An investigation into the influence of learning preferences and personality on visual and text-based learning

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Abstract

This study investigated the recall and retention of participants who were subject to visual learning compared with participants who were subject to text-based learning. The study also investigated the role, if any, of conscientiousness and extraversion as influences of the recall and retention levels on both of these tasks. There were 50 participants in this study; 26 completed a text-based task and 24 completed a visualbased learning task. The participants were obtained through the use of email and the study was based online. The nature of study that of an experimental betweenparticipants design. There were four types of analysis carried out; descriptive statistics, T-Tests, ANOVAs and correlation coefficients. The results rejected the first hypothesis accepting the null. There were two sub-hypothesis in hypothesis two; the results accepted one of these and rejected the other. There were two main limitations of this study; sample size and the environment in which the test was taken. There were also two main strengths; the use of video and the addition it made to the lack of present research on the topic. In conclusion, the current study adds to present research and literature but it would be beneficial for more research to be conducted on this area.

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1. Introduction

Over the years, there has been a lot of interest in learning and what factors may have an influence on learning and on the way in which individuals learn. Traditionally, researchers aimed very little of this interest towards learning preferences and instead, focused on learning and cognitive styles (Smith & Sadler-Smith, 2006). Learning preferences relate to the way in which an individual prefers to interact with the learning environment (Riding & Rayner, 2000). According to Smith (2000a, as cited in Smith & Smith-Sadler, 2006), it is important to study learning preferences, in addition to learning or cognitive styles. Learning or cognitive styles relates to information processing and also relates to the conditions, both affective and physiological, of the learning environment (Wraight, 2007). It is also important to explore learning preferences while taking other factors such as personality into account as a learner's personality may predict the way in which they prefer to interact with the learning environment. There has been a huge increase in the variety of learning techniques that are available and utilised today; therefore, preferences have become more important. This increase in learning techniques is largely down advances in a number of areas. An area which has advanced enormously and has had a large increase on learning techniques is technology. Learning through the use of online, interactive and visual resources is becoming more and more popular as these resources have become widely available. The current study will seek to explore how personality may affect the learning preferences of individuals. It will require participants to either learn information visually or learn through reading a text. They will then complete a personality questionnaire relating to the information learned. This will allow conclusions to be made regarding how the type of task and the personality of the individuals affect their performance/level of memory retention.

As well as technological advances, cognitive psychology and computing advances have also played a huge part in the development of learning and teaching in education and learning techniques (Spector, Ifenthaler, Kinshuk & Sampson, 2010). These two disciplines are growing and developing rapidly and when paired with technological advances, such as simulations, virtual reality and online resources, are affecting both academic and professional learning (Spector et al., 2010). These three influences have led to huge changes in learning and have encouraged different learning preferences leading to the development of paradigms such as collaborative approaches to learning, student-centred learning, interactive learning and constructivist approaches to learning (Spector et al., 2010). Many of these new techniques encourage an interactive approach to learning through online, technological resources and also through interactions with others (teachers, peers, co-workers). They all tend to encourage learners to use interactive techniques such as experiments, problemsolving, visual methods of learning, projects and presentations (Cohen & Cowen, 2007). There has also been an emergence of innovative visual learning techniques such as YouTube which can be used as a visual method of learning and allows learners to access videos and tutorials to aid with learning and understanding of particular phenomenon (Burke & Snyder, 2008). The current study will use YouTube as a means of exploring the performance of individuals when learning through visual means.

These new learning techniques pose a question; is visual learning more effective than traditional 'textbook' learning and is personality a factor in the effectiveness of these two techniques? In order to determine which is more effective, if either, it is first important to explore whether an individual's personality can have an influence on their preference for a learning technique and therefore, an influence on the effectiveness of this technique. If personality does have an influence on learning preferences then it

will be difficult to determine which technique can be deemed the better of the two as it will differ according to personality type and therefore, it may be difficult to say, in general, which is better or most effective. The current study is focused on learning preferences, personality and individual differences and how the two interact in relation to text-based and visual-based learning.

1.1 Learning Preferences

A study on learning preferences was conducted by Opdecam, Everaert, Van Keer and Buysschaert (2014) and was based on preference for team-based learning and its effectiveness compared to preference and effectiveness of lecture-based learning. This study is different from the current study as it explores team-based versus lecture-based rather than text-based versus visual learning. However, it is still important as it gives an insight into the other preferences that individuals may hold in terms of learning. This study implemented a quasi-experimental design and the participants were first-year undergraduate students studying financial accounting. There participants were asked to choose their preferred learning method of the two being studied. This study had two main objectives. The first was to explore students' preference to these techniques in relation to their gender, motivation, ability and strategy to learn. The second objective was to investigate, whether learning through team-based activities was more effective than learning in lectures, when students take part in their chosen and preferred method (Opdecam et al., 2014). According to the results, female students had a higher preference for team learning and those with a preference for team learning generally had a lower level of ability, were intrinsically motivated, had less control of their own learning beliefs and were more willing to both ask for and give help (Opdecam et al., 2014). It may be beneficial to explore the results of this study along

with the results of the current study in order to investigate whether there is a relationship between preferences for either team/lecture based learning and text-based/visual learning and whether personality has an influence on this. A study carried out by Polkinghorne (2008) also explored the area of learning preferences. Again, this study focused on learning preferences in terms of the learning environment (i.e. traditional lecture based classes versus non-lecture based classes).

This study explored these environmental learning preferences with regards to locus of control and high school class-skipping. This study was carried out to explore the learning preferences of two groups of students who were majoring in different subjects; industrial technology and education. There were 43 industrial technology students and 44 education students. The participants completed a survey regarding their learning preferences, class-skipping and locus of control. This study was carried out to gain insight into whether the subject a student was studying had any influence on their preference for a learning technique. This research suggested that Education students had a preference for academic classes rather than non-academic classes while Industrial Technology students showed a preference for non-academic classes (Polkinghorne, 2008). Reid (1987) also explored differences in learning preferences but instead, compared the preferences of non-English speaking students to American students.

This was done to investigate whether differences in learning preferences between the two sets of students caused non-English speaking students to spend much of their time trying to adapt to the American methods of learning rather than actually learning anything (Reid, 1987). The study involved the participants filling out a selfreport questionnaire which was developed to look at the relationship between

learning preferences and the following variables; language background, education level, age, sex, the length of time they had been in and studying in the U.S (Reid, 1987). The results of this study suggested that non-English speaking students differ from each other in their learning preferences and that the variables mentioned above are related to differences in learning preferences and learning styles (Reid, 1987). This may have implications for English courses designed specifically for non-English speaking students. Differences were suggested through these results so it may be beneficial to these English courses to use techniques best suited to the students they are catering for rather than techniques used in that particular country as there seems to be differences across cultures. As mentioned above, there is a lack of research on learning preferences in relation to the personality variables which will be explored in the current study. It is important to first explore personality and individual differences separate from learning preferences. This is because it gives an insight into differences across individuals in relation to personality traits and types and these differences, in turn, may be studied to explore if they have an influence on learning preferences.

1.2 Individual Differences

Personality is a complex topic and one which has been studied and researched significantly (McKenna, 2000). It is a dynamic concept and is never static; an individual's personality is influenced by their experiences and how they were brought up and therefore, it changes and develops over time (Colendrino-Bucu, Guerrero, Pascual & Arre-San Mateo, 1993). Personality is unique and allows individuals to be distinguished from one another. According to Smith and Pellegrini (2000), there is less emphasis, with regards to available research, on both learning and personality and their interactions. This means there is a lack of a clear taxonomy of personality variables or

clearly defined traits that influence learning and therefore, it is difficult for researchers to know what traits to choose when researching learning and personality (Smith & Pellegrini, 2000). Consequently, researchers must rely on previous research and studies to choose what traits or variables they want to investigate. They must look at what variables were used in order studies in order to build on this research or carry out research on variables which may not have been studied at all or which may have only been studied a small number of times. An increase in research/studies on this topic would limit this issue and give researchers a clear insight into the variables which have an effect on learning and also, to what extent these variables have an influence. The individual differences that have been studied and researched most with regards to this topic are; intelligence, trait anxiety, fear of failure, locus of control, ego orientation, achievement motivation, intrinsic motivation, social competence, self-concept of ability and self-esteem (Smith & Pellegrini, 2000).

 The current study seeks to explore personality traits and individual differences through the use of the Ten Item Personality Inventory (TIPI). The TIPI test examines the five personality dimensions as outlined by the Big-Five personality model which was developed by Costa and McCrae (Paton, 2009). This model came about through the work of Allport and Odbert (1936, as cited in John, Robins & Pervin, 2010). They conducted a study on the lexical hypotheses and found almost 18,000 words that could be used to describe personality. This was then reduced to just over 4500 words and these words were subject to factor analysis to reduce these descriptions down to five dimensions (Johns, Robins & Pervin, 2010). The Big-Five personality model is considered the most widely accepted arrangement of dimensions of personality and is a clear and comprehensive framework of personality (Reis & Judd, 2014). The five personality dimensions as outlined by the Big-Five personality model are;

conscientiousness, extraversion, agreeableness, openness to experience and neuroticism (Thomas & Segal, 2006). The current study will focus specifically on two of these dimensions; extraversion and conscientiousness. Extraversion tends to be the dimension which is most widely debated as there has been an ongoing dispute as to whether it forms through internal rewards gained from sociability or whether it is characterised by warmth and sociability and is not just the by-product of sensitivity to rewards (Thomas & Segal, 2006). Conscientiousness relates to the need for a high level of organization and conscientious people are generally self-disciplined, persistent and have a need for achievement (Thomas & Segal, 2006). This current study examines the relationship between conscientiousness and learning as it has been suggested that conscientiousness leads to greater motivation in relation to learning (Hoare, 2011). Simmering et al. (2003, as cited in Hoare, 2006), also suggested that high conscientiousness leads to a greater inclination to learn and also leads to the tendency to partake in continual learning.

Again, it has been suggested that extraversion has an influence on learning. As mentioned previously, a characteristic of extraversion is sociability. Sociability may have an influence on learning as it may indicate that extraverts may prefer learning in a socially stimulating way or environment. According to Eysenck (as cited in Davies, Matthews, Stammers & Westerman, 2013), extroverts tend to require stronger stimulation to introverts, due to differences in neural functions, which encourages them to seek out highly stimulating social environments whereas introverts are more easily stimulated so tend to seek out environments which are not as stimulating. This then has an effect on the way in which they learn and prefer to learn. It has been suggested that extraverts tend to benefit in group learning environments where they are highly stimulated while introverts tend to benefit from individual learning as they

may become overstimulated in social or group learning environments (Davies et al., 2013). According to the present and available research, there is a clear link between learning and the dimensions of extraversion and conscientiousness. However, there is little recent studies or theories on this area so the current study seeks to investigate this area further. The current study also seeks to explore whether these two personality dimensions have an influence on the learning preferences of individuals.

1.3 Learning Preferences and Personality

A study which is somewhat similar to the current study was conducted by Lara (2014) and also looked at the Big Five personality dimensions in relation to an individual's preference for individual or collaborative learning through the use of an online educational game. The study was done with the aim to gain an insight into the performance and attitudes of university students who played a game with others online but in different locations compared to students who played the game individually. The relationships between game performance and personality traits were examined as well as differences in patterns of playing the game and attitudes about this learning method and experience. Participants were required to play a version of the Diffusion Simulation Game (DSG) repeatedly for 80 minutes. The participants in the collaborative group were put into dyads based on their level of agreeableness. DSG stored histories of each game played which allowed the researcher to examine and draw results and participants also completed a learning achievement test, a personality trait questionnaire and an attitude survey (Lara, 2014). The results suggested that conscientiousness was positively correlated with performance in an individual setting whereas; extraversion and agreeableness were negatively correlated to the individual's performance on the collaborative game (Lara, 2014). This study is similar to the

current study as they both explore an individual's preference for learning techniques by using an experimental design and two different learning methods. They are also similar in that they both used the Big-Five to explore personality types of the participants involved. The main difference between the two is that the study by Lara (2014) required one group of participants to collaborate while learning while both conditions of this dissertation study required the participants to work alone. Keller & Karau (2013), also used the Big Five personality dimensions but instead to explore learning preferences, similar to the current study.

This study investigated online learning in relation to the relationship personality may have with an individual's preference for and impressions of online courses and online learning methods. The participants were undergraduate, graduate and married students and the participants ranged in age from 18-64. The study looked at the differences in learning preferences between these three groups; undergraduate, graduate and married and how personality type affected their preferences. It also looked at how personality type was related to the impressions an individual may hold about online learning and the value of online learning in relation to; engagement, value to their career, overall evaluation and anxiety/frustration (Keller & Karau, 2013). It suggested that conscientiousness was positively related to all five of the impressions while agreeableness and openness were both positively related to the perceived value of these online courses to their careers (Keller & Karau, 2013. It also reported that undergraduate students indicated stronger preferences for online courses and classes than graduate students. Kim, Lee and Ryu (2013), also examined personality in relation to preferences for e-learning.

This experiment was designed to gain an understanding of how an individual's personality traits can influence their preference for a particular learning method. This study involved two controlled experiments which were both carried out in a computerbased learning session (Kim, Lee & Ryu, 2013). The first experiment was carried out in order to discover if there were any differences in the learning performance of introverts in comparison to the performance of extroverts. The second experiment used the results from the first to discover if guidelines for the practical application of personality traits could be developed for the design of e-learning techniques. The results from the first part of the study suggested that there was a significant difference on learning performance between those who were introverts compared to those who were extroverts (Kim, Lee & Ryu, 2013). This experiment led to the hypothesis for the current study which states that there will be a difference in learning preferences of introverts compared to those of extroverts. Experiment two led to the recruitment of a number of the participants being taught through either an introversion or extraversionfriendly e-learning method which aimed to determine if e-learning techniques can be developed and utilised in this way, according to personality type (Kim, Lee & Ryu, 2013). This would allow the development of learning techniques specifically for introverts or extroverts and therefore, facilitate an optimum level of learning for individuals depending on their personality type. This study outlines the importance of personality in learning and therefore, the importance of research in this area. Jessee,

O'Neill and Dosch (2006) also devised a study in order to identify learning preferences and personality types of participants in order to try to facilitate more effective learning.

The participants of this study were undergraduate dental students at the University of Texas Dental Branch. There were three main objectives of this study; to

identify the most common personality types among first and second year students, to identify the learning preferences of these personality types and to determine a more effective approach to teaching dental students based on personality types and learning preferences (Jessee, O'Neill & Dosch, 2006). Unlike the current study, the Myers Briggs Type Indicator (MBTI) was used to identify the personality type of each student. An introverted, sensing, thinking, and judging personality was the one which was most common (Jessee, O'Neill & Dosch, 2006). This study is important as like the study by Kim, Lee and Ryu (2013), it demonstrates the importance of lecturers and teachers being aware of the different personality types and how they relate to learning preferences and therefore, they can make adjustments to teaching methods and techniques in order to improve learning and promote motivation (Jessee, O'Neill & Dosch, 2006). Although all of these studies focus on personality and learning in relation to the individual learner, learning preferences can also be dictated through the personality type and traits of the teaching individuals.

A study devised by Chamorro-Premuzic et al., (2008) looked at this phenomenon of the teacher's personality having an influence on how well an individual learns from the teacher. It has been suggested that learners prefer teachers or lecturers who are similar in personality to them. The results put forward that correlations between the personalities of students and teachers show that students prefer teachers who are similar to themselves in all traits except neuroticism and also put an emphasis on the desire for teachers high in levels of openness and conscientiousness (Chamorro-Premuzic et al., 2008). This suggests that if an individual is being taught by someone of similar personality, they may both have similar learning preferences and this will lead to effective learning for the learner. On the other hand, if a learner has a dissimilar personality type to the teacher or lecturer

then they may be taught through a method that is not suited to or preferred by them and therefore, learning will not be as effective and will be difficult. It also suggests that teachers/lecturers who are open and helpful tend to be preferred by students. A meta-analysis carried out by Giluk and Postlethwaite (2015) also explored personality in a different light. This study reverts back to studying the personality of the individual learner but unlike any of the studies mentioned and unlike the current study, it explored the affect personality may have in relation to academic dishonesty such as cheating and plagiarism.

A meta-analysis was done to investigate each of the Big Five personality factors in relation to academic dishonesty. It has been suggested in the past that neuroticism and extraversion may be potential predictors of academic dishonesty (Giluk & Postlethwaite, 2015). The results of this study proposed that conscientiousness and agreeableness are both negatively related to academic dishonesty (Giluk & Postlethwaite, 2015). Although this study differs from the current stud in that it does not explore learning preferences it is still important as it highlights the notion that personality has an influence on other aspects of learning, other than on learning preferences and it also gives an insight into how the Big Five personality factors can be used to predict behaviour and outcomes in academia.

The studies mentioned above indicate how important it is to research this area of personality and learning preferences. Some of the studies are more similar to the current studies than others but they all suggest personality plays a huge influence on learning. The current study adds to the research available by using a visual learning technique.

1.4 The Role of Online Videos in Learning

It has been suggested that due to the fast-paced, technologically advanced students of today's world, it is important that learning techniques and methods stay relevant to encourage this new generation of learners to continue to learn and build their knowledge (Burke & Snyder, 2008). One of these new and innovative learning techniques is the use of visual learning aids such as YouTube which facilitates videosharing, learning through visual aids and discussion, whether it be online discussion or classroom/peer-based discussion (Burke & Snyder, 2008). YouTube is also beneficial to visually or physically impaired individuals (Burke & Snyder, 2008). Visually impaired individuals can easily and freely access audio educational information and it allows physically impaired individuals to access any educational content straight from their computers. According to Halsted, Clifton and Wilson (2014), there are over 100 hours of video being uploaded to YouTube every minute and as of 2014, over one billion unique users visited YouTube every month. These statistics suggest that the use of visual techniques for not only learning, but other disciplines, is growing rapidly which may suggest these visual techniques are of great benefit to many individuals. The current study uses a video as a means of learning in order to compare it to text-based learning by examining whether there are any differences in recall and retention scores across the two conditions.

1.5 Memory and Retention

Learning preferences essentially depend on what learning method or technique allows an individual to successfully store and retain the information. An individual's ability to store and retain information from a particular learning technique may also be effected by their personality type. If an individual can store, retain and recall information that they have learned from a particular learning technique then they may

have a preference towards that technique. According to Dzubak (2007), it may be beneficial for individuals through learn information through multisensory techniques. Multisensory techniques relate to the use of more than one learning method in the learning process. Multisensory learning may come about through the use of an individuals preferred method of learning paired with a less preferred method (Dzubak, 2007). It has been suggested that multisensory learning is beneficial as it utilises a number of different channels which leads to the maximum stimulation of the brain which in turn, can lead to greater levels of retention (Dzubak, 2007). A study carried out by Plass, Chun, Mayer and Leutner (1998) investigated, similar to the current study, whether visual learning is better than text-based and vice versa and also whether multisensory learning is beneficial.

The participants in this study were English speaking students who were studying the German language. The participants were asked to read a German story through a computer programme. There were key-word translations available to the participants through onscreen text translations, visual video or picture based translations or both. In relation to multisensory learning, the results suggested that the participants who had selected both text and visual translations remembered and recalled the information better than those who had chosen to use only one technique (Plass et al., 1998). The results suggested that the participants both understood and remembered and recalled information when they had chosen their preferred technique (Plass et all., 1998). As previously mentioned, the current study will also use a visual technique to measure recall and retention in comparison to a text-based technique.

1.6 Rationale for Current Study

Although there has been research done on the area of personality and learning, due to the recent nature of visual learning, there has not been sufficient research done on text-based learning techniques compared with visual-based techniques. There has also been little research carried out on this topic which makes use of the TIPI test to measure personality. This study uses this test as it is time-efficient and is short so the participants have less chance of losing interest in completing the study.

This study is also being done to build on the research in this literature review to determine if it can be in agreement with the suggestions made that personality does have an influence on learning preferences. In particular, to build on the research carried out by Lara (2014) to determine if the same results can be obtained by using two different learning techniques but the same personality dimensions.

Another reason as to why this study is being carried out is to suggest whether the dimensions of conscientiousness and extraversion are more suited to text-based or visual-based learning. This may then allow teachers, lecturers or any individuals involved in teaching to use the results and information obtained from the study to modify teaching methods in order to use methods which facilitate the best learning outcome for students, dependant on their personality types.

Finally, this study is also being carried out to build on the research which was done by Kim, Lee and Ryu (2013). This study is similar to this dissertation study as it explored preferences for computer-based learning and personality. Therefore, it would be beneficial to compare these two results and make a suggestion about what personality types (introverts or extroverts) are best suited to computer-based or elearning.

1.7 Hypotheses

 The current study will investigate the recall and retention of information by participants who were subject to either a visual or text-based learning task and this information will then be used to examine whether the personality dimensions of extraversion and conscientiousness have influenced these recall and retention levels. This study proposes two main hypotheses;

- There will be a difference on recall and retention scores across the two conditions, specifically, participants in the visual learning group will have higher scores than those in the text-based learning group.

- There will be a difference in performance of both tasks based on the personality dimensions of conscientiousness and extraversion, specifically, those who score highly on the extraversion scale will perform better on the visual task than those who score low on the scale while those who score highly on the conscientiousness scale will obtain higher recall and retention scores.

2. Method

2.1 Participants:

There were 50 participants in this study; 26 completed the text-based task and 24 completed the visual task and this was done through random selection. There were 24 males and 26 females. The ages ranged from 16-57 and the mean age was 23.51. Each condition was sent randomly to each distribution group and the researcher does not know what course groups completed what condition. The participants were also told that participation was voluntary and that they did not have to take part.

2.2 Design:

This study used a between participants experimental design. Both conditions were distributed to only one group of participants so each participant only took part in one of the conditions (i.e. text based or visual based learning). An experimental design was used to in order to obtain the true effects of each condition on individuals of different personality types. It was also used so that comparisons could be made regarding particular personality types and recall of information on each condition. The main independent variable was the group/condition (i.e. visual or text-based) while additional independent variables that were investigated were; personality differences, in particular, conscientiousness, extraversion and introversion and learning preferences which were measured through a feedback Likert scale and a number of other Likert scales regarding different learning techniques (e.g. group learning, use of visual aids, use of podcasts, reading texts, reading lecture notes, learning through practical application). The dependant variable for both of these independent variables was the level of retention and recall of the information and also the feedback that the participants gave regarding the experiment.. A between participants design was used

in order to limit fatigue in participants and limit practice effects that may have been an issue if a within participants design was used, due to the nature of the study. The study required participants to answer questions relating to a text/video they had just read/watched so if they were asked to take part in the task again, in either condition, they would have had practice which may have biased results.

2.3 Materials:

This study was carried out using two separate questionnaires and these were distributed online. The questionnaires were put together using Google documents. Google documents was used as it was an efficient way to put the sections together and also allowed for the efficient distribution of the studies. Both questionnaires had four sections. Both studies also had an introduction page which gave details of the study and the voluntary nature of the study (see Appendix A).

Video/Text Conditions:

The first section was the educational video or text (see Appendix B). The video was first chosen and was chosen as it was educational and informative. It related to metacognition and how metacognition influences how well an individual performs as it effects their perception of their own ability. The video gave information which the participants may not have been aware of before so this led to the relatively easy development of questions for the MCQ and also limited any biases that may have been present had the information been about something some of the participants were studying. The video was just over 6 minutes long. When it was chosen, a transcript of it was then developed by the researcher. All of the information in the video was written as a text to create the text-based condition. This ensured the information and questions were the same for each of the two conditions.

MCQ Test:

The MCQ test was the second section of the study (Appendix B). It contained questions relating to the video/text in order to test participants on what they had just learned. The MCQ questionnaire was devised in order to test individual's level of recall and retention of the information. There were eight questions in this section. The first five questions were closed questions where the participant was given a number of answers and they had to choose the correct one. An example of one of these closed questions was; "What field of Psychology does Dr Chu specialise in?" and the choice of answers were; developmental, cognitive, social and behavioural. The final three questions in this section were open-ended questions and allowed for the individual to give an answer in their own words. This allowed the individual to express their own understanding of a particular concept covered in the video/text. An example of one of these open-ended question was; "What does the concept meta-cognition refer to?" These open-ended questions allowed the researcher to realise if the individual actually learned some information through this learning technique.

TIPI Personality Questionnaire:

The TIPI test was the personality measure used in this study (see Appendix C). This was developed as a brief measure of the Big-Five personality dimensions in order to allow researchers to measure these dimensions in a timely yet effective manner (Gosling, Rentfrow & Swann, 2003). The Big Five personality dimensions are: extraversion, agreeableness, conscientiousness, neuroticism and openness. As well as increasing efficiency, it has been suggested that the TIPI test is an adequate measure of personality as it maintains construct validity and has test-retest reliability (Jonason, Teicher & Schmitt, 2011). The results of the TIPI test are calculated on a Likert scale.

The scores for items, 2, 4, 6, 8 and 10 were recoded per TIPI scoring guidelines.

Demographic Information:

The final section of the study was in relation to demographic information such as age, gender and employment status. This section also included six 7-point Likert scales. The first four scales were self-report measures to examine what learning techniques participants view as being effective for them. The last two questions were used to gain an insight into how enjoyable and also how difficult the individual found the task they had completed (see Appendix D).

2.4 Procedure:

Once the research topic and question had been finalised, the study began to be developed. An educational video was selected based on the content and the questions that could be asked on the content. The study was developed using Google Drive and google documents. This method of development was used as it was time-efficient and allowed the study to be easily distributed to participants. The video was then transcribed to create the text-based element. An MCQ was then devised based on the information that participants were asked to learn through either visual or text-based means. The next section that was included was the TIPI personality questionnaire. A demographic questionnaire was then formulated which was used to find out certain information about the individuals such as gender and age. This section also asked a number of Likert scale questions relating to the individuals enjoyment of the task and also relating to their learning preferences and which method they feel allows them to learn best and most successfully.

Once finalised, the study was emailed to participants. An email was sent to all of the course distribution groups at The National College of Ireland. The email included

details of the study and the study itself; in each email there was either the text-based study or the visual study. The participants were told they could find out the results of the study by emailing the researcher or supervisor. Email was chosen as it appeared to be an efficient way of distributing the study and participants seemed to be easily accessible through the use of college distribution groups. The conditions were randomly assigned to participants and the identity of participants was kept entirely anonymous. Once participants began completing the study it was sent back to the researcher through Google Drive. Google Drive created Excel spreadsheets based on the results collected. The researcher then exported the information from Excel to SPSS. The data had to be tweaked slightly when moved from Excel format to SPSS. The data was then analysed using the following analyses; descriptive statistics t-tests and analysis of variance (ANOVA). Results were then analysed and conclusions were drawn to test the hypotheses.

3. Results

The data was analysed using SPSS. There were four main statistical analyses carried out in relation to the current study. Descriptive statistics, independent samples

T-Tests, an Analysis of Variance (ANOVA) and correlations were all performed on the data collected.

3.1 Descriptive Statistics:

Descriptive statistics were first carried out In relation to the age, gender and employment status of the participants. There were 50 participants in this study; 24 males (48%) and 26 females (52%). There were 24 participants in the visual learning group and 26 in the text-based group. The mean age of participants was 23.51 (SD=7.9). The ages of participants ranged from 16-57. Employment status was also analysed and suggested that most of the participants were in full-time employment. The descriptive statistics are presented in Table 1 and depict the mean, minimum (min), maximum (max) and standard deviation (SD)

Table 1: Descriptive statistics for the variables; age, gender and employment.

	Mean	**Min**	**Max**	**SD**
Age	23.51	16	57	7.9
Gender	1.54	1	2	.503
Employment	3.34	3	8	.872

Descriptive statistics were also carried out in relation to the dimensions of the Big Five, particularly, extraversion, conscientiousness (see Table 2). These two dimensions were focused on as they are the two dimensions that the hypotheses of the current study are most interested in examining. This is because results of previous studies have mentioned that these two dimensions may have an influence on learning preferences. This analysis found that participants scored, on average, 4.71 on the

extraversion scale (SD=2.01). It also found that participants scored higher, on average, on the conscientiousness score with a mean score of 5.8 (SD=1.67). These dimensions were then later used to compare them with recall and retention performance on the tasks in order to determine whether they did have an influence or not.

Table 2: Descriptive statistics for the Big Five Personality dimensions of extraversion and conscientiousness.

	Mean	**Min**	**Max**	**SD**
Extraversion	4.71	1.00	8.50	2.01
Conscientiousness	5.8	1.00	8.50	1.67

Descriptive statistics also suggested results in relation to the recall and retention of data. It was found that, while taking all of the closed questions into account, participants who took part in the text-based learning method were more successful that those who took part in the visual based learning method (see Table 3). This analysis was done as the first part of the testing of H1 which proposed that there will be a difference in recall and retention on both tasks and that there will be a higher level of successful recall and retention on the visual task. The findings of this analysis suggested that the text-based group had higher levels of recall and retention on the closed questions.

Table 3: Percentage of correct answers for the closed MCQ questions for both groups.

	Visual Group	**Text-based Group**
Question 1	62.5%	57.7%

Question 2	83.3%	96.2%
Question 3	66.7%	61.5%
Question 4	45.8%	61.5%
Question 5	75%	96.2%
Mean	66.66%	74.62%

As well as the closed questions, analysis was also carried out on the open questions. This was done by first coding the answers into correct - 1, partly correct – 2, wrong – 3 and if they answered that they didn't know or forgot it was coded as 4. The percentage scores for the correct answers in each open-ended question were obtained. According to these results, the average fully correct answers for the textbased condition was 30% while it was 12.5% for the visual based condition. The second open question was the one which both conditions scored highest on; average text-based condition correct answers was 50% and average visual based condition correct answers was 21%. The combined mean for correct answers on both closed and open-ended questions across the two conditions was then calculated to test hypothesis 1 that there will be a difference in recall and retention scores and that the visual group would score higher. The results of the combined means of both sets questions show that in total, the text-based group had a correct answer average of 12.17 while the visual group had a combined correct answer average of 10.89. These results suggest that the text-based group performed better, overall, with regards to recall and retention of information (see Table 4).

Table 4: Percentages of correct answers for open-ended questions and the mean for total correct scores

	Visual Group	Text-based Group
Question 6	8.3%	34%
Question 7	21%	50%
Question 8	8.3%	8%
Mean	12.5%	30.7%
Total mean score (all questions)	10.89%	12.17%

3.2 Independent Samples T-Test:

An independent samples T-Test was the next statistical analysis used on this data. It was used a number of times on different variables. This test was chosen as in the current study, there are two groups of participants who are being measured on the same variables and this test allows the comparison of means scores on the same variable for two separate groups of participants.

Firstly, this analysis was used to examine the differences in retention of information tested through the use of the three open-ended questions across the two conditions (see Table 5). This was done by first coding the answers into correct - 1, partly correct – 2, wrong – 3 and if they answered that they didn't know or forgot it was coded as 4. A T-Test was carried out to determine if there were significant differences in the number of correct answers between the text-based group and the visual based group (see Table 4). According to this analysis, the second group (visual) had higher a higher mean than the first group in question 6 and question 7 ($t = -1.92$, $t = -.117$). However, these differences were not statistically significant as $p > 0.05$ for both questions ($p = .062$, p

= .908). The first group (text-based) showed a mean difference higher than the second group in question 8 (t = 1.96) however, this was also not statistically significant (p = .056).

Table 5: Independent Samples T-Test displaying mean differences for the three openended questions

	t	df	sig.	Mean Difference
Question 6	-1.92	42.2	.062	-.458
Question 7	-.117	48	.908	-.035
Question 8	1.96	37.9	.056	.587

An independent samples T-Test was also used to determine if there were mean differences (MD) in each group with regards to their learning preferences (see Table 6). Six Likert scales were used to gain an insight into the learning preferences of each participants. There were four learning techniques measured through the Likert scales; reading from a book, writing out notes, watching videos/listening to podcasts and being part of a study group. These were 7 point scales with 1 being very effective and 7 being not effective at all. The final two Likert scales were used to gain feedback from the participants relating to the tasks they had just completed. The analysis suggested that the second group (visual) had mean differences to the first group (text) on the reading, study group and task enjoyment scales (t = -1.67, t = -2.07, t = -6.263) and of these, the mean differences for the study group and task enjoyment were significant (p = .046, p = .000). The high t value on the difficulty of the task suggests significant mean difference on the text-based task compared with the visual-based task (t = 2.085, p = .043).

Table 6: Independent Samples T-Test showing group differences on the six Likert scales

	t	df	sig.	MD
S1: Reading	-1.67	45	.101	-.785
S2: Writing notes	.629	45	.533	.260
S3: Videos/Podcasts	.369	38.33	.714	.155
S4: Study group	-2.07	35.41	.046	-.871
S5: Difficulty of task	2.085	45	.043	1.236
S6: Task enjoyment	-6.263	45	.000	-2.620

An independent samples T-Test was also carried out to obtain information about the differences in means for the two Big Five dimensions of interest (see Table 7). This was done to determine if there was any difference in the mean levels of extraversion and conscientiousness between the two groups. The results suggested that there was a difference in levels of conscientious and extraversion between the participants in both conditions. This difference was only slight on the extraversion dimension and there was no statistical significance (t = .006, p = .996). However, there was larger differences on the conscientiousness scale and this was statistically significant (t = 2.407, p = .021).

Table 7: Independent Samples T-Test results displaying group statistics for the level extraversion and conscientiousness.

	t	df	sig.	Mean Difference
Extraversion	.006	48	.996	.0032

| Conscientiousness | 2.407 | 41.13 | .021 | 1.100 |

3.3 ANOVA:

The next analysis which was performed on the data was an ANOVA. A oneway between subjects ANOVA was carried out to compare the effect of extraversion and conscientiousness on recall and retention in text-based and visual-based learning conditions.

The first ANOVA was carried out on the two groups with regards to the recall and retention as measured by the MCQ (See Table 8). The results of this ANOVA suggest that only question 6 displayed statistically significant variance differences between the two conditions (p = .049)

Table 8: ANOVA table showing results for variability in scores across conditions in relation to MCQ questions

	df	F	Mean	Sig.
Question 1 (Closed)	1	.116	.029	.735
Question 2 (Closed)	1	2.498	.360	.121
Question 3 (Closed)	1	3.761	2.622	.058
Question 4 (Closed)	1	.013	.003	.910
Question 5 (Closed)	1	.014	.016	.908
Question 6 (Open)	1	4.089	4.205	.049
Question 7 (Open)	1	.030	.101	.864
Question 8 (Open)	1	3.440	1.109	.070

A second ANOVA was carried out on the extraversion and conscientiousness dimensions in order to determine if there was a statistical significant difference between the mean variances across the two conditions. This analysis found that there was a statistically significant difference on the conscientiousness scale across the two conditions (F = 5.952, p = 0.18). The significant level for the extraversion dimension was not statistically significant (F = .000, p = .996) (see Table 9).

Table 9: ANOVA results showing statistical significance levels for extraversion and conscientiousness.

Dimension	df	F	Mean	Sig.
Extraversion	1	.000	.000	.996
Conscientiousness	1	5.952	15.127	.018

3.4 Correlations

A correlation analysis was carried out in order to gain an insight into whether the personality dimensions of extraversion and conscientiousness had any influence on the recall and retention of individuals on the two tasks. It was also carried out to test hypothesis 2 that extraversion and conscientiousness would have an influence on the recall and retention levels (see Table 10).

A Pearson's correlation coefficient was computed to assess the relationship between conscientiousness and correct answers. This analysis found that there was a weak negative correlation between the two variables which was depicted by the r value of -.290. This weak negative correlation is statistically significant (p = .043).

A Pearson's correlation coefficient was also computed to assess the relationship between extraversion and correct answers. According to the results of this analysis, there was a weak positive correlation between extraversion and correct

answers (r = .327). Again. This result was statistically significant (p = 0.22) which indicates that extraversion does have an influence on correct answers.

The correlations also suggest that conscientiousness and extraversion are weak negatively correlated but this is not statistically significant (r = -.202, p = .160).

The results of this analysis have rejected part of hypothesis 2; that conscientiousness would be positively correlated with accurate recall and retention but have accepted the other part; that extraversion would have an influence on recall and retention levels.

Table 10: Correlations between conscientiousness and extraversion and correct answers

	Extraversion	**Conscientiousness**	**Answers**
Extraversion			
Pearson's Correlation (r)	1	-.202	.327
Sig. (p)		.160	.022
Conscientiousness			
Pearson's Correlation (2)	-.202	1	-.290
Sig. (p)	.160		.043

4. Discussion

The current study employed an experimental between participants design to explore learning preferences and whether personality has an influence on visual versus text-based learning. This was done through the use of two groups of participants who took part in either a text-based or visual-based learning task. The retention and recall ability of individuals was tested after they took part in the task. A research-devised MCQ was used to test the recall and retention level of participants. This was done to examine differences in recall and retention between the two groups. The TIPI personality questionnaire was then used to gain an insight into the personality types of the participants and to then examine whether their personality had any influence on their recall and retention ability on these two learning tasks.

There were two main hypotheses; recall and retention scores will be different on both conditions, specifically, they will be higher on the visual learning method than those participants who take part in the text-based method and there will be a difference in performance of both tasks based on personality, especially with regards to the personality dimensions of conscientiousness which will lead to increase recall and retention levels and extraversion/introversion.

4.1 Hypothesis 1

Hypothesis 1 was in relation to recall and retention scores and proposed that they would differ between both conditions but would be higher on the visual learning task. This hypothesis was ultimately suggesting that individuals who participated in the visual learning task would score higher on the MCQ test that those who participated in the text-based learning task. This hypothesis was developed as it has been suggested that visual methods of learning, such as video, allow learners to engage with the

information in a different way to if they were learning through the use of a text. It has been suggested that this type of learning aids learners with the acquisition of new information and concepts by allowing them to see and hear rather than by just reading (Burke & Snyder, 2006). It may encourage them to use more senses when learning the information and this may lead to increased stimulation in the brain which in turn, may lead to increased retention of the information.

The results of the current study rejected this hypothesis. The results found that the text-based group performed better on the MCQ and therefore, obtained a higher level of recall and retention. This hypothesis was analysed through the use of descriptive statistics and T-Tests. Overall, the text-based scored a mean of 12.17 in relation to correct MCQ answers while the visual group obtained a mean of 10.89. The results also found that the text-based group scored higher than the visual based group on both the closed and open-ended questions.

The results also suggest that although the text-based group obtained higher percentage levels of recall and retention, there was little significance in the mean differences and variances between age group. There was no statistically significant differences in means between the two groups on the open-ended questions.

This hypothesis and study was also developed to explore the preferences of individuals. The results suggest that there were significant mean differences on the study group scales but little statistically significant mean differences on the other preferences scales.

Overall, hypothesis 1 is rejected as participants in the visual group did not obtain higher recall and retention scores that those in the text-based group. Although

descriptive suggest the text-based group scored higher on the MCQ test, the lack of statistical significance has resulted in the null hypothesis being accepted.

4.2 Hypothesis 2

The second hypothesis in the current study proposed that conscientiousness and extraversion would lead to differences in performance on the recall and retention tasks. Specifically, high levels of conscientiousness would lead to increased levels of recall and retention.

This hypothesis was developed due to previous research and literature on the topic. Thomas & Segal (2006) suggested that high levels of conscientiousness led to effective learning as it leads to an individual to need and desire achievement and the desire to learn and perform to the best of their ability. This then propose that high levels of conscientiousness would lead to higher levels of recall and retention on the current study as individuals would be motivated to do well in the task. Simmering et al., (2003, as cited in Hoare, 2006) was also in agreement with this literature and suggested that high levels of conscientiousness leads to a greater inclination to learn. This literature proposed that conscientious individuals enjoy learning and are driven to learn new information. Conscientious individuals have been suggested to be very self-disciplines and learn for their own satisfaction (Thomas & Segal, 2006).

The results of a study carried out by Lara (2013) also suggested that conscientiousness was positively correlated with performance on an online task in an individual setting. The current study was also carried out to test this hypothesis and add to it by comparing a video task with a text-based task.

This literature on the influence of conscientiousness on learning led to the development of this hypothesis. However, when tested, the results relating to this part

of hypothesis 2 were surprising. The hypothesis was tested through the use of correlation analysis. The results suggested that conscientiousness was negatively correlated to the accurate recall and retention of information on both tasks. This was suggested through the use of a Pearson's correlation coefficient and the results were statistically significant.

The second part of this hypothesis stated that extraversion would have an influence on recall and retention of information. This hypothesis was developed due to the previous literature which suggested that extraversion influences learning and learning preferences as extroverts generally require more stimulation than introverts so they tend to choose highly simulating learning techniques (Davies et al., 2013). There is lack of research available relating to whether extraversion leads to higher levels of recall and retention regarding learning so the current study proposed this hypothesis in order to find out more information on this area.

The results of a correlation analysis suggested that there was a statistically significant weak positive correlation between extraversion and the accurate retention and recall of information. This result leads to the acceptance of the second part of hypothesis 2 that extraversion will have some influence on learning.

4.3 Limitations

This study contained a number limitations. It may be beneficial to explore these limitations as it will identify them to researchers and allow them to be limited or eliminated if this study was repeated.

These limitations were predominantly due to the online nature of the data collection method. The first of these limitations is in relation to sample size. It was originally hoped that there would be at least 80 participants involved in this study.

However, there were only 50 and it was difficult to obtain this number of participants. The study was sent via email to approximately 800 individuals who are attending college at The National College of Ireland. There is a significantly large difference between the number of individuals invited to take part in the study and the number of participants who actually took part in the study. It is possible that the study was not completed by so many may have been due to the nature of how it was sent to participants. The participants may have been receiving a number of emails from final year students across the many different courses within the college. This may have resulted in them choosing to ignore the emails once they realised they were being asked to take part in a study. The fact that the researcher was not face-to-face with the individuals may have also been a factor as they would not have felt obliged to take part in the study. If the participants were obtained in a face-to-face setting more participants may have taken part. A larger sample size was desired as it may have resulted in more statistically significant results and also in results that could be more accurately generalised to the population.

 Another weakness which is also a result of the online nature of the study is that it was not possible to control for the environment in which the test was taken. If the test was taken in an environment which contained distractions, the results may have been biased. The visual and text-based tasks required concentration and focus in order to then accurately measure the retention of information from them. If the participants concentration lapsed, their results would have been different to if they were fully concentrating on the task. As the study was sent to college students, a number of them may have decided to take the test at the same time and in the same room. This may have led to the conferring of answers. Again, this would have led to biased results. If this study was to be carried out again, it would be beneficial to distribute it in a

controlled environment where there would be no distractions or the opportunity for participants to share answers among each other.

4.4 Strengths

Although there were limitations, there were also strengths of this study. The first strength of this study is in relation to the results obtained. The current study found results that would suggest conscientiousness is negatively correlated to increase recall and retention levels on a learning task. If the current study was in agreement with the research mentioned previously, then it would have produced results that proposed a positive correlation between conscientiousness and recall and retention in learning. However, as it disagreed with previous research and theories, it may be beneficial for further studies and research to be carried out on this topic in order to be able to make generalisations about conscientiousness and its influence on learning.

The second strength of this study is that it successfully utilises a visual learning method; video. Similarly to the study carried out by Plass et al., (1998), the current study aims to examine whether video learning is an effective learning technique. As previously mentioned, it is important to research this topic due to the advances in technology. However, many studies investigating learning don't use video as a learning technique. The current study adds to the research available on video learning and as it rejected the hypothesis, it paves the way for more, similar studies in relation to video learning, to be carried out.

4.5 Implications

This study highlights the importance of research in this area. As there is a lack of it, it is difficult to make general assumptions relating to both video learning and

the role of personality dimensions such as conscientiousness and extraversion in learning.

This study provided two surprising results; acceptance of the null hypothesis in relation to visual learning leading to more successful recall and retention than textbased learning and also that conscientiousness is negatively correlated with recall and retention on learning tasks. As these results are inconsistent with previous literature, it would be beneficial for more studies to be carried out in order to obtain a consistent view on the topic.

The study also highlights the importance of personality as an influence on learning, through both the literature used and the results obtained, particularly the results on extraversion. It suggests that certain traits do have an influence on learning. This is beneficial and can have positive implications for learning in the future as it may allow for more of an emphasis to be put on the influence of an individual's own personality traits when engaging in learning techniques in order to get the best out of learning. If more studies are carried out, the results of this study combined with new results may be used to change learning techniques or to modify them in accordance with an individual's personality type or traits.

4.6 Conclusion

In conclusion, learning and the factors that influence learning is an extremely important topic. It is important as it examines preferences which contribute to effective learning and it also examines factors such as personality traits that may affect these preferences and the way in which an individual learns. In order to learn effectively, an individual must be aware of their preferences. They must also be aware of their personality traits and how to choose the learning techniques that positively correlate

with their traits. The current study was carried out as there is a lack of existing research on this area. In order for individuals to obtain the best possible results out of learning, it is important that there is more research carried out in this area to identify differences in learning preferences and differences in personality traits in relation to learning. This would allow for teaching procedures to be put in place to facilitate individuals based on their preferences and personality. It would also allow individuals to exert more control over how they learn as they would be more knowledgeable on what technique best suits them.

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6. Appendices

Appendix A

Introduction page (both conditions)

This study is aimed at exploring if there is a connection between learning preferences and personality type. There has been a lot of interest and research in this area so this study aims to add to the existing literature on the topic. This study also builds on some of the previous studies by using different learning techniques. This study is being carried out as part of my dissertation for my Undergraduate Psychology Degree. The study is being be supervised by Dr Rebecca Maguire, a member of staff within the Psychology Department at The National College of Ireland.

This study uses an experimental design. There will be a control and experimental group. One group will read a short passage while the other will watch a short video. You will be randomly assigned to one of these groups. You will be asked to fill out a short personality questionnaire and lastly, you will be asked some demographic questions regarding gender, age etc. The study should take approximately 10 minutes to complete from start to finish.

Participation in this study is entirely voluntarily. You may decide to stop being part of the research study at any time without explanation and any data you have given will be destroyed. You also have the right to ask any questions you may have about the study.There are no known benefits or risks for you in this study.

All of the information collected will be kept anonymously and the only person with access to it will be the researcher. As outlined by ethical guidelines, the information will be stored for a maximum of 5 years and will then be destroyed.

The supervisor of this study, Dr Rebecca Maguire, will be happy to answer your questions regarding this study at any time. You can contact her at Rebecca.Maguire@ncirl.ie. If you wish to find out any results of this study they will be available in May 2015 and you may contact the supervisor or the researcher to access them.

Thank you for your time and participation.

Maria Murphy x12317246@student.ncirl.ie

Appendix B

Video/Text *Video:*

The first section of this study requires you to carefully watch this short video in full. When you are finished watching the video please proceed to the following page and answer a short Multiple Choice Questionnaire (MCQ) on the video. Please answer the questions honestly and do not go back to the video when answering questions. Please follow the link to the video. https://www.youtube.com/watch?v=RH95h36NChI *Text:*

The first section of this study requires you to carefully read this short text in full. When you are finished reading the text please proceed to the following page and answer a short Multiple Choice Questionnaire (MCQ) on the text. Please answer the questions honestly and do not go back to the text when answering the questions.

Hi, I'm Doctor Steven Chu I'm a professor psychology here at Samford University in Birmingham Alabama. I'm a cognitive psychologist which means I study how people learn and think. I'm going to be explaining to you the basic principles of how people learn best.

All students based their study behavior on their beliefs about how the best learn: do I need to go to class; do I need to read the textbook how much do I have to study material before I have mastered it? The more accurate beliefs, the more effectively you learn. Let's start with some common misconceptions about how people learn that I call 'beliefs that make you stupid'. If you hold these beliefs, chances are they're undermining your learning. Most first-year college students grossly underestimate the time required to complete assignments or study material effectively. Truly comprehending material takes careful reading and more importantly review.

A hallmark of students who are struggling is that they study by trying to memorize isolated facts and unfortunately many textbooks encourage this by putting key terms in bold print and listing definitions in the margins so students get note cards to write out the definitions and memorize them .The problem is that good teachers test for comprehension and how well you understand the concept, you simply don't get that if you memorize isolated facts.

A lot of students believe they're good at multitasking because they do it all the time. They study while texting, checking social networks, emailing having other distractions. The problem is that the students never compare their performance while multitasking to the performance when they focus on one task without distraction. The research evidence is overwhelming that we are bad at multitasking. We are bad especially if one of the tasks involves concentration and effort like studying. What we're good at is fooling ourselves into believing that we're good at multitasking because all those distractions are more fun than studying but in order to succeed you need to reduce or even better, eliminate, all those distractions for every distraction you have you reduce the amount you learn, increase the time it takes to understand material and increase the chance for a bad grade.

I want to introduce a new concept that can have a huge impact on your learning. It's called meta-cognition. Meta-cognition refers to your awareness of how well you truly understand the concept. Accurate meta-cognition is one of the key differences between successful and struggling students. Weaker students are grossly overconfident on how well they understand the material. As a result, weaker students don't study as much as they need to

truly understand the material. They take an exam, they're confident they've done well then they're stunned when they find out they've done poorly.

Let's see how this works; a few years ago in my general psychology class I did the following: at the end of the first exam I had students estimate what percentage the questions they got right from 0 to 100 percent. I then created a graph based on their actual exam performance and how they estimated they did. If students had an accurate view of how well they knew the material, their estimate closely matched the actual score. If however, they were overconfident on how they did their actual results did not match their estimated results. It was the weakest students who were the most overconfident; they had poor meta-cognitions. After the exam I had students who did poorly tell me 'I felt so confident after exam' or 'I thought I really knew the material', these are all signs of poor meta-cognition. These students were unprepared were overconfident and in truth, completely unaware of those facts. The problem for college freshmen is they spent years honing their sense of meta-cognition for high school. Now they come to college and their sense of meta-cognition is all wrong. A big transition in the freshman year is developing a more accurate sense of meta-cognition; the problem for meta-cognition is that it may indicate that you've poor study strategies. The hallmark of a poor study strategy is that it builds overconfidence without increasing actual learning so therefore, you have poor meta-cognition. In order to improve your study effectiveness you need to improve your study skills.

Appendix C

MCQ Questionnaire

Answer these short questions relating to the video you have just watched. Please answer all questions honestly and avoid looking back at the video.

Closed questions:

Q1. According to Dr Chu, do students grossly underestimate their own ability to complete assignments?

Choose one;   Yes.

                No.

Q2. What field of Psychology does Dr Chu specialise in?

Choose one;   Developmental.

                 Behavioural.

                 Cognitive.

                 Social.

Q3. What do students learn from textbooks?

Choose one;   To do extra reading in their own time.

                To memorize facts without any extra reading.

                A small amount of information.

                All of the information they need to know on that topic.

Q4. What do students never do while multi-tasking?

Choose one;   Pay enough attention to studying.

                Focus on one task.

                Compare their learning to when they learn with no distractions.

                Check their Facebook/twitter as many times as they should.

Q5. What problems do weaker students have when learning?

Choose one;   They overestimate their ability.

                They can't concentrate for long periods of time.

Open-ended questions:

Q6. What does the concept meta-cognition refer to?

Q7. What did Dr Chu discover about the weaker students when he put their actual results and their estimated results on a graph?

Q8. According to Dr Chu, what might poor meta-cognition indicate?

Appendix D

Ten-Item Personality Inventory (TIPI)

Here are a number of personality traits that may or may not apply to you. Please tick the box to indicate the extent to which you agree or disagree with each statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other. There are no right answers. All traits are rated by choosing one of the following;

Disagree strongly.

Disagree moderately.

Disagree a little.

Neither agree nor disagree.

Agree a little.

Agree moderately.

Agree strongly.

1. I see myself as extraverted, enthusiastic.
2. I see myself as critical, quarrelsome.
3. I see myself as dependable, self-disciplined.
4. I see myself as anxious, easily upset.
5. I see myself as open to new experiences, complex.
6. I see myself as reserved, quiet.
7. I see myself as sympathetic, warm.
8. I see myself as disorganized, careless.
9. I see myself as calm, emotionally stable. 10. I see myself as conventional, uncreative.

Appendix E

Demographic Information

Age:

Gender: Male

                                  Female

Employment status: Full-time employment

Part-time employment

Full-time student

Part-time student

Retired

Unemployed

Other

3rd level education: Yes

No

The next four questions are Likert scales rated from 1 (very effective) to 7 (not effective at all).

1. On a scale from 1-7, how effective is reading from a book for you in terms of learning?

2. On a scale from 1-7, how effective is writing out notes for you in terms of learning?

3. On a scale from 1-7 how effective is watching videos/listening to podcasts for you in terms of learning?

4. On a scale from 1-7 how effective is being in a study group for you in terms of learning?

The following two questions are also Likert scale questions but are rated slightly differently than the previous four:

5. On a scale from 1(very difficult)-7(not difficult at all) how difficult did you find this task (reading the text and answering questions)?

6. On a scale from 1(greatly enjoyed it)-7(didn't enjoy it at all), did you enjoy taking part in this task?