Students' experiences of anxiety in an assessed, online, collaborative project

Abstract

Collaborative learning activities have become a popular method in online education to encourage active learning and equip students with team working skills that are highly valued by employers. However, past research has identified that working with other students online has the potential to cause anxiety for learners, particularly when work is being assessed. There is concern that, as well as the emotional distress this may cause, anxiety may affect students' participation and performance in these activities. This paper investigates these issues by exploring part-time distance learners' experiences of a group project where they were required to collaborate online to create a wiki resource and a website. An online survey and interviews were conducted with students who had recently completed the project. Results revealed that anxiety was commonly experienced, and causes of anxiety included relying on 'unknown others', fear of negative evaluation, and worries about non-active group members. It was found that anxiety reduced over the course of the project, as feelings of uncertainty were resolved. Findings also revealed that, although anxiety is often viewed to have detrimental consequences, more learners perceived anxiety to have had a facilitative effect on participation and performance than a debilitative one. Students who employed problem-focused coping strategies, rather than avoidance coping ones, were more likely to experience facilitative effects. These findings will be of value to educators who are designing and running online collaborative activities, and students who are participating in them.

Highlights

- Investigates effects of anxiety on participation in an online collaborative project
- Feelings of uncertainty were a major cause of anxiety for learners
- Anxiety reduced over the course of the collaborative project
- Facilitative effects of anxiety were more common than debilitative effects
- Facilitative effects were associated with problem-focussed coping strategies

Keywords:

1. Introduction

The inclusion of social and collaborative learning activities in online learning programmes is becoming increasingly prevalent in higher education (Järvelä et al., 2015). Traditional methods of online instruction, such as one way transmission of knowledge from teacher to student, are being replaced by active learning through interacting with fellow students. These changes reflect reforms in educational policy aimed at improving the quality of teaching and learning in higher education (e.g. the Teaching Excellence Framework in the United Kingdom). They also aim to equip learners with a range of employability skills, such as teamwork competencies and creative and critical thinking, which are seen as essential for working in the 21st century 'knowledge age' (Binkley, Erstad, Herman, Raizen, & Ripley, 2012; Häkkinen et al., 2017; Harasim, 2017).

Despite the benefits of using online collaborative methods, some learners may experience a range of unpleasant emotions and feelings (e.g. anxiety and frustration) when undertaking such learning activities (Bakhtiar et al., 2018; Kwon et al., 2014; Capdeferro and Romero, 2012; Oliveira et al., 2011). Researchers have reported that these unpleasant emotions can be caused by a variety of factors including working in an unknown learning environment, communicating with 'strangers', uncertainty over the commitment demands, personality clashes, and dealing with 'free-riders' (Brindley, Walti, & Blaschke, 2009; Donelan, Kear, & Ramage, 2010; Helen Donelan & Kear, 2018; Kear, 2011).

One unpleasant emotion that has been reported by students in these online learning contexts is anxiety (e.g. Helen Donelan & Kear, 2018; Oliveira et al., 2011), an emotion that is often viewed as being detrimental to learning and academic performance. Only a limited number of studies have focussed specifically on anxiety in online collaborative settings, with past research tending to explore the overall emotional experiences of students or focussed on experiences of collaborative learning more generally. The primary aim of this study was therefore to investigate students' experiences of anxiety in an online collaborative project. This research will help online educators and course designers to: create collaborative projects that do not cause undue anxiety for learners; and find ways to support learners who do experience anxiety. Moreover, it will emphasise the potential of anxiety as being a facilitative and activating emotion in online collaborative learning contexts.

1.1 Emotion and Online Collaborative Learning

The importance of emotions in academic learning has been evidenced over the last two decades. Cognition and emotion are viewed as being inextricably linked, and emotions are seen as having a vital role in student motivation, self-regulation and academic achievement (Boekaerts & Pekrun, 2016; Tyng, Amin, Saad, & Malik, 2017). Although the conceptualisation of emotion is an extremely difficult task, this complex phenomenon can be defined as: a relatively short-lived intense reaction in response to a personally meaningful situation (Artino, Holmboe, & Durning, 2012).

Emotions are thought to be both multifaceted, consisting of numerous interrelated components, and context-specific (Shuman & Scherer, 2014). For instance, a student about to carry out a presentation using synchronous video communication as part of an assessment may experience high levels of anxiety. This may cause subjective feelings of nervousness (affective component), worry about not performing well (cognitive component), a desire to escape the situation (motivational component), increased heart rate and sweating (physiological component), and anxious facial expressions (expressive component). Emotions can be analysed by their valence (i.e. positive/pleasant emotions, such as enjoyment, and negative/unpleasant emotions, such as anxiety) and activation (i.e. physiologically activating emotions, such as excitement, and physiologically deactivating emotions, such as calmness).

In the last 20 years, increased attention has been paid to the study of emotional aspects of online learning (e.g. Artino, 2012; Daniels and Stupnisky, 2012; Marchand and Gutierrez, 2012; Zembylas, 2008; Zembylas et al., 2008; Wosnitza and Volet, 2005; Vuorela and Nummenmaa, 2004; O'Regan, 2003). Much of this work has focused on individual learning situations and has found that students experience a variety of pleasant (e.g. enjoyment, excitement) and unpleasant (e.g. anxiety, frustration) emotions in these learning environments (e.g. Zembylas, 2008; Zembylas et al., 2008; O'Regan, 2003). Much less research has, however, focussed on the collaborative elements of online learning. In such contexts, the social nature of collaboration can lead to both positive and negative emotional reactions. For instance, interpersonal interaction between peers may evoke enjoyment and enthusiasm for some learners whilst for others it may induce anxiety and fear (McConnell, 2005; O'Regan, 2003). Many challenges can arise in online collaborative learning contexts that can lead to conflict and negative emotional arousal, for example, personality clashes (Helen Donelan & Kear, 2018), differences in goals and expectations (Capdeferro & Romero, 2012), challenges with commitment and time (Brindley et al., 2009), and differences in styles of working and communicating (e.g. 'free riders') (Capdeferro & Romero, 2012). Furthermore, intense emotions, such as increased levels of anxiety, may be evoked due to the unfamiliar nature of these learning environments and differences when compared to individual learning situations (e.g. the change in role of the tutor and the need for students to plan their time to align with others).

1.2 Anxiety and Online Collaborative Learning

Anxiety is considered to be an unpleasant emotion and has been of great interest to educational researchers for decades due to its potential detrimental impacts on academic performance and the learning process. In this study, anxiety is defined as 'an unpleasant emotional state or condition which is characterised by subjective feelings of tension, apprehension, and worry, and by activation or arousal of the autonomic nervous system' (Spielberger, 1972, p.482). We will be primarily concerned with the palpable, transient *state* reactions of anxiety in relation to specific aspects of undertaking an online collaborative project, rather than the more stable personality *trait* which predisposes individuals to

interpret stressful situations as threatening (Spielberger, 1966). In research literature, the term anxiety has often been used interchangeably with other terms, such as stress and worry, when referring to the same phenomenon (Putwain, 2007). The term stress can be viewed as an imbalance between demand and perceived ability to cope with that demand (Lazarus & Folkman, 1984). Worry (i.e. the negative cognitive thoughts about the situation at hand and potential consequences) is considered as one of two distinct components in anxiety, the other being emotionality (i.e. subjective perceptions of physiological arousal) (Morris, Davis, & Hutchings, 1981).

Evidence highlighting anxiety as an emotion experienced by learners in computer-based and online learning settings has derived from both qualitative and quantitative research approaches, and much of this research has concentrated on individual learning situations rather than social and collaborative learning settings. Quantitative approaches have predominantly used self-report methods to measure anxiety when undertaking different online learning activities, such as using computers (e.g. Saadé and Kira, 2009), using the internet (e.g. Thatcher et al., 2007), computer-mediated communication (e.g. Brown et al., 2004) and using wikis (e.g. Cowan and Jack, 2014).

Qualitative and mixed methods approaches have been used to investigate students' experiences of anxiety and other emotions in individual and collaborative online learning settings. Such research has often had the intention of exploring specific emotions (e.g. Bolliger and Halupa, 2012; Capdeferro and Romero, 2012), overall emotional experiences (e.g. Zembylas, 2008; O'Regan, 2003), or general experiences (Helen Donelan & Kear, 2018) in these learning environments.

1.3 Causes of anxiety

Research has shown that anxiety can often stem from interacting and communicating with other learners. For instance, the following aspects of online collaborative learning have all been reported as causing anxiety: judgement from peers (Duncan, Smith, & Cook, 2013; Symeonides & Childs, 2015); being misinterpreted, talking 'publicly' in an open forum (Symeonides & Childs, 2015); delays in messages being answered or acknowledged, letting other students down, being dependent on others (Allan & Lawless, 2003); reduced flexibility and convenience of online study (Brindley et al., 2009). The inclusion of assessment in the online collaborative learning process has also been shown to cause tension between individual endeavour and group requirements (Macdonald, 2003) which can lead to anxiety about how an individual's marks could be affected by others (Helen Donelan & Kear, 2018). It is clear from the existing literature that anxiety can stem from various sources when undertaking online collaborative learning. However, further explicit in-depth exploration of assessed online collaborative activities is required to significantly enhance understanding of the origins of this emotion in such settings.

1.4 Impact of anxiety on participation and performance

Anxiety is typically characterised as a negative emotion and it is often perceived to have negative and debilitative impacts on the learning process. However, the idea that anxiety can also have positive and facilitative effects has been discussed previously (e.g. Alpert and Haber, 1960). In academic settings, Pekrun et al. (2002) have shown that, although anxiety may be negatively correlated with motivation in some learners, it is positively associated with motivation in others. These findings highlight the complexities of anxiety and support the idea that this emotion can have both positive and negative impacts on learners' engagement and achievement. However, as this work was conducted in a face-to-face setting, the application to distance learning environments is unknown. To date very little research has explored facilitative and debilitative anxiety in distance learning settings.

Investigation into the effects of anxiety in collaborative environments is extremely sparse. Falkner, Falkner, & Vivian (2013) reported that several learners perceived anxiety to have a positive impact when completing face-to-face collaborative learning activities in a Computer Science course and Oliveira et al. (2011) found that increased levels of anxiety were prevalent in less successful collaborative working in an online environment. In both studies, however, the details of how anxiety impacted the participation and engagement of learners were not explored.

It is evident that there is currently a lack of research exploring how anxiety impacts participation and performance in online collaborative learning settings. The effects of this emotion in online collaborative learning environments might be vastly different to face-to-face settings, and further research is needed to explore the facilitative and debilitative effects.

1.5 Coping with anxiety

How a learner experiences anxiety may depend on their ability to regulate, or cope with, this emotion. Although numerous emotion regulation and coping taxonomies have been proposed, here we differentiate between 'problem-focused' (Lazarus & Folkman, 1984), 'emotion-focused' (Lazarus & Folkman, 1984) and 'avoidance' coping (Endler and Parker, 1990; Lazarus and Folkman, 1984). Problem-focused strategies aim to actively manage or resolve a situation (e.g. seeking information, increasing efforts, planning, managing priorities). Emotion-focused coping aims to regulate or deal with the emotional distress in the mind (e.g. seeking emotional support, positive reframing, venting, acceptance, wishful thinking). Avoidance coping involves certain behavioural (e.g. reducing effort, removing self from situation) and psychological (e.g. denial, blocking, or mental distancing) efforts to avoid stressful situations.

Very few studies have explicitly investigated the coping responses of learners to feelings of anxiety in social online learning contexts. When exploring student experiences of asynchronous text-based computer mediated communication, Symeonides and Childs (2015) identified social interactions as effective coping responses – one learner coped by

gaining emotional support from a fellow learner during stressful times, and another learner found it helpful to read fellow students' self-discourses of their struggles on the online course. Other coping responses included: retreating from the online environment; only posting information that was 'worth sharing' on the forum; and 'forcing' oneself to interact with others. Seeking tutor support has also been described as a coping response used by learners in online environments (Angelaki & Mavroidis, 2013). Having a greater understanding of how students cope with anxiety during online collaborative learning may enhance the support that can be offered, and help learners manage their emotions more effectively.

1.6 Reducing anxiety

A number of scholars have provided suggestions to help reduce the likelihood of negative emotions, such as anxiety, arising in online collaborative learning contexts (e.g. Jung et al., 2015). A common theme among these is the creation of a supportive learning environment. Zembylas (2008) recommends that fostering quality communication with fellow learners and tutors will help reduce negative emotions associated with online learning. This is a view shared by Allan and Lawless (2003) who believe that establishing good relationships and trust between learners is essential in creating a 'safe' learning culture. To help achieve such relationships, ice-breaker activities and face-to-face meetings, before or at the start of the learning experience are seen as beneficial (Allan & Lawless, 2003; Symeonides & Childs, 2015). Other suggestions to help reduce negative emotions include: increasing 'social presence'(Jung et al., 2015), defined as 'the degree to which a person is perceived as "real" in mediated communication (Gunawardena and Zittle, 1997, p.8); encouraging learners to express and share their feelings and emotions (e.g. through emotional journals or in 'safe spaces') (Xu, Du, & Fan, 2014); promoting the use of emphatic talk amongst learners (i.e. taking greater care when communicating and ensuring responses are appropriate) (Allan and Lawless, 2003); and giving novice students marked examples of previous students' work (Jung et al., 2015). Gaining a student perspective of how learners could be supported further may yield new findings that could be of great benefit in alleviating anxiety and other negative emotions in online collaborative learning.

1.7 Research questions

Insight from exploring anxiety in online collaborative learning will be of great value to educators and institutions who have adopted, or who are planning to adopt, this pedagogical approach. It will also advance knowledge in the growing area of emotion in online learning, the need for which has been advocated by numerous scholars (e.g. Garrison, 2017; Artino, 2012; Zembylas, 2008). The overarching research question of this study was: What are students' experiences of anxiety in an online collaborative project? This question was broken down into four sub-questions:

1. What are students' perceived reasons for anxiety in an online collaborative project?

2. How does anxiety in an online collaborative project impact student participation and performance?

3. What strategies do students use to cope with anxiety in an online collaborative project?

4. What can be done to reduce undue anxiety, and support those who are experiencing it, in online collaborative projects?

2. Materials and methods

2.1 Study context

The study was undertaken using students from The Open University UK who were studying an undergraduate module on Communication and Information Technologies (T215). As part of the module, students were required to work in groups of between 5 and 8 to undertake a group project. This involved producing: a wiki resource about online communication; and a website for a specific 'client' (e.g. clients have included a community theatre and walking club). To carry out the project, groups were provided with various online tools: a forum for group discussion; a wiki to document decisions and create the wiki resource; and *WordPress* for the website development. A student's overall grade for the project was made up of both individual and group marks.

2.2 Mixed methods approach

Both quantitative and qualitative data sources were used as this enabled a more comprehensive portrait of students' experiences of anxiety than could be generated by one data source alone. Quantitative data derived from an online survey, whilst qualitative data derived from both open-ended online survey questions and follow-up semi-structured telephone interviews. The specific mixed methods design selected for this study was based on Explanatory Sequential Design (Participant Selection model) (Creswell & Plano Clark, 2011). This model allowed the initial online survey data to be used to purposefully select participants for the in-depth, qualitative, second phase of the research (Creswell & Plano Clark, 2011). The use of interviews in the second phase allowed for data comparison and triangulation with survey responses (Bryman, 2016). This process enhanced the confidence in the findings reported.

2.3 Online survey

An online survey was developed by the lead author of this paper, in consultation with the three co-authors. This was created based on an extensive literature search and was reviewed by the co-authors of this paper (all specialists in distance education and one a psychologist) to ensure face and content validity, as recommended by Gehlbach & Brinkworth (2011) and Taherdoost (2016)**.** The survey was aimed at exploring the experiences of anxiety from a broad range of students who had completed the online collaborative project. Questions were framed around the main research questions of this study. Example questions from each area explored have been provided in Figure 1.

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The survey comprised 14 questions. Of these, 13 had closed response options with an optional 'Additional comments' box, allowing respondents the opportunity to explain and qualify their responses using open ended comments. Three types of closed questions were used in the survey: rating scale; multiple response; and dichotomous. The remaining question had just an open-ended response field to ask how students thought that anxiety in online group projects could be reduced. When creating the survey, thorough consideration was given to guidelines of effective online survey design (e.g. Lumsden, 2007). This ensured that the survey was easy to navigate through, that questions were response friendly and standards of accessibility and usability were upheld. The survey was created and administered using a commercial Internet survey platform (Qualtrics).

Prevalence of anxiety:

- "Before starting the group project […] I felt anxious" (5-point Likert scale response options e.g. "Strongly agree")

Reasons for anxiety:

- "If you experienced anxiety before or during the […] group work, what was the cause of these feelings?" (Multiple choice response options)

Impact of anxiety on participation and performance:

- "If you experienced anxiety before or during the […] group work, what impact did this have on how you participated?" (5-point Likert scale options e.g. "Very negative impact")

Support for students to reduce undue anxiety during online collaboration:

- "How could the […] university have offered more advice and guidance to help you feel less anxious and more confident when completing online group work?" (Open entry text field)

Figure 1. Example survey questions.

Before contacting students, ethical approval was gained from The Open University's Human Research Ethics Committee (HREC) and Student Research Project Panel (SRPP). Invitation emails stating the purpose of the study, and informing students that taking part would have no effect on any aspect of their module or university study, were sent to 290 of the 422 students that studied the module that year. Some students could not be surveyed because they had taken part in other educational research within the previous 12 months or had asked not to be contacted about such research. The survey was active for 33 days and during this time three reminder emails were sent (2, 3 and 4 weeks after the initial invitation email was sent).

A total of 76 students completed the online survey (response rate of 26.2%). This is a good response rate for The Open University, where students study part-time at a distance, and many are in full-time employment and/or have other responsibilities. All surveys were completed anonymously but anyone willing to take part in the second phase of the study (telephone interviews; see below) provided their email address. The respondents ranged in age from 22 years to 70 years (M = 37.39 years, SD = 10.76 years). This is representative of the module cohort, with the 30 to 39 year age band being the largest. The majority of respondents were male (80.3%) which is slightly higher than for the overall module cohort, which was 76% male.

2.4 Telephone interviews

From the 76 respondents to the online survey, 40 provided their email addresses, indicating their willingness to take part in a follow-up interview. Out of these, 30 respondents were contacted: those who had indicated clearly in the survey that they had experienced anxiety related to the group project. From these, 11 respondents subsequently returned a signed copy of a consent form, and took part in a telephone interview.

To focus discussions during telephone interviews, a pre-planned interview guide was used. This adopted a semi-structured approach and aimed to gain a detailed understanding of students' perspectives and experiences of anxiety in the online collaborative project. This approach allowed key topics and issues to be pursued (e.g. in relation to the research questions and the findings from the survey), whilst, at the same time, allowing the participants freedom to explore their own thoughts. The interview guide consisted of 11 primary questions, with 10 of these having further probe questions aimed at eliciting more information and elaboration from participants. Like the online survey, interview questions were framed around the main research questions of the study. Example interview questions are given in Figure 2.

- Could you explain your feelings of anxiety in the […] online group project?
- What were the reasons for you feeling anxious in the […] online group project?
- How did feelings of anxiety impact your participation and engagement in the […] online group project?
- How did feelings of anxiety impact your overall performance in the […] online group activity?
- How did you manage, or cope with, feelings of anxiety in the […] online group activity?
- How could have The Open University offered more advice and guidance to help you feel less anxious and more confident when completing online group work?

Figure 2. Example interview questions.

When creating the interview guide, recommendations outlined by Bryman (2016) were followed. For example: questions were grouped by topic and followed a logical order to help the flow of the interview; the language of the questions was made comprehensible and relevant to participants taking part; questions were not leading; the purpose and structure of the interview were outlined at the beginning; and two general questions about the collaborative group project were asked at the start of the interview to help the participant feel more relaxed and help engage them in conversation. A number of steps were also followed to ensure the quality and trustworthiness of the qualitative telephone interviews, such as: peer scrutiny of this aspect of the project; the use of "reflective commentary" by the researcher; providing a detailed description of the study context and interview procedures; and triangulation of data collection methods. These followed strategies discussed by Shenton (2004) and aimed to address matters of credibility, transferability, dependability and confirmability.

The use of telephone interviews was selected as students were distance learners and were therefore geographically dispersed. Telephone calls are also one of the communication methods for learners at The Open University. Undertaking face-to-face interviews would have reduced the number of learners taking part in this phase of the research. In addition, Bryman (2016) notes that telephone interviews may help interviewees feel more relaxed and disclose more sensitive information. Given the sensitive topics being discussed here it was therefore felt that telephone interviews would be an appropriate approach. This mode of interview has been found to produce data of a similar amount and quality when compared to face-to-face interviews (Sturges & Hanrahan, 2004).

Telephone interviews were carried out by one researcher (lead author), who is experienced in leading telephone interviews and building rapport using this mode of interview. The interviewer also had no affiliation with the module being explored. All interviews were recorded, and each lasted for approximately 30 minutes. A financial reward (a £20 Amazon voucher) was given to each of the participants who completed an interview (this approach was approved by the ethics committee).

2.5 Quantitative data analysis

In this study, both descriptive and inferential statistics were used. Frequencies (n, %) of all closed survey questions were calculated and transformed into graphs within Microsoft Excel 2013. A Wilcoxon signed-rank test was used to detect significant differences in perceptions of anxiety before and during the online collaborative project.

A Spearman's correlation coefficient was calculated to explore the bivariate relationships amongst these items as well as the relationship between perceptions of how anxiety impacted participation and performance. In accordance with Cohen (1988), correlation coefficient effect sizes of 0.1, 0.3, and 0.5 represented small, moderate and large associations, respectively. All inferential statistics were completed using conventional statistical software (SPSS). Statistical significance was set at $P < 0.05$.

2.6 Qualitative data analysis

Qualitative analysis was conducted on data from the open-ended survey responses and the semi-structured interviews (transcripts were made from audio recordings), and was undertaken using thematic analysis (Braun & Clarke, 2006). The primary method of identifying themes within the qualitative data was through an inductive or 'bottom up' approach.

The six-phase procedure outlined by Braun and Clarke (2006) was followed. In the first stage, data were read and re-read with the aim of becoming familiar and immersed in the qualitative content, and initial ideas were identified and refined. During the second stage, data were systematically worked through and interesting features coded; 45 codes were generated during this phase. The third stage involved grouping codes into potential themes. Five initial themes were identified and an initial thematic map was produced. In the fourth stage, themes were reviewed further and two of the initial themes were collapsed into one theme. The final stage involved selecting extracts that would help illustrate the themes and provide a "voice" to survey respondents and interviewees in a written report. All data were analysed using the qualitative analysis software NVivo 11. The coding and analysis was carried out by the first author of this paper, with the three co-authors reviewing the process at intermediate stages.

3. Results

3.1 Quantitative findings

3.1.1 Prevalence of anxiety

Two of the survey questions asked students the extent to which they agreed with the statements '*Before starting the group project in T215 I felt anxious*' and '*Whilst completing the group project in T215 I felt anxious*'. The findings revealed that respondents were more anxious before the online collaborative project than during it, with 43 (56.6%) respondents selecting either 'Strongly agree' or 'Agree' before the project, compared to 29 (38.2%) during the project (see Figure 3). A significant difference in median rank scores was found ($z = -2.911$, $p < 0.01$, $r = -.33$).

Levels of anxiety before and during the online collaborative project were correlated. A significant positive relationship was found between feelings of anxiety before and during the online collaborative project ($r_s = .51$, $p < .001$).
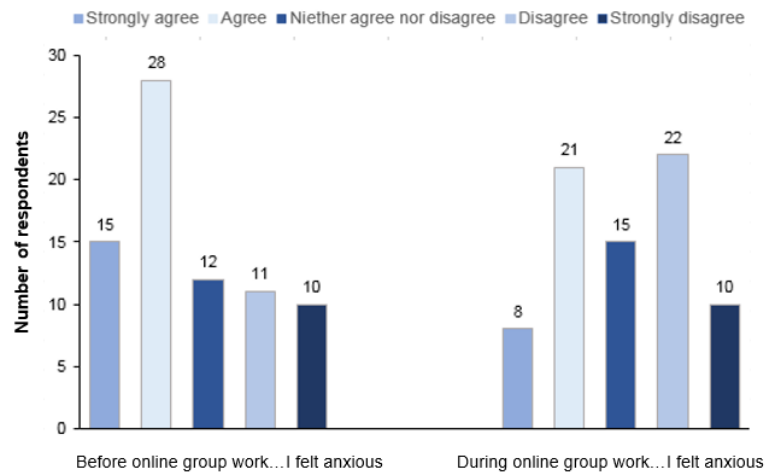
Figure 3. Feelings of anxiety before and during the online collaborative project (n=76).

3.1.2 Reasons for anxiety

A multiple response question asked students to identify the cause(s) for anxiety before or during the online collaborative project: *'If you experienced anxiety before or during the T215 group work, what was the cause of these feelings?'*. From the 76 respondents, 69 (90.8%) selected one or more of the pre-defined responses. Frequencies (%) are illustrated in Figure 4. Four respondents selected the 'Other' option. Although one of these stated 'I did not experience anxiety' (Respondent 59, Male, 30-39 years) the other three provided the following causes for anxiety: 'Others would not complete the tasks on time' (Respondent 75, Male, 40-49 years), 'Not being able to approach anybody for guidance' (Respondent 58, Male, 65 and over) and 'I suffer with anxiety in general everyday life anyway' (Respondent 72, Male, 30-39 years).

As shown in Figure 4, three response options were each selected by about 50% of respondents. These related to: lack of control over performance; relying on others; and worry about letting others down.
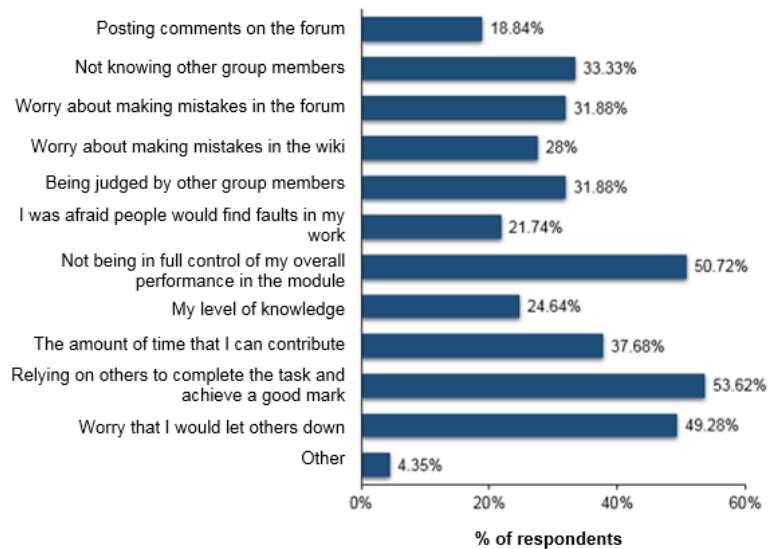
Figure 4. Perceived reasons for anxiety before or during the online collaborative project.

3.1.3 Impact of anxiety on participation and performance

Participants were asked *'If you experienced anxiety before or during the […] group work, what impact did this have on how you participated?';* more respondents perceived anxiety to have a positive impact than a negative impact. 24 (31.6%) selected either *'Positive'* or *'Very positive'* response options whilst 18 (23.7%) selected either *'Negative'* or *'Very negative'* response options (see left-hand side of Figure 5). A large proportion perceived anxiety to have a neutral impact on participation, with 23 (30.3%) respondents selecting this option. 11 (14.5%) respondents stated that they did not experience anxiety.

Participants were also asked how anxiety had impacted their performance: *'If you experienced anxiety before or during group work in […]', what was the impact of these feelings on how well you achieved in the group project?*. A greater percentage of respondents perceived anxiety to have a positive impact than a negative impact - 25 (32.9%) selected either 'Positive' or 'Very positive' response options whilst 14 (18.4%) selected either 'Negative' or 'Very negative' response options (see right-hand side of Figure 5). 24 (31.6%) respondents thought anxiety had a neutral impact on their performance. A significant positive relationship was found between how respondents perceived anxiety to impact participation and performance (r_s = .80, p < .001).
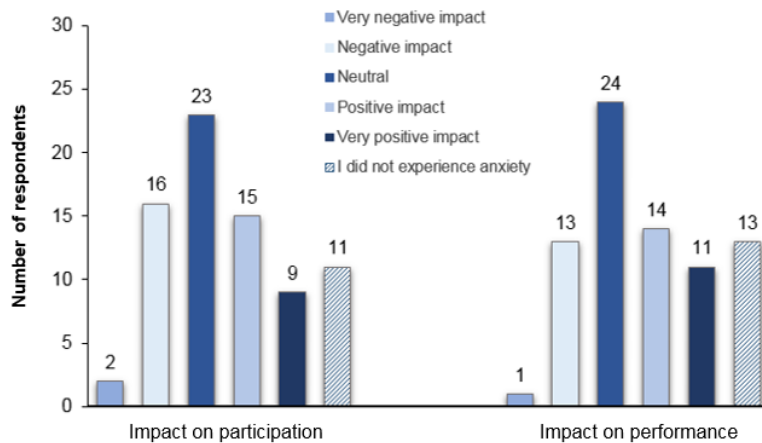
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Figure 5. Impact of feelings of anxiety on participation and performance in the online group project (n=76).

A multiple response question was used to gain a more detailed understanding of how anxiety affected respondents' participation and performance: *'In what ways did feelings of anxiety affect your participation and achievement in the [...] group project?*. Out of the 76 respondents, 54 (71.1%) selected one or more of the response options. Frequencies (%) are illustrated in Figure 6. A large number of respondents selected 'Other', and it became clear that this was partly to identify positive effects of anxiety which were not included in the response options. From the 20 respondents who selected 'Other', 9 explicitly stated that anxiety impacted participation and performance by making them try harder and be more proactive. For example, in the free text field associated with this question, Respondent 46 (Male, 40-49 years) wrote 'I did try to cover up my anxiety by getting involved with everything I could', whilst Respondent 68 (Male, 50-59 years) stated 'It [anxiety] made me try harder and attempt to engage more with fellow students'.

Figure 6. Ways in which feelings of anxiety affected participation and performance.

3.2 Qualitative findings

Four main themes emerged through thematic analysis of the telephone interviews (n=11) and the open-ended online survey responses (45 responses to the one open ended question and 227 'additional comment' responses). These main themes were: 1) uncertainty; 2) individual differences; 3) change in anxiety; and 4) support. Three out of the four themes had subthemes, as shown in Figure 7. Each theme and subtheme are discussed below.
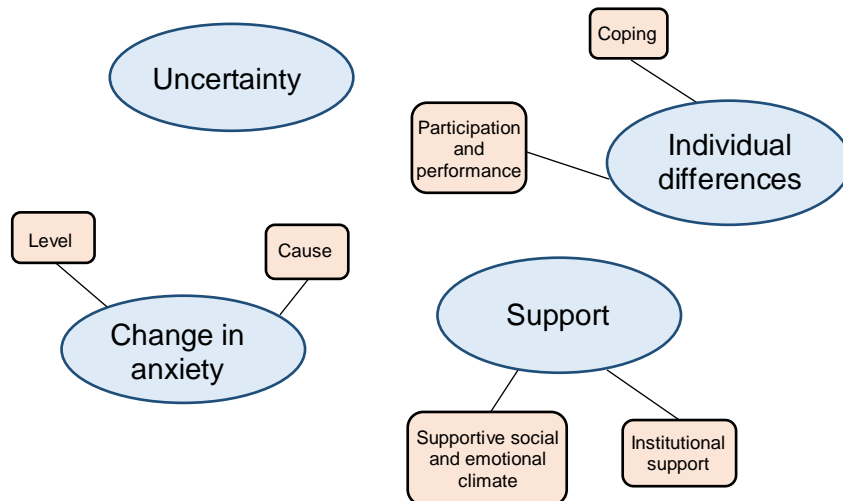

Figure 7. Final thematic map (themes and sub-themes).

3.2.1 Uncertainty

Students' comments suggested that uncertainty was a major cause of anxiety for them. Comments highlighted that before, or at the start of, the project uncertainty was often due to working with 'strangers' and being reliant on these 'unknown others' to successfully complete the project and achieve a good grade.

> '…I just didn't know them, I didn't know what their aims were, I didn't know anything about them, I didn't know their capabilities. And for those reasons that's where my anxiety stemmed from.' (Interviewee I)

A commonly cited uncertainty during the project was that of non-active group members. Comments suggested that this led to worry about how overall grades might be impacted, and apprehension about having to do additional work.

It was apparent that many students were worried about negative evaluation or judgement from other group members. Comments were often linked to part of the project where group members had to provide feedback on each other's draft wiki pages. Learners were concerned that their comments may be misinterpreted or cause offense.

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> '…I hated the feedback, that was the worst part of it... putting that across [areas for improvement] was so hard in a positive way without coming across as I don't know, I know better or something, which I certainly don't, it was so difficult to phrase it correctly and not to, as I thought I might, upset people.' (Interviewee B)

Learners also expressed uncertainties over their own abilities or level of knowledge (i.e. related to the subject matter or, to a lesser extent, use of online tools), which led to worries of letting others down, keeping up with the group, and making mistakes. Some also expressed uncertainty over the time that could be committed to the collaborative project, due to the perception that online collaboration reduces the flexibility of online learning and is a more time-consuming activity.

3.2.2 Individual differences

There seemed to be substantial differences in how anxiety affected students in the online collaborative project. This was considered through two sub-themes; coping, and participation and performance.

Coping

Being more proactive was the most commonly reported coping strategy. Some respondents commented that anxiety made them work harder, plan their time more thoroughly, take on bigger roles within the group, seek information from tutors, monitor other group members' contributions more frequently, and engage early with communication and collaboration. Some students said that they did this because they did not want to let the group down and have a negative impact on the overall group grade. Others said that being proactive allowed them to take more control over the situation.

> 'this [anxiety] made me think more about how I was going to work in the group. I also decided I was going to start doing my part early so I would not fall behind or let any of the group down.' (Survey respondent)

The asynchronous nature of discussion forums and the wiki allowed students to reflect upon comments and consider responses, and some respondents reported that this helped alleviate anxiety. One survey respondent wrote:

> 'I am extremely nervous of meeting new people face to face or over the phone. I don't have that issue if the meeting is online. Online interaction allows me time to consider and evaluate my response.'

Seeking emotional support to cope with feelings of anxiety was explicitly indicated as a coping mechanism by some learners. Interviewee C commented that he expressed his concerns and feelings about the project with his partner which helped reduce feelings of worry. It was also noted that students were using Facebook to vent feelings and emotions about the online collaborative project.

Anxiety in an online group project

Although fewer learners described avoidance coping strategies, a number of comments related to stepping back and not fully engaging with the collaboration. Many of these learners commented that they were reluctant to make first contact, and would wait until others had interacted before joining in. Interviewee F commented that feelings of anxiety made him be a 'bit more reactive instead of being proactive'. More extreme disengagement was mentioned by two learners. Interviewee A commented that anxiety led him to avoid the forums completely, whilst Interviewee B stated that he tried to avoid responding to others on the forum as much as possible.

Participation and performance

Comments revealed that anxiety had differing impacts on students' participation and performance. The facilitative impact of anxiety was the most commonly expressed by learners. Many of these comments were also linked to the proactive strategies employed to cope with feelings of anxiety.

> 'If anything, the anxiety pushed me into working harder to try and get as high a grade as possible.' (Survey respondent)

A number of learners commented that anxiety had no impact on their participation and performance. For instance, two survey respondents stated: 'I continued to work to my standards regardless' and 'I was anxious, but carried on working as one should.'

The negative, debilitative impact of anxiety was also mentioned (though much less often than the facilitative effects of this emotion).

> 'It certainly didn't have a positive impact…I could have done better if I hadn't have been worried about other people's perceptions of me, so yes it would have had a negative impact I think.' (Interviewee B)

From comments made by interviewees, there seemed to be a link between employing disengagement and avoidance coping strategies and experiencing the debilitative impact of anxiety.

3.2.3 Change in anxiety

Students perceived anxiety to change throughout the collaborative project. This theme is considered through two sub-themes: level of anxiety and cause of anxiety.

Level of anxiety

Many comments expressed a reduction in levels of anxiety during the online collaborative learning process, with numerous learners perceiving that feelings of anxiety decreased once the project had started. A lowering of anxiety during the project was often attributed to the resolution of uncertainties, such as meeting and getting to know group members, understanding individual and group roles and responsibilities, and witnessing tasks being completed by peers.

Anxiety in an online group project

> 'My anxiety was lifted as soon as I got to know fellow students in my project group.' (Survey respondent)

> 'I think once you determined what everyone had to do and the work was split up, a lot of the anxiety had dissipated because a lot of the uncertainty had gone and I knew what I had to do and I could get on with it.' (Interviewee J)

However, Interviewee B commented that although his anxiety initially decreased after arranging a face-to-face meeting with his group, when this did not materialise his anxiety increased again and remained elevated throughout the project.

> '…I even suggested a face to face meeting at one point and a couple of them initially were quite happy with that and that made me feel less anxious and more sort of supported by the others around me, but then they backed off and that never actually happened in the end'

Cause of anxiety

A few students commented that they perceived the cause of anxiety to change during the online project.

> '…beforehand, it came from you know the prospect of working with complete strangers…and certainly during the module, during the work, it was anxiety from am I contributing enough, am I playing my part. That kind of thing.' (Interviewee J)

3.2.4 Support

Many respondents thought that students experiencing anxiety could be supported further in online collaborative learning environments. Two sub-themes emerged: supportive social and emotional climate; and institutional support.

Supportive social and emotional climate

The development of a supportive social and emotional climate when carrying out online group work was seen as important for reducing anxiety. Although a 'get to know your group' task was undertaken before the project, numerous learners commented that interacting and getting to know other group members to a greater extent at the beginning or prior to the project would have helped them feel more comfortable and less anxious. Comments suggested that introductory ice breaker activities, use of more emotionally rich communication media, and increased face-to-face meetings would have helped foster communication and relationships between peers.

Expressing emotions to peers is something learners may have found difficult in the online group project. Interviewee B stated that: '…I didn't feel I was really able to talk about it [anxiety], I don't know if other people felt the same'. It was also highlighted that being aware of others' feelings would have helped reduce anxiety. Interviewee J commented:

> 'Possibly, maybe something that could be illustrating other people could be feeling exactly the same way as you… so it's not strange for you to feel anxious and I think knowing that possibly other people are going to be the same, feeling the same, lessens the anxiety.'

Interviewee H described how her group created other 'outlets' beyond the module forum such as a 'secret' Facebook group where group members '…could connect as people as opposed to just team members'. She expressed how this space allowed peers to express emotions and feelings which would have been difficult on the module forum. It also allowed individuals get to know each other on a personal level, for example, by sharing photos of their interests and aspects of their personal lives.

Institutional support

Numerous comments mentioned that more guidance and support could have been provided in the following areas: advice on best practices for online group work (i.e. from tutors or past students); information on using additional communication tools; and help with encouraging engagement and participation of group members. Other comments in this sub-theme highlighted that anxiety may have been reduced if there were changes in the assessment marking, predominantly the group mark element. One survey respondent wrote: 'I think the [university] could have pushed at the start to get everyone involved rather than just leaving it to the group'. Additionally, some learners felt that the marking criteria were not clear and further clarification of these would have helped reduce anxiety.

4. Discussion

In this section, the findings of the research are discussed in relation to the four research questions and the research literature. This is followed by a discussion of the limitations of the study and suggested future research.

4.1 What are students' perceived reasons for anxiety in an online collaborative project?

Quantitative results revealed that anxiety stemmed from a variety of sources, most frequently: reliance on others to complete the task; not being in full control; and worry of letting others down. These findings were supported by qualitative results which highlighted differences in the origins of anxiety, and increased anxiety caused by losing control and being reliant on 'unknown others' (see section 3.2.1 – uncertainty).

The overarching theme of 'uncertainty' identified through qualitative analysis was consistent with Lazarus' (1991, 2000) core relational theme for this emotion. Lazarus (2000, p.244) suggests that feelings of anxiousness are aroused when '…important values and goals are threatened under conditions of ambiguity about what will happen ...' The unfamiliar (e.g. unknown method of study and unknown group members), assessed (increased importance to learners' goals), and collaborative nature of the project led to many situations being appraised as threatening by learners, such as the risk of achieving a lower grade, the threat of negative judgment by peers, and the fear of letting others down.

Numerous reasons for anxiety reported in this study support the findings of previous literature. These include: being dependent on others, and concern about letting others down (Allan & Lawless, 2003); feelings of inadequacy and low self-efficacy (Hartnett, 2015) fear of negative judgment (Duncan et al., 2013); worries over group and individual assessment (Helen Donelan & Kear, 2018); and being misinterpreted (Symeonides & Childs, 2015). A number of learners felt that, when communicating via an online forum, interaction with group members was restricted (e.g. lack of non-verbal cues and reduced spontaneous communication). This led to worries about how comments would be interpreted and whether they might cause offence. Anxiety caused by different communication modalities is an important consideration for online collaboration (Potts, 2011).

The influence of non-active group members, or 'free-riders', has been discussed at length in research related to online collaborative learning (e.g. Capdeferro and Romero, 2012), but few studies have identified this as a direct source of anxiety. The current study revealed that many learners worried that non-active members could jeopardise the project and create more work for other members. Many learners perceived anxiety to stem from uncertainty over the ability to balance the online collaborative project with work and life commitments (Brindley et al., 2009; Macdonald, 2003). Introducing an unfamiliar type of educational approach meant that some students were unprepared for the time demands prior to the project. The project was perceived by some as more time-consuming, less flexible, and not as convenient as traditional study.

For a number of learners, reasons for anxiety changed during the collaborative process (see section 3.2.3 - change in anxiety). These changes can be explained by the resolution and/or reappraisal of the anxiety-causing uncertainties (see section 3.2.1 – uncertainty). For instance, fear of the 'unknown' was lessened as learners became familiar with their group members and understood their roles and responsibilities. This is similar to the development of 'emotional kinship' described by Zembylas (2008, p.82), who explained how communication between peers changed the dynamic of the online experience and helped reduce anxiety in learners. Developing familiarity and trust between group members can therefore be seen as an important factor for reducing feelings of anxiety in online collaborative learning (Allan & Lawless, 2003; Potts, 2011) (see section 3.2.3 – changes in anxiety). The temporal changes in anxiety are important considerations for future research.

4.2 How does anxiety in an online collaborative project impact student participation and performance?

There were substantial individual differences in how anxiety influenced participation and performance, with facilitative, debilitative, and neutral impacts being reported (see section 3.2.2 – individual differences). However, more learners perceived anxiety to be facilitative than debilitative; this is a surprising finding, as typically anxiety is considered a negative emotion with detrimental consequences. Falkner et al. (2013) found evidence of facilitative anxiety in face-to-face collaborative learning; however the idea that anxiety can have facilitative properties has mainly arisen in domains such as sport psychology (Hanton et al., 2008) and is supported by some emotional theorists (e.g. Pekrun et al., 2006; Lazarus, 2000).

A number of scholars have attempted to explain how anxiety can act as an energising emotion (e.g. Strack et al., 2017; Pekrun et al., 2006). Strack and Esteves (2015) propose that, if people interpret anxiety as facilitative, they will appraise the emotional encounter, or stressor, as a challenge (i.e. an opportunity for self-growth) rather than a threat. These authors believe that this interpretation will lead to enhanced motivation, effort, and performance, as well as reducing the emotional exhaustion that is often associated with anxiety. This interpretation may explain why some individuals appear to experience facilitative effects whilst others experience debilitative effects, when faced with the same situation. Future investigation would, however, be needed to test this theory in online collaborative learning settings.

Although the perceived facilitative impacts of anxiety are one of the most significant findings of this study, a greater understanding is needed of how these facilitative effects are elicited and what impacts they have on participation and performance. It is also important that educators do not encourage anxiety in online collaborative settings. Although anxiety may have facilitative effects for some learners, it can also have very negative impacts on well-being, satisfaction, and motivation.

4.3 What strategies do students use to cope with anxiety in an online collaborative project?

From the analysis of qualitative data, it was revealed that students employed a range of coping strategies during the project. Most frequently cited were strategies with a problem-focused coping function (e.g. increased effort, planning time more thoroughly, taking control, and seeking information), as opposed to those serving either emotion-focused (e.g. venting, emotional expression, and seeking emotional support from family and peers) or avoidance coping (e.g. disengagement from the project) functions. Many learners who reported employing problem-focused coping strategies perceived anxiety to have a facilitative impact on their participation and performance. Conversely, those who employed avoidance strategies tended to perceive anxiety to have debilitative effects (see section 3.2.2 – individual differences). These findings extend the previous literature, as very few studies have explored how learners in online collaborative environments cope with the resulting emotions.

The importance of emotion-focused coping in helping learners manage anxiety in online learning environments has been emphasised in previous research (e.g. Symeonides and Childs, 2015; Zembylas, 2008). In support of Symeonides and Childs (2015), this study found that the use of emotional support (from peers and family members), and reading self-discourses of others' feelings and struggles helped alleviate anxiety (see section 3.2.4. – support). Although some students conveyed that they were comfortable expressing emotion and seeking emotional support, others revealed that they were reluctant to discuss their feelings with peers in the online forum, as they perceived this to be non-conducive to the online activity (see sections 3.2.4 – support, and 3.2.2 – individual differences). However, some learners were comfortable expressing their feelings via a Facebook group created by learners in the module. This constituted a personal and private area for discussion of the module. Results also revealed reluctance from a number of learners to

seek emotional support from tutors, in line with the findings of previous studies (Symeonides & Childs, 2015; Xu et al., 2014).

According to Lazarus and Folkman (1984) there are no universally appropriate or inappropriate coping strategies, and coping responses appear to differ (see 3.2.2 – individual differences) depending on whether an emotional encounter is appraised as controllable or uncontrollable. The goodness-of-fit hypothesis (Lazarus & Folkman, 1984) suggests that emotional situations considered controllable tend to lead to the utilisation of problem-focused coping strategies (i.e. an attempt to change controllable stressors), whilst emotional situations that are perceived to be beyond personal control often lead to the use of emotion-focused coping responses (i.e. an attempt to adapt to uncontrollable stressors). In relation to the present study, issues of control could be viewed as central to the coping process. Those individuals who employed problem-focused coping may have evaluated situations causing anxiety as controllable whilst whose who employed emotion-focused coping or avoidance coping may have perceived the situations as uncontrollable. However, given that perceived control of anxious encounters was not assessed in this this study, firm conclusions cannot be drawn.

The ability of individuals to cope with negative emotions (such as anxiety) when undertaking online collaborative learning is an important consideration for educators. Advising learners how to cope with controllable (i.e. use of problem-focused coping) and uncontrollable (i.e. use of emotion-focused coping) stressors may have beneficial impacts on participation and performance, and may foster positive and enjoyable learning experiences. Guidance should provide learners with knowledge of a range of coping strategies (e.g. various problem- and emotion-focused coping strategies) to address the substantial inter-individual and intra-individual variability in this process (Lazarus & Folkman, 1984).

4.4 What can be done to reduce undue anxiety and support those who are experiencing it in online collaborative projects?

Learners thought that, as well providing advice and guidance on coping strategies, developing a more supportive social and emotional climate was important for helping those with anxiety (see section 3.2.4 – support). Central to this was getting to know other group members before or at the start of the project, for example, through ice-breaker activities, face-to-face tutorials, and using more emotionally-rich communication media (e.g. web conferencing). These suggestions are in line with recommendations for reducing stress in online collaborative activities outlined by Allan and Lawless (2003), who emphasise the importance of building trust, increasing social presence, forming relationships, and creating a safe learning culture where mistakes are accepted.

Learner comments suggested that emphasis needs to be placed on developing trust and relationships between group members. Lawless and Allan (2004) suggested holding dedicated 'getting to know your group' face-to-face tutorials, which could significantly reduce anxieties related to 'unknown others'. They also emphasised that learners need to understand their own, as well as others', online group working preferences (e.g. preferred

communication media, roles within the group, working patterns) before the main collaborative activity begins; further guidance and facilitation from tutors might be needed at this stage.

The importance of emotional expression was discussed previously, and this was highlighted by respondents as an important way to help support students who experience anxiety; this view is supported by numerous scholars (e.g. Xu et al., 2014; Zembylas, 2008). Zembylas (2008, p.83) states that 'It is valuable for online instructors to find mechanisms that encourage learners to evaluate their positive and negative feelings alike'. Gaining information about learners' emotional experiences may be of great value to tutors; uncertainties and anxieties expressed by learners could be acknowledged and additional support provided. If emotional expression was also shared with other learners, students may offer each other emotional support and share successful coping strategies (Xu et al., 2014).

Multiple mechanisms for emotional expression in online settings have been advocated (Zembylas, 2008), for instance, the inclusion of a forum designed specifically for expressing feelings related to the online collaborative project. Advice and guidance on using other Web 2.0 tools (e.g. Facebook) may also be of benefit. For example, one learner in this study described how her group members created a private Facebook group which helped them discuss feelings in a safe environment. This also helped increase social presence as learners could view pictures and information about the lives of other group members.

Respondents suggested that gaining advice from past students would be of value. Understanding the experiences of others could help reduce worries at the start of the project, and also clarify understanding of the requirements for the collaborative and group marks in the project. Finally, many learners perceived that more facilitation from tutors to encourage participation of all group members would have helped reduce feelings of anxiety.

4.5 Limitations

As with any research, there are a number of limitations to this study. Firstly, the investigation is based on a relatively small, self-selected sample of students. This may have led to a response bias, with a greater number of learners who had experienced anxiety responding to the survey. Second, the study took place at one institution, using students from one module. The sample, although representative of the module population, had a high percentage of male students in comparison to females. When compared to other HE institutions, the average age of the sample may have been untypically high and learners may have been more competent with ICT and familiar with online communication. Last, the question exploring effects of anxiety in the online survey (see Figure 4) omitted to include any options describing positive ways in which anxiety could have affected student participation and performance. This led to a reduced response rate on this item and a high number of respondents selecting the 'other' response option. However, inclusion of the open-text field in this item and semi-structured interviews enabled the facilitative effects to be identified.

4.6 Future Research

This study advances knowledge of how anxiety is experienced and perceived by students in an assessed, online, collaborative project at The Open University. Future research is recommended in broader contexts, using a more diverse range of students. For example, this could include undertaking further research with courses from different academic disciplines and with different student demographics. Research could also be undertaken in blended or traditional teaching and learning contexts. It may also be prudent to explore student anxiety in various types of online collaborative learning activities such as online problem-based learning or non-assessed collaborative group work. The use of longitudinal designs (e.g. using reflective and emotional journals or experience sampling; (Larson & Csikszentmihalyi, 2014) would further aid understanding of how experiences of anxiety change over time; as Lazarus (1991) notes, the study of emotion is primarily a study of change and flow over time and across occasions. Additionally, understanding tutors' perspectives of student anxiety in online collaborative learning may increase knowledge of how anxious students could be better supported. This study was exploratory in nature and there was a greater emphasis placed on qualitative research methods. Future work could examine anxiety in online group work using quantitative approaches and larger sample sizes. The development of a valid and reliable self-report scale to measure anxiety in online collaborative contexts would be greatly beneficial. It is also imperative that intervention strategies aimed at reducing anxiety and supporting students in online collaboration are implemented in learning designs and tested to explore their effectiveness. Without such exploration it will be difficult to fully understand the role of anxiety in online collaborative learning environments.

5. Conclusion

The research reported in this paper explored students' perceptions and experiences of anxiety in an online collaborative project. The findings contribute to an increased understanding of how anxiety affects learners in these environments, and how its negative effects can be addressed. Results revealed that anxiety was a commonly experienced emotion among the learners, and stemmed largely from the uncertainty involved in working in such contexts. There were substantial individual differences reported for the causes of anxiety, including relying on 'unknown others', fear of negative evaluation, and worries about working with non-active group members. It was found that many learners perceived anxiety to be greater before the project began than during it, as uncertainties were gradually resolved.

Anxiety is often viewed as a negative emotion with detrimental consequences; however, a novel finding from this research was that more learners perceived anxiety to have a facilitative effect on participation and performance than a debilitative one. Nevertheless, it is important that educators do not ignore, or even encourage anxiety in online collaborative contexts.

In order to cope with anxiety, students reported using more problem-focused strategies than emotion-focused or avoidance coping. Another important finding was that problem-focused coping strategies were linked to the facilitative effects of anxiety, whereas

avoidance coping was associated with the debilitative effects. Helping learners to develop a range of coping strategies, and particularly problem-focused coping, may therefore be beneficial. Creating a supportive social and emotional climate was perceived by students as important for alleviating feelings of anxiety. Central to this is helping group members get to know each other before the project begins, in order to build relationships and trust.

The findings of this research are particularly significant for educators who are designing and running online collaborative activities. It is important that educators have an awareness of the potential facilitative effects of anxiety, as well as the more negative effects, so that appropriate encouragement and support can be offered. An understanding of the value of enabling learners to feel comfortable with each other, and encouraging emotional expression (student-to-student and also student-to-tutor) is important for reducing the negative effects of anxiety in online collaborative learning settings, while acknowledging the potential positive effects.

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