of university staff no matter how well the placement progressed. In contrast, another participant, who consistently performed well in her studies and placement-based learning, stated that she was happy with a telephone call, an email or a video "chat". The group as a whole discussed the role of confidence in affecting amenability towards video-based communications for placement support.

Figure 3 illustrates the change in activities that occur as part of placement support, in response to differing student confidence levels (Taylor, 2012): Whilst an under-confident individual may need discussions relating to goal setting in order to maximise their placement experience, this may develop to include appraisal of written work or review of assessment documents in a student already engaging with a progressive experience. Whilst confidence is only one variable in a complex pattern of behavioural characteristics, the impact upon support activities, demonstrates the intricacies of planning for the use of this technology on a larger scale. This variability inevitably leads to challenges that contradict moves towards unidirectional support structures, and necessitates full consideration of individual needs.

CONSIDERING TECHNOLOGICAL EXPERIENCE

Kappas and Kramer (2011) suggests that exposure to a technology will in time result in adaptation and acceptance. However, a partici-

Figure 3. Continuum of Individual Need: Diagrammatic representation of the impact of confidence levels in placement-based students upon the activities taking place within support visits in relation to key identified areas of input (Adapted from Taylor (in press))



pant from phase three of the author's research (Taylor, 2011) perhaps reinforces consideration of Mortimore's "Cognitive Apprentice" model: Following engagement with placement related supportive dialogue via a video communications medium, phase three's focus group explored participants' perceptions of the experience in some depth and the reasons behind identified discomfort and concerns. One participant had echoed other group members' (n=10) concerns over the use of video-based communications for a failing placement. However, unlike most of her colleagues this participant had considerable experience with Skype in a personal capacity. Despite weekly use of it, communicating with family members in New Zealand, she stated that using the medium more formally was a different experience and not one that she enjoyed. She discussed the perceived artificial nature of the communication, her dislike of "having to remain in camera shot" and the uncomfortable environment in which the discussions took place: When conversing with her family, she stated that she often sat on her bed and painted her toe nails and did not have the same need to try to maintain a visual "connection" with the recipient.

This participant's experience suggests the change in context of application being pertinent to a change in attitude towards the technology. This individual clearly felt hindered by the more formal use of the medium which questions her individual needs with regards to communications structure and support provision. Contrary to Kamar's suggestions, despite considerable experience with the medium in context, the author continues to find the use of Skype uncomfortable, preferring telephone conversations or email contact. However, other colleagues enjoy the technology, highlighting the added input of visual stimuli as interesting and engaging. Through consideration of differing individual's responses to the technology, the impact of emotions, individual need, com-

munication strategies and personal behavioural characteristics on, not only engagement with the medium, but on emotional response can be seen. Whilst technological experience forms a core component of Figure 2, the interaction with psychological and behavioural factors is again raised as an important element in this complex communications system.

INCREASING BREADTH OF CONSIDERATION – BEHAVIOURAL RESPONSE

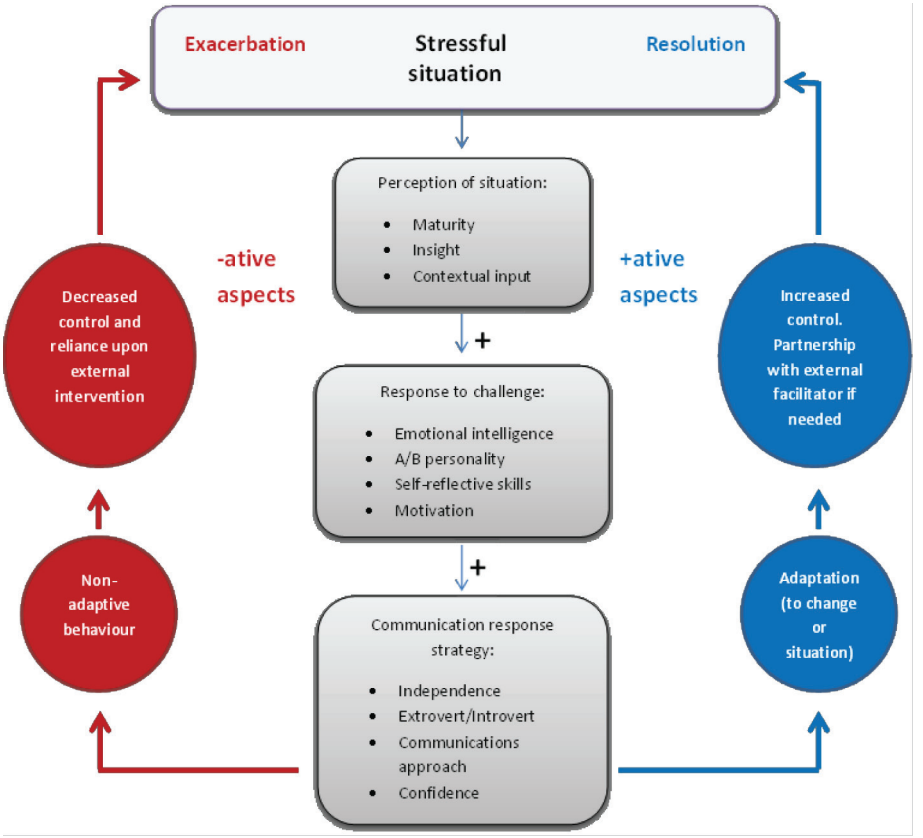
Verjans (2003) discusses the complexity of implementing information technology within an organisation, recognising individual need which relates to both unique internal and external drivers. Thus, what support one person needs from a technology will differ from another's needs. Maslow's seminal work (Maslow et al., 1970) exploring the hierarchical development of individual need concurs with Op'tEynde and Turner (2006), citing the complex interactions involving cognitive, conative and physiological responses to context specific events in generating emotional experiences. The impact of context, beliefs and previous experience, underpinned by behavioural characteristics becomes clear in differentiating between the experiences of one individual and another. Therefore, the implementation of technology within an organisational system needs greater consideration that merely the pedagogic or process driven principles.

Exploration of personal characteristics, psychology and motivational theory in the context of supporting a stressful, emotionally charged event such as a failing placement, is an extensive topic in itself. The purpose of this article is not to produce an in-depth exploration of singular theoretical influences but to illustrate their complex interactions within supportive communications. Figure 4 is used to illustrate a simplified pathway of interactions observed in students experiencing a stressful placement. Representing extremes of a continuum, the diagram uses element of psychological models (e.g. Beaudry & Pinsonneaul, 2010; Hodgins, 2008; Ryan & Deci, 2000; Weinstein & Ryan, 2011) to illustrate the interaction of positive or negative behavioural characteristics within the perception, response and communication stages. It should be noted that any combination of positive and negative behavioural characteristics is likely within any one individual, thus, impacting upon the resultant response.

Motivational theory explores the complex factors influencing an individual's willingness to engage with new technologies and their emotional response to change (Coffin & Macintyre, 1999; Folkman et al., 1986; Weinstein & Ryan, 2011). In a study investigating implementation of technology into a banking system (n=249), Beaudry and Pinsonneaul (2010) demonstrated positive correlation between technological usage and perceived emotions such as excitement and happiness and negative correlation with anger and anxiety. However, these correlations related not to the emotions themselves, but to the resulting intermediary behaviours: For example, individuals, happy with the implementation but not undertaking appropriate adaptations to their working processes, were less likely to continue using a technology compared than those who adapted their working behaviours. Beaudry and Pinsonneaul, therefore, suggest that it is the behavioural response to the emotion, rather than the emotion itself that impacts upon technological implementation. In relation to the concept diagram in Figure 2, Beaudry and Pinsonneaul's work supports an overarching impact of behavioural characteristics upon other influencing factors.

However, when considering supporting an individual who is failing a placement, planning a support strategy becomes further complicated by the overlying influence of a person's psychological resilience towards and response to stress. The participant who felt that she wanted a face-to-face visit no matter what (Taylor, 2012), despite performing to a more than satisfactory level in both academic and placement-based studies, stated that she was not a confident individual. This student perceived a need for reassurance from an academic as

Figure 4. Simplified diagram demonstrating the potential influence of negative and positive behavioural characteristics upon management of stress within placement-based learning environments



routine. Hodgins (2008) suggests this behaviour to illustrate control orientated characteristics; relying upon external input for validation and indicating increased propensity towards stress or a negative response to stressful situations. This perhaps highlights the potentially vulnerability of some students over others in terms of meeting their support needs via a non-direct communications method. Hodgins et al. (2010) go to on discuss the impact of individual stress management strategies upon communications and linguistics, thus reinforcing the structure of Figure 2. Whilst the impact of psychology upon communications is covered below, an initial understanding of communications theory is important in comprehending the impact of video-based communications upon normal dialogue development.

COMMUNICATIONS THEORY

Aaltonen et al. (2009) cite successful communications as involving a sense of effortless dialogue that meets common goals and conveys emotional and social signals. In defining a "social ecosystem" of communications, Aaltonen et al identified the critical factors associated in a communications situation: emotional involvement, active participation, co-presence, reciprocity and group cohesion. In comparing audio, low quality video communications and high definition (HD) video communications (n=91) their study found HD video-based com-

munications to most effectively utilise these critical factors. However, participants still perceived the experience as unnatural, highlighting a sense of decreased emotions involved.

Research in this area commonly highlights limitations in dialogue as a result of using a two-dimensional communications medium (Aaltonen et al., 2009; Abbot et al., 1993; McFadden & Price, 2007). Identified limitations primarily relate to verbal message transmission, non-verbal message transmission and the alignment of the two.

Verbal Communication

In normal, face-to-face dialogue, a complex pattern of speech, utilising variations in pitch, speed, intonation and construction are used to generate a clear message. In addition, changes in these aspects are used by the recipient to anticipate opportunities for interruption or a change in speaker. Patterns of speech delivery vary with subject complexity, the collaborative knowledge of participants in the dialogue and context. Of greatest importance however, is recognition of the sub-text involved in any two way dialogue (Aaltonen et al., 2009; Bachan, 2011). Within collaborative learning dialogue the sub-text can also indicate the emotional context of the message being sent and the level of processing that is occurring: As learning takes place and understanding is achieved, the speech patterns move from initial flat speech pattern indicative of knowledge input, to more melodic speech patterns indicating an emotional content (James et al., 2012). The impact of using video-based communications may be to alter the clarity of the verbal message and interfere with interpretation of the sub-text. Prone to transmission delay and reliant upon the use of speakers and microphones, video communications, even with an HD system, may limit a message, excluding its wider interpretive elements. Consequently, the importance of the inclusion and accurate interpretation of non-verbal cues becomes more important.

Non-Verbal

Human communication utilises complex strategies of non-verbal cues that vary with individuals, culture and context. Simple aspects such as awareness of facial expression and eye contact are used to evaluate another's emotions and engagement with dialogue. Subtle body movements such as fidgeting or toe tapping indicate interest, discomfort or distraction, and specific small body movements may be used to facilitate interruption or indicate cessation of speech. In addition, non-verbal strategies are often used to indicate the context of an interaction. For example, a statement of "Can you close the door" can have many interpretations and it is often the use of appropriate non-verbal actions that clarifies the context and meaning (Krauss, 2002). The use of "matching" verbal and non-verbal messages in generating full clarity of meaning is referred to as alignment and is thought to be more important within emotional interaction, than the clarity of either verbal or non-verbal message alone (Bachan, 2011; Pickering & Garrod, 2004).

Pickering and Garrod (2004 pp. 171) refer to effective dialogue as a "game of cooperation where both participants win if they understand". As such, it relies upon the ability of participants to generate not only accurately aligned verbal and non-verbal messages, but also aligned situational models that encompass orientation to place and context. Formal, structured dialogue relating to information delivery may relate most strongly to effective linguistics, including accurate and familiar semantics. In this case, much of the interaction is one-way and requires less interpretation of non-verbal cues. Thus, the impact of video communications on dialogue accuracy correlates most strongly with aspects of signal quality affecting verbal utterances. This may explain why literature that explores the use of video-based communications within team task completion exercises (Crede & Sniezek, 2003; Hayward, 2002) or initial patient assessment (Schopp et al., 2000) finds video to be equally effective as face-to-face.

However, potentially emotive communications, such as student support or interview via Skype, increase the complex interaction between linguistics; prosodic and non-prosodic cues and non-verbal strategies, in conveying more than just the content of the dialogue. Complex combinations of communicative factors all contribute to alignment, a lack of which may lead to perceptions of mistrust or confusion (Pickering & Garrod, 2004).

Further impacting upon alignment via video-based communications, is the effect of the visual signal. The combination of transmission delay, low resolution picture and pixilation can magnify the delay between each speaker as a result of the distraction of a poor visual image. This is further exacerbated when participants lack experience with the medium or are uncomfortable.

Discomfort/Experience

Most commonly discomfort with using the medium manifests in a large scale change in non-verbal communications. A participant in phase 3 of the author's research (Taylor 2011) expressed dissatisfaction with his partner's communications as a result of her "not moving whilst on camera". Not uncommon in video-based communications, a preoccupation with the visual feed aspect of the tool results in attempts to remain in camera shot. This restricts not only large scale body movement but also inhibits more subtle non-verbal cues. In this case, both participants found the conversation stilted and tended to compensate for a lack of non-verbal cues through shouting at one another, "in order to make sure they could be heard and understood". Consequentially, both felt there were questions over the confrontational nature of their partners.

Impact of the Medium

Changes in communications strategies as a result of using video-based communications technologies are well documented (Kappas & Krämer, 2011). In particular, limitations on eye contact are often cited as a problem. Under normal, face-to-face circumstances, eye contact and gaze awareness are used as a means of assessing, an individuals' engagement, interest or sincerity.

When using a medium such as Skype, the emphasis upon the camera as the means of communication, tends to alter normal non-verbal interaction. For example, an individual may attempt to maximise eye contact in order to maintain "good" communications. As normal interaction involves short periods of eye contact followed by other periods of gaze that occurs in the general direction of the recipient (Gale & Monk, 2000), an increase in duration of eye contact may be perceived as confrontational. The resulting subconscious response to a perceived threat can alter the dynamics of the dialogue. In contrast, limited webcam positioning possibilities can result in decreased perceived eye contact or confusion over gaze direction. Exacerbated in distracting environments, a loss of eye contact or gaze awareness may be perceived as indicating a lack of honesty or discomfort with the dialogue and has been seen to raise concerns over confidentiality and trust (Taylor, 2012). Thus, misinterpretation of the emotions of the individual is a risk to both the development of interactive relationships and to the clarity of communications. Thus, the reciprocal nature of interaction between communications and psychology can be seen.

Early work by Clark and Brennan (1991) discusses the social nature of dialogue: Normal communications involve complex patterns of interruptions, tailing off of sentences, unfinished sentences etc… that are unpredictable and dependent upon the circumstances and the individuals, and supported by non-verbal cues. Subtle movements such as forward inclination of the head may be used to indicate opportunities for interruption or cessation of speech. However, via video, these forward/backward motions are particularly difficult to gauge; a problem which is emphasised when the view image is either just facial (which maximises

facial expression but prevents visual access to wider non-verbal cues) or full body (where the subtleties of eye contact or facial expression may not be available). Under these circumstances, the stereotypical stop-start, stuttered conversation can be observed (Taylor, 2011) as participants attempt interruptions without clear non-verbal cues.

Whilst this is an oversimplification of a complex theory, the need for the verbal and non-verbal message to match, and the impact of a two dimensional medium on interpretation of these potentially limits the usability of the technology. Communication theory forms one of the central areas found in Figure 2. Interactions between communications theory, technological experience and goals of interaction, dictate not only the level of verbal and non-verbal communication expected, but also the nature of the interpersonal relationships needed in order to meet the communications goal.

Mirroring

The impacts upon communications strategies of psychological and physiological factors are complex and relate to both the individual and to the context of communications. Within human interaction, interpersonal relationships are fundamental to support activities and rely upon the generation of a degree of empathy between participants (Arizmendi, 2011; Goldman, 2009). The generation of an empathic relationship is based upon the effective use of mirrored body language, facial expression and verbal communications strategies (Arizmendi, 2011). Carr et al. (2003) discuss the role of facial mirroring in perceptions of emotion, having observed individuals engaging in emotive dialogue mirroring the facial expressions of the speaker. Under MRI scan, activity in the Amygdala (an area of the brain critical in emotional behaviour) was seen in the recipient, mirroring the emotions of the speaker. Carl et al's work suggests that mirroring of facial expression to a degree allows the recipient to experience the emotions of the speaker, thus, enabling a more appropriate response. Older research in computer sciences, has reviewed the importance of facial expression and wider, non-verbal cues in the development of interactive avatars (Fabri et al., 2004; Fabri et al., 1999). This area of study emphasises the importance of mirroring not only facially but in wider movements, in generating perceptions of interpersonal relationships.

However, if subtle facial expression is of such necessity in this context, video-based communications may be flawed in it limitations. Whilst a facial camera shot may allow for visualisation of facial expression, transmission delay may prevent timely mirroring. In addition, a lack of ability to also view other non-verbal cues may prevent full understanding of the sub-text of dialogue. In contrast, the use of a half or full body camera shot may allow greater understanding of non-verbal cues but may not enable sufficient observation of facial features to facilitate mirroring behaviour. Furthermore, the increased perceived distance between participants may impact upon social norms from which it can be seen that normal, private conversations are usually conducted at between 18 inches and 4 feet separation (Roussel et al., 2004). Thus, video-based communications for extreme emotive situations may be fundamentally flawed in failing to fulfil its purpose.

SOCIAL PRESENCE

In addition to effects on dialogue, video-based communications also impacts upon interpersonal relationships through altered social presence perception. Social presence is defined as "the salience of the other in a mediated communication and the consequent salience of their interpersonal interactions" (Short et al (1976) pp.65, cited in Rourke et al., 2007). Humans utilise complex visual and neurological responses, known as motion parallax to detect the distance from another human (Zhang et al., 2011). Using visual acuity and mental interpretation, the observed distance of the individual from another's facial features is used to build up a three dimensional awareness of their facial expression, head position and distance.

This awareness of distancing is suggested to be an important component in social presence perception. Brick et al. (2009) in researching two and three-dimensional video-based communications, found that discomfort with a communications medium strongly related to a perceived reduction in social presence awareness. With social interaction cited as being vital to learning (Bandura, 1977; In Tu, 2000), social presence can be seen to be fundamental in enabling collaborative communications within learning, facilitating the development of appropriate interpersonal connectivity (Gunawardena, 1995).

Clearly in a situation in which true distance to an object cannot be evaluated through visual acuity, there develops a risk of reduced social presence perception. Thus, video-based communications that present a flat screen image, fail to provide a sense of social presence that facilitates collaborative dialogue. Whilst potentially unimportant for information sharing, the nature of a placement as a learning experience necessitates reflective and learning activities as part of placement support. Therefore, in addition to the limitations of the medium for emotive dialogue, there are also questions raised over its ability to facilitate a true learning experience.

COLLABORATIVE DIALOGUE

Research in education illustrates the empathic and collaborative nature of effective relationships between teachers and learners (Cooper et al., 2000; Dixon & Morse, 1961; Knowles et al., 2011; Mann et al., 2009). Through consideration of educational theory, the two-way, collaborative nature of learning communications, in which speaker and recipient work together concurrently to develop interaction, rather than taking it in turns to deliver a message becomes clear. The nature of this dialogue tends to result in shorter turns, latched, and overlapping turns during which the participants work together to develop dialogic rules and mutual understanding (James et al., 2012). In this way, supportive dialogue can be seen to be non-linear in its development and far from following an input/output model, requires complex interactions in which meaning will be developed rather than imposed. The limitations in audio transmission of an "internet protocol" communications method such as Skype present clear barriers to effective collaborative dialogue. Due to the nature of the signal, as one participant speaks, the signal from the other end is paused. As such, overlapping speech becomes impossible. In addition, without effective non-verbal cues and with limited interpretation of linguistics, understanding opportunities for interruption becomes more challenging. Consequently, dialogue tends to become more formal with turn taking behaviours which clearly impact upon the development of concurrent communications strategies and slow down collaborative dialogue (Taylor, 2011).

A participant in Phase 3 of the author's study (Taylor, 2011) illustrates the potential impact upon interpersonal relationships of these changes in communications strategies. This participant expressed a perceived "internal conflict" as a result of emotional discussions via video communications. This participant outlined how as an adult, he had learnt how to use voice, tone and words to comfort an individual via the telephone, and how he used body movement and touch as a means of providing comfort in a face-to-face dialogue. Whilst he admitted that he rarely engaged with actual physical contact, he felt that the ability to move and suggest physical contact was important to him, and was fundamental to feeling competent in providing effective support. He went on to state that video-based communications felt like face-to-face to some degree but as he was unable to use movement or touch, he felt conflicted and stressed by the experience. The influence upon an individual's emotional state as a response to using video-based communications suggests further caution being necessary when considering emotive and potentially stressful situations such as a failing placement. Thus, the interaction between psychology, behaviour, communications and purpose are again highlighted as fitting the definition of a complex, adaptive system.

PSYCHOLOGY

Psychological theory also integrates with communications theory in the context of stress management. Within stressful situations, levels of stress have been seen to be impacted upon by the nature of interpersonal relationships (Gaine & La Guardia, 2009). Mohr and Wolfram (2010) surveyed employees regarding their stress management strategies; demonstrating a reliance on close working relationships within an organisation to buffer stress. It is questioned whether under failing placement circumstances these close working relationships are between student and familiar academic tutors. Therefore, the use of empathic relationships and collaborative learning strategies becomes all the more important in supporting stress or buffering potential stress.

Psychological theories regarding stress management highlight wider ranging influences on the ability of an individual to deal with stress. Self-determination theory states that the basic psychological needs of an individual relate to:

- Perceptions of competence and the ability to influence ones environment;
- Relatedness and the connections or closeness with other individuals;
- Autonomy in that behaviour is volitional (Weinstein & Ryan, 2011).

In the context of the failing student, self-determination theory suggests a number of threats to the psychological wellbeing of the individual. As the student proceeds to fail the placement, inherently, they will perceive a failure in competence. Depending upon the communications within the placement team, this may also be exacerbated with a perceived reduction in connections with individuals in situ. Ultimately, the influence of these psychological factors will be in the development of perceived stress. Weinstein and Ryan (2011) discuss the means by which individuals process and cope with stressful situations, citing control and autonomous orientated individuals as representing the extremes of behavioural responses. Whilst not directly related to the use of video-based communications, the strategies utilised by individuals in managing stressful occurrences, will inevitably impact upon the nature of the support that they require as a component of the placement visit. As such, the integration between goals/purpose, psychology and behavioural characteristics is again illuminated.

An autonomous orientated individual is described as one who is either resilient to stress or copes with stress in an effective manner. In concurrence, Ryan and Deci (2008) suggest autonomous motivation to be representative of a more open and receptive (or mindful) approach and therefore, more likely to be aware of potentially stress inducing factors. Weinstein and Hodgins (2009) go on to suggest that not only are autonomous individuals potentially more resilient to stress but that they have a better understanding of the related emotions involved, thus enabling them to process these and to formulate appropriate actions.

In contrast, control orientated individuals rely more heavily on external input in order to validate performance and assist them in emotional processing (Weinstein & Ryan, 2011). As such, these individuals may be the students most in need of emotional support and, thus, the importance of developing an empathic relationship becomes clear. Through a reduction in perceived social presence, impacts upon empathic relationships, effects upon non-verbal communications and the corresponding disruption of message clarity, it is felt that the student may be at risk of increasingly feeling alone and of developing response behaviours that are detrimental to progress. It must be noted, however, that over-confident students with limited insight, but demonstrating autonomic orientated stress management processing, may also present a support challenge. These students may require considerable development of reflective skills and help in recognising problem areas, all of

which require collaborative dialogue and clear communication.

Placement support represents a high stakes instructional opportunity. Thus, this raises concerns over the appropriateness of video-based communications, with questions over the accuracy of the message transmission and the engagement with the emotive sub-text inherent in the technology.

PHYSIOLOGY

Whilst physiology is out-with this article to discuss, the impact of stress upon the cognitive functioning of an individual is well documented. With an increased use of the "reptilian brain", "fight or flight" responses reduce an individual's ability to engage with learning, instead focusing upon survival (Smith, 1996 pp.16). The involvement of video-based communications in support may, therefore, further exacerbate an existing stressful situation through the use of an unfamiliar or less effective communications strategy. Thus, the student's ability to engage with resolution of a situation and the development of effective learning strategies is further compromised. In relation to Figure 2, it is suggested that particular care should be taken over the support of externally controlled/control orientated individuals via this medium; further indicating the complex interaction of purpose, communications and psychology.

MANIPULATION AND LINGUISTIC CUES

Hodgins et al. (2010) suggest a link between stress response and linguistics that may be useful in evaluating communications via video link; citing increased latency before responding, decreased response length and higher pitched voice as indicative of the effective cognitive processing of stress. Therefore, contrary communicative indicators may be useful in identifying when an individual is struggling to process stress effectively. However, it is questioned whether mis-interpretation of altered linguistics, occurring as a result of the using video-based communications, may negate the usefulness of these cues. It is suggested that this medium may, therefore, compromise evaluative tools that are effective for skilled communicators.

Earlier work by Fridlund (1991) also outlines how skilled communicators may use facial expression to manipulate a response from a recipient. Used extensively in social interaction, Fridlund discusses how facial responses, for example smiling, can be used to illicit a similar response in the recipient. With consideration of the effects of mirroring on emotional perception, it is suggested that this technique is used to subtly manipulate a recipient's emotions. Via video link, these subtle evaluative and manipulative skills, useful to a talented communicator, may be compromised. As with mirroring, changes in the degree of zoom of the camera shot impacts upon the level of detail that can be perceived.

In the context of interviewing, high stakes meetings or dialogue with emotional content, the limitations of manipulative skills has the potential to significantly affect the outcome of dialogue. In situations in which power dynamics further complicate the development of interpersonal relationships, the inability to manipulate and evaluate suggests further complexity of this communications system, based upon the needs of all participants, not just the students'.

CONCLUSION

Whilst Skype and video conferencing are not new technologies, research into their use is often performance related. As such, numerous texts discuss the equity of the video experience for, for example, distance delivery of curriculum, engaging in problem solving conference calling or undertaking a medical assessment. However, this body of work largely ignores the quality of the experience. When applied to the support of individual students at distant locations from the host institution, it is argued that "duty of care" necessitates more consideration than the achievement of specific outcomes.

Whilst many institutions are increasingly approaching curricular planning with a one size fits all mentality (Altbach et al., 2009; Rolfe, 2012), the complexity of video-based communications in this context supports a balance between mass delivered curriculum and individual learning need. In order to fully appreciate the impact of video-communications technology, a complex adaptive systems approach to implementation is advised. Through consideration of wider behavioural, psychological and physiological factors, a conceptual representation of the impact of individual factors on practical considerations is presented. The model presented is not intended to represent all influencing factors, but to provide an overview of some of the factors seen within the author's investigations. It is recognised that many other theoretical influences could be considered to impact upon this complex system. However, in the context of student support, the integration of communications, purpose, technical experience and social presence, overlaid with psychological and behavioural elements, is designed to provide direction in considering implementation.

As with most social research, one size does not fit all and whilst a compromise inevitably has to be found in order to match need with financial viability, recognition of the potential limitations of an initiative is needed if students are not to be placed at risk. It is anticipated that by viewing technological implementation in this context as a complex, adaptive system, planners will be encouraged to look beyond standard pedagogical assumptions. Thus, implementation of technology will, hopefully, reflect diversity rather than uniformity.

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