

Procrastination on Social Networking Sites: Types, Triggers, and Socio-Technical Countermeasures

Abdulaziz Alblwi

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ABSTRACT

Procrastination has become an important field in academic research and refers to a voluntary delay in performing tasks that need to be done. Procrastination can lead to negative consequences such as low academic performance, low work productivity and anxiety. Numerous studies have examined the factors that may lead people to procrastinate, such as low self-efficacy, low self-regulation and low self-esteem. Social networking sites (SNSs) may facilitate procrastination; for example, notifications could be a distraction that promotes procrastination for people, preventing them from performing their original tasks.

This Thesis aims to understand how procrastination on SNS occurs, the role of SNS design in triggering it and how to engineer social media to combat it through existing and novel features. Then, this knowledge will be used to develop a method to combat procrastination on SNS. This method will be informed by psychological theories as well as technical and socio-technical countermeasures.

To achieve this goal, a mixed methods approach was conducted with SNS users, including focus groups and diary studies, co-design sessions and surveys. The results of these studies helped to develop a method that helps users to gain more control over their procrastination on SNS. The developed method is supported by persuasive techniques including reminders and suggestions, which help to persuade users to change their usage style without forcing them toward the change. Finally, the developed method was evaluated with SNS users who self-declared as procrastinators on SNS. The evaluation study examines five aspects: clarity, procrastination awareness, coverage, effectiveness and acceptance. The results demonstrated that the combating procrastination on SNS method (D-Crastinate) helps to improve users' control over their procrastination.

Table of Contents

Copyright	i
Acknowledgements	ii
Abstract	iii
Publications Arising From This Thesis:	xii
1 Chapter 1: Introduction	1
1.1 Research Context	3
1.2 Research Problem	4
1.3 Research Motivation	4
1.4 Research Aim	5
1.5 Research Questions	5
1.6 Research Objectives	5
1.7 Research Methods and Objectives	8
1.8 Report Structure	10
1.9 Chapter Summary	12
2 Chapter 2: Literature Review	13
2.1 Procrastination	13
2.1.1 The Phenomenon of Procrastination	14
2.1.2 Definition of Procrastination	14
2.1.3 Consequences and Side Effects of Procrastination	16
2.1.4 Procrastination and Academic Performance	16
2.1.5 Procrastination and Work-Related Stress	17
2.1.6 Procrastination and Digital Addiction	17
2.1.7 Procrastination and Anxiety	19
2.1.8 Different Forms of Procrastination	19
2.2 Social Networking Sites	20
2.2.1 Definition of SNS And Honeycombed Framework	21
2.2.2 Usage Types of SNS	25
2.3 Psychological Theories	26
2.3.1 Self-Determination Theory	26
2.3.2 Organismic Integration Theory (Oit)	27
2.3.3 Self-Efficacy Theory	28
2.3.4 Self-Regulation Theory	29
2.3.5 Peer Pressure	29
2.3.6 Theory of Planned Behaviour	30
2.3.7 Self-Image	31

2.3.8	Ideal Self.....	31
2.3.9	Reinforcement Theory	31
2.4	Software Assistance Toward Combatting Procrastination	33
2.4.1	Persuasive Techniques	33
2.4.2	Gamification	36
2.4.3	Gamification Definition	37
2.4.4	Gamification Compared To Serious Games	37
2.4.5	The Effect of Gamification On Behaviour Change	37
2.4.6	Stages of Gamification Design	38
2.5	Chapter Summary	41
3	Chapter 3: Methodology	42
3.1	Research Philosophy.....	43
3.1.1	Pragmatism	43
3.1.2	Positivism.....	43
3.1.3	Realism	44
3.1.4	Interpretivism.....	44
3.2	Research Approach	46
3.3	Research Strategy.....	47
3.3.1	Ethnography	48
3.3.2	Experiments	48
3.3.3	Surveys.....	48
3.3.4	Case Study	49
3.3.5	Grounded Theory	49
3.3.6	Action Research.....	50
3.3.7	Research Choices.....	50
3.4	Techniques And Procedures	52
3.4.1	Data Collection	53
3.4.2	Data Analysis	57
3.5	Design Approaches	58
3.5.1	Participatory Design.....	59
3.5.2	User-Centered Design.....	60
3.5.3	Scenario-Based Approach.....	61
3.6	Ethical Considerations	62
4	Chapter 4: Procrastination on SNS: Types and Triggers	64
4.1	First Phase: Focus Group Design.....	64
4.2	Second Phase: Diary Study	66

4.3	Thematic Analysis	67
4.4	Procrastination And Sns Design Findings	68
4.4.1	Procrastination On SNS: General Perception	69
4.4.2	Procrastination on SNS: Types	70
4.4.3	Personal Triggers	72
4.4.4	Social Triggers	74
4.4.5	Sns Features Triggers.....	75
4.4.6	Task Triggers	79
4.4.7	Negative Consequences of Procrastination.....	80
4.4.8	Suggested Countermeasures	82
4.5	Chapter Summary	85
5	Chapter 5: Procrastination on Social Networking Sites: Combating By Design.....	86
5.1	Co-Design Method.....	86
5.1.1	Co-Design Study: Purpose.....	87
5.1.2	Co-Design: Questions	87
5.1.3	Co-Design: Protocol.....	87
5.1.4	Co-Design: Sampling.....	88
5.1.5	Co-Design: Adopted Techniques.....	88
5.1.6	Co-Design: Analysis	89
5.2	Co-Design Findings	90
5.2.1	Procrastination: Socio-Technical Countermeasures	90
5.2.2	Technical Countermeasures	95
5.2.3	Task Motivations	102
5.2.4	Countermeasure: Side Effects.....	106
5.2.5	Mapping SNS Features With The Suitable Countermeasures	109
5.3	Users Requirements Vs Existing Tools	112
5.4	Chapter Summary	115
6	Chapter 6: Procrastination on Social Networking Sites: Confirmation	116
6.1	Questionnaire Structure	116
6.1.1	Participants' Demographic Information	117
6.1.2	Personality Trait Scale	117
6.1.3	Self-Control Scale.....	118
6.1.4	Types of Procrastination	119
6.1.5	Features of SNS That May Facilitate Procrastination.....	119
6.1.6	Countermeasures For Combating Procrastination on SNS.....	119
6.2	Questionnaire: Pilot Study	123

6.3	Questionnaire: Sample and Distribution.....	124
6.4	Questionnaire: Descriptive Analysis.....	124
6.5	Procrastination on SNS: Results And Discussion.....	125
6.5.1	Demographic Information.....	125
6.5.2	General Perception of Procrastination	125
6.5.3	Comparison of How People Estimate Their Procrastination Time With Their Friends	126
6.5.4	Types Of Procrastination	127
6.5.5	Task Engagements And Motivations	131
6.5.6	Features of SNS and Their Suggested Countermeasures.....	132
6.5.7	Correlations Between Features Of Sns And Procrastination Types	144
6.6	Discussion	146
6.7	Chapter Summary	151
7	Chapter 7: Combating Procrastination On Social Networking Sites Method (D-Crastinate).....	152
7.1	D-Crastinate Method's Background	152
7.1.1	Health Belief Model.....	152
7.1.2	Relapse Prevention.....	153
7.1.3	Digital Resilience.....	154
7.1.4	Positive Thinking.....	155
7.1.5	Relatedness And Connected To Others	155
7.1.6	Acceptance Of Non-Perfect	156
7.1.7	Emotional Intelligence	156
7.1.8	Social Norms.....	157
7.1.9	Poor Expectation Management.....	158
7.1.10	Impulsive Control	158
7.1.11	Poor Time Management.....	159
7.1.12	Habitual Checking	160
7.1.13	Think Aloud Strategy.....	161
7.2	Stages Of D-Crastinate Method	161
7.2.1	First Stage: Education.....	164
7.2.2	Second Stage: Self-Diagnosis	169
7.2.3	Third Stage: Planning and Preparation	171
7.2.4	Fourth Stage: Action	174
7.2.5	Fifth Stage: Self-Assessment	174
7.2.6	Sixth Stage: Error Identification	175

7.3	Chapter Summary	176
8	Chapter 8: Evaluation of The D-Crastinate Method	177
8.1	Aim of The Evaluation Study	177
8.2	Evaluation Protocol.....	179
8.3	Analysis.....	182
8.4	Findings	183
8.4.1	Clarity of D-Crastinate.....	183
8.4.2	Coverage of D-Crastinate	185
8.4.3	Procrastination Awareness.....	188
8.4.4	Effectiveness	190
8.4.5	Acceptance of The D-Crastinate Method	194
8.5	Discussion and General Observation	198
8.6	Updates and Amendments	201
8.7	Threats to Validity	201
8.8	Chapter Summary	203
9	Chapter 9: Conclusion and Future Work	204
9.1	Research Questions and Revised Objectives	206
9.1.1	Objective 1: To Conduct a Literature Review on Procrastination And Related Psychology Theories.....	206
9.1.2	Objective 2: To Explore The Relationship Between Procrastination And Sns Design Features.....	207
9.1.3	Objective 3: To Propose Different Countermeasures to Combat Procrastination On Sns.....	207
9.1.4	Objective 4: To Propose and Evaluate a Novel Method to Combat Procrastination on SNS	208
9.2	Contributing to Knowledge.....	208
9.3	Recommendations for Future Work.....	210
	References.....	212
	Appendix 1: Exploration Study (Focus Group).....	233
	Appendix 2: Inclusion Criteria.....	239
	Appendix 3: Diary Study Template	240
	Appendix 4: Co-Design Sessions Materials	242
	Appendix 5: Questionnaire Advertisements	248
	Appendix 6: Questionnaire Design.....	249
	Appendix 7: D-Crastinate Method Materials.....	259
	Appendix 8: Evaluation Questionnaire Before Using The D-Crastinate Method	280
	Appendix 9: Evaluation Questionnaire After Using The D-Crastinate Method.....	283

Appendix 10: The E-Therapy Attitudes And Process Questionnaire (Etap)	287
Appendix 11: Treatment Questionnaire Concerning Continued Programme Participation	290
Appendix 12: Information Sheet.....	292

List of figures:

Figure 1: Research Methods and Objectives	9
Figure 2: Thesis Chapters	11
Figure 3: The Honeycomb Framework of Social Media (Kietzmann et al. 2011)	22
Figure 4: Theories that Contributed to The Research	26
Figure 5: Theory of Planned Behaviour (Ajzen 1991)	30
Figure 6: FOGG Behaviour Model (FBM).....	36
Figure 7: Research Onion with Choices (Underlined) For This Thesis (Saunders et al. 2007)	42
Figure 8: Deductive and Inductive Research Approaches (Saunders et al., 2007).....	46
Figure 9: Procrastination Types and Triggers.....	69
Figure 10: Procrastination on SNS: Socio-Technical Countermeasures	91
Figure 11: Procrastination on SNS: Technical Countermeasures.....	97
Figure 12: Procrastination on SNS: Increasing Task Motivation and Engagement	104
Figure 13: How Respondents Feel about their Procrastination	126
Figure 14: Users' Daily Procrastination Time Compared with their Friends.....	127
Figure 15: Procrastination Types.....	128
Figure 16: Task Motivation and Engagement Tools.....	132
Figure 17: Features of SNS As Procrastination Facilitators	133
Figure 18: Mapping Between SNS Features and their Countermeasures.....	134
Figure 19: Suggested Countermeasures for Procrastination Resulted from SNS Features .	135
Figure 20: An example from D-Crastinate Method.....	164
Figure 21: Clarity Level of D-Crastinate Method.....	184
Figure 22: Participants' Respondents Regarding the Coverage of D-Crastinate Method	188

List of Tables:

Table 1: Mapping research questions, objectives and thesis' chapters	8
Table 2: Suggested Definitions for SNS.....	21
Table 3: Differences Between Positive and Negative Reinforcement and Positive and Negative Punishment	33
Table 4: Research Philosophies and Associated Data Collection Methods (Saunders Et Al., 2007).	45
Table 5: Summary of Data Collection Methods	52
Table 6: An Example of The Thematic Analysis.....	68
Table 7: Procrastination Classification Based on User's Self-Control.....	109
Table 8: Downtime in iOS Screen Time VS Recommendation	113
Table 9: Personality Trait Types and Their Description.....	118
Table 10: Breakdown of The Questions and The Insight They Provide.....	120
Table 11: Summary of The Respondents' New Suggested Countermeasures.....	143
Table 12: Correlation Between Procrastination Types and SNS Features	145
Table 13: Assessing Google Digital Wellbeing Against the Suggested Countermeasures .	149
Table 14: Stages of D-Crastinate Method and their Expected Outcomes	161
Table 15: Guidance for Applying D-Crastinate Method	162
Table 16: Self-Diagnosis: Procrastination Types	169
Table 17: Self-Diagnosis: SNS Features.....	170
Table 18: Planning and Preparation Stage: Task Engagement Tools	171
Table 19: Planning and Preparation Stage: Procrastination Countermeasures.....	172
Table 20: Self-Assessment.....	175
Table 21: Error Identification Questions	175
Table 22: Mapping Between the Aims of The Evaluation Study and The Survey Questions	181
Table 23: Comparison of The Participants' Awareness Level Before and After Using D-Crastinate Method.....	189
Table 24: Procrastination Types Before and After Using D-Crastinate Method ...	192
Table 25: The Respondents Regarding SNS Features Before and After Using D-Crastinate Method.....	194
Table 26: Distribution of Means and Standard Deviations for Autonomous and Controlled Regulation	196
Table 27: Distribution of Means and Standard Deviations for Planned Behaviour Theory Four Components	197
Table 28: Participants' Selection for Procrastination Types, Triggers, Countermeasures and Task Engagement Tools.....	200

PUBLICATIONS ARISING FROM THIS THESIS:

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- Alblwi, A., McAlaney, J., Altuwairiqi, M., Stefanidis, A., Phalp, K., & Ali, R. (2020). Procrastination on Social Networks: Triggers and Countermeasures. Psihologija. Advance online publication. doi: <https://doi.org/10.2298/PSI190902016A>. (see Chapter 6).

Declaration of co-authors contribution to the published work of this thesis:

The author of this thesis was the first author of publications arising from this thesis and their contribution was as follows:

- Forming and articulating the idea and aim of each paper.
- Deciding upon the appropriate methodology to be adopted in each paper.
- Designing and implementing the empirical studies presented in each paper (e.g. developing focus group scripts, recruiting participants and collecting data).
- Analysing and interpreting the collected data and drawing conclusions (e.g. statistical analysis, qualitative analysis).
- Reporting the findings and writing the papers.

The co-authors contributed to the published papers in terms of verifying and validating the studies' findings by comparing them against the actual responses from the participants. They also provided guidance and feedback on the structure and the overall articulation of the papers' message. In addition, they gave insights on the methodology and also checked the writing quality and suggest modifications on some parts of the text. Furthermore, the co-authors enriched the papers with the appropriate terminologies in certain places especially those related to the venue where the papers were published.

1 CHAPTER 1: INTRODUCTION

The phenomenon of procrastination is widespread in education and workplace contexts and refers to the voluntary delay of activities that may prevent people from performing certain tasks, potentially leading to negative consequences (Klingsieck 2013). (Knaus 1973) defines procrastination as the delay of relevant and timely activity. The delay may therefore lead to people experiencing negative consequences such as low academic performance and increased levels of stress and anxiety (Klingsieck 2013). Moreover, procrastination can be considered one of the main sources of work-related stress (Beheshtifar et al. 2011); for example, it may increase people's stress when they keep delaying working on their tasks because of deadlines, delivering low-quality work as a consequence.

On the other hand, Ivarsson and Larsson (2011) argue that procrastination might help people to alleviate stress and refresh their mood, thereby positively improving their work efficiency. As part of a specific domain, an association relationship was found between unmanaged procrastination and low academic performance (Kim and Seo 2015). Unmanaged procrastination refers to people's inability to retain control over their procrastination; for example, some people may plan to procrastinate for five minutes with the aim of changing their emotional state and end up spending hours without realising how quickly time has passed.

Several factors may encourage people to procrastinate, such as performing a difficult or mundane task, lack of motivation or lack of energy. Furthermore, recent technological changes which enable almost unlimited access to the Internet, may have played some role in increasing the likelihood of engaging in procrastination, especially for those who use the Internet for their work (Vitak et al. 2011; Cao and Yu 2019). For example, people can be distracted by notifications that they receive while working, encouraging procrastination, especially for those who have low self-control. Hence, there is a clear distinction to be made

between using the Internet for work and procrastinating while on the Internet. Paulsen (2015) reports that employees engage in non-work related activities during working time and they eventually procrastinate for between 90 and 180 minutes. SNSs appear to consume most of the time that users spend while they are online (Zheng and Lee 2016). According to the latest statistics, as of the fourth quarter of 2017, the number of monthly active Facebook users worldwide was 2.2 billion people, up from one billion active users in 2012 (Statista 2018).

SNS platforms enable users to create personal profiles, communicate, and get in touch with others, regardless of their location, experiences or language. Despite these benefits, such activities have a tendency to become harmful behaviour for those people who engage in excessive online usage, problematic attachment and digital addiction (J Kuss et al. 2014; Altuwairiqi et al. 2019a). Numerous studies have reported that procrastination on SNS has become a huge issue in the context of work and in academia (Hussain and Sultan 2010; Metin et al. 2016; Prem et al. 2018). It can be argued that the possibility of procrastination and delayed work may have increased due to the high level of enjoyment that SNSs provide to their users or due to the pressure that users may feel to respond instantly to meet their contacts' expectations. Most research discusses procrastination from the perspective of people's personalities and self-control; in contrast, this thesis will discuss the role that the design of SNS features plays in facilitating procrastination among users.

The relationship between SNS design and procrastination has not previously been explored in literature, raising questions about which SNS features might encourage users to procrastinate, how this happens and how can be managed. The current research therefore aims to conceptualise and understand the design features of SNSs that may encourage users to procrastinate in order to develop a method that may help users to gain more control over their procrastination. This thesis uses psychological theories that provide information about how procrastination happens and how it can be mitigated while developing countermeasures. Being informed by psychological theories can increase the likelihood of providing more suitable countermeasures.

This thesis will demonstrate that the design of SNS plays an important role in encouraging users to procrastinate and develop a method that proposes the use of certain features to combat procrastination on SNS. For example, ‘surveillance of presence’ features could lead to procrastination, where the user fears that their contacts see them online and feels pressure to interact instantly to build a positive self-image and meet their contacts’ expectations. To reduce this fear, a ‘showing availability’ countermeasure could be embedded on SNS to manage the expectations of the user’s contacts, which eventually may reduce the likelihood of procrastination.

1.1 RESEARCH CONTEXT

Several factors can increase the possibility of procrastination, such as low-self efficacy, low self-control, lack of motivation and task difficulty. Moreover, excessive usage of SNSs often prevents users focusing on their tasks in favour of engaging with SNSs, which they believe will improve their mood or relieve work stress (Sonnentag and Zijlstra 2006; Whiting and Williams 2013). The main aim of SNS design is to fulfil users’ social connectivity and belonging needs and to keep them online. To achieve this, SNS have implemented features that may increase users’ urge to interact for various reasons, including fear of losing information or meeting others’ expectations by replying to online requests instantly to build a positive self-image. For example, Snapchat stories are designed to disappear after a certain time, which could add more pressure among users to view these stories to avoid missing them; this could lead to users excessively checking their SNS accounts, eventually resulting in procrastination. There is therefore a need to diagnose the current designs of SNS to identify the main features that may facilitate procrastination. This investigation is preliminary to suggest appropriate countermeasures to combat procrastination.

1.2 RESEARCH PROBLEM

Several factors encourage users to procrastinate on the Internet, including ease of access to it, the level of enjoyment that SNS use provides, and the motivation to be online rather than focusing on original tasks; any of these factors might increase the possibility of procrastination (Lin and Lu 2011). There is evidence that unmanaged procrastination has negative side-effects on student behaviour and academic performance, which is frequently the cause of anxiety, depression and increased stress levels (Kim and Seo 2015). There is a gap in the empirical literature to identify whether SNS design has some responsibility for increasing procrastination. To fill in this gap, this research will explore and identify the different elements that facilitate procrastination. Particular attention will be paid to exploring and understanding how the design of SNS features might encourage users to procrastinate. Furthermore, it will illustrate how future designs could help users to gain more control over their procrastination and minimise any associated negative side-effects.

1.3 RESEARCH MOTIVATION

This thesis demonstrated that adding an intervention into the procrastination field will lead to a better understanding of this domain and will help to determine the elements that might facilitate users to procrastinate and avoid or delay doing original tasks in favour of accessing SNSs. Examples of the elements are low-self efficacy and low self-esteem. Moreover, this thesis will pay attention to the design of SNS features to better understand how these may encourage users to procrastinate, with the aim of adding interventions to future software design features that may help users to gain more control over their procrastination. Hence, there is a motivation to find a new or complementary approach to help users gain more control over their procrastination and overcome the negative side-effects that are associated with procrastination.

1.4 RESEARCH AIM

This thesis aims to explore the role of SNS features design in facilitating procrastination in order to develop a method that could help users to gain more control over their procrastination. To achieve this aim, users will be involved in the research process from the starting point, where the researcher will explore how procrastination happens on SNS, through to the final point where the proposed method to combat procrastination will be evaluated. Involving users in the research process and considering their needs could enhance the acceptance of the developed method and increase the possibility of it being used in the future (Kujala 2003).

1.5 RESEARCH QUESTIONS

This section presents the questions that need to be addressed to achieve the objectives of this thesis. Table 1 presents the links between the thesis questions, objectives and chapters, identifying where the findings of each objective are presented.

Q1- What are the different factors that encourage users to procrastinate?

Q2- What is the role of SNS design features in procrastination?

Q3- What are the different countermeasures that could be used to combat procrastination?

Q4- How could the findings of Q1, Q2 and Q3 be used to develop a method that could help users to combat procrastination?

1.6 RESEARCH OBJECTIVES

The following section presents the research objectives and provides an overview of how to achieve these objectives.

Objective 1: Literature review

Conducting a literature review enables the researcher to draw the main boundaries of this thesis and build knowledge about the research problem. It also facilitates a better understanding of the related topics in this area, such as digital addiction, cyber slacking, behavioural change theories, self-concept theories and persuasive technology. Exploring the literature and these related topics helps the research to determine what is already known about the topic. In addition, the search of psychological theories will not only help the researcher to gain a deeper understanding of the psychological background that underlies procrastination but also inform them about why people tend to procrastinate. Furthermore, the research will consider these theories at the design solution stage to explore and minimise the expected side effects of the suggested countermeasures.

Objective 2: To explore the relationship between procrastination and SNS design features

Literature in the procrastination field is limited to identify the relationship between procrastination and the design of SNS features. Therefore, there is a need to identify whether the design of SNS features has responsibility of encouraging users to procrastinate, which can be achieved by conducting an exploration study to identify the role of SNS features in facilitating procrastination among users. The exploration study will also identify the types of procrastination, which means that it will identify the reasons why users procrastinate and how SNSs encourage users to procrastinate instead of performing their original tasks. Moreover, it will investigate how people perceive procrastination and what they expect to see in future software in order to help them gain more control over their procrastination. To confirm the findings of the exploration study, an online survey will be conducted to examine to what extent the participants agree with the procrastination types and the features that may facilitate procrastination on SNS. Online surveys have several advantages, such as the ability to recruit participants quickly and giving participants the flexibility to fill in the survey at any time. They also allow a wide access and large participants sets.

Objective 3: To propose different countermeasures to combat procrastination

This objective sought to identify the different countermeasures that could be employed in future SNS design to fight procrastination. These countermeasures can provide users with various strategies for controlling procrastination, from increasing users' awareness to time limit restrictions. To achieve that, a co-design session will be conducted with users, in which the researcher and users will propose the countermeasures that could help to fight procrastination. Co-design sessions will also explore the expected side effect of each countermeasure, suggesting how the side effects could be avoided. Furthermore, the best modality will be discussed in order to implement these countermeasures in a way that could address the side-effects for each countermeasure. In addition, the researcher will map the SNS features and their suggested countermeasures; each feature of SNS that leads to procrastination will have its own countermeasures, which will facilitate the creation of more specific countermeasures for each feature.

An online survey will also be conducted to examine to what extent the participants agreed with the procrastination countermeasures. Because the survey will target users from different nationalities, this will enable the researchers to determine whether the findings apply to different cultures, which will allow the qualitative findings to be confirmed and refined.

Objective 4: To develop and evaluate a method to combat procrastination

Based on the findings of the previous Objectives 1, 2, and 3, a method of combatting procrastination on SNS will be developed. At the first stage, the method will educate users and raise their awareness about how procrastination on SNS happens and second, the method will help users to identify their types of procrastination and the features that lead them to procrastinate. Then, the method will customise the countermeasures for each feature, which will enable them to be relevant to each specific feature.

To evaluate the developed, a mix methods approach will be used that has two phases, focus group (qualitative) and survey (quantitative). The evaluation study will involve users to assess the extent to which the proposed methods are able to improve users' control over their procrastination. The method will be assessed based on a set of qualities including clarity, coverage, procrastination awareness, effectiveness and acceptance.

Table 1: Mapping research questions, objectives and thesis' chapters

Research Question	Research Objectives	Chapters
Q1: What are the different factors that facilitate users to procrastinate?	Objective 1	Chapter 2
	Objective 2	Chapter 4
Q2: What is the role of SNS design features in procrastination?	Objective 1	Chapter 4
	Objective 2	Chapter 6
Q3: What are the different countermeasures that could be used to combat procrastination?	Objective 3	Chapter 5
		Chapter 6
Q4- How could the findings of Q1, Q2 and Q3 be used to develop a method that could help users to combat procrastination?	Objective 4	Chapter 7
		Chapter 8

1.7 RESEARCH METHODS AND OBJECTIVES

Figure 1 provides a map between the followed research method, thesis objectives and the main findings.

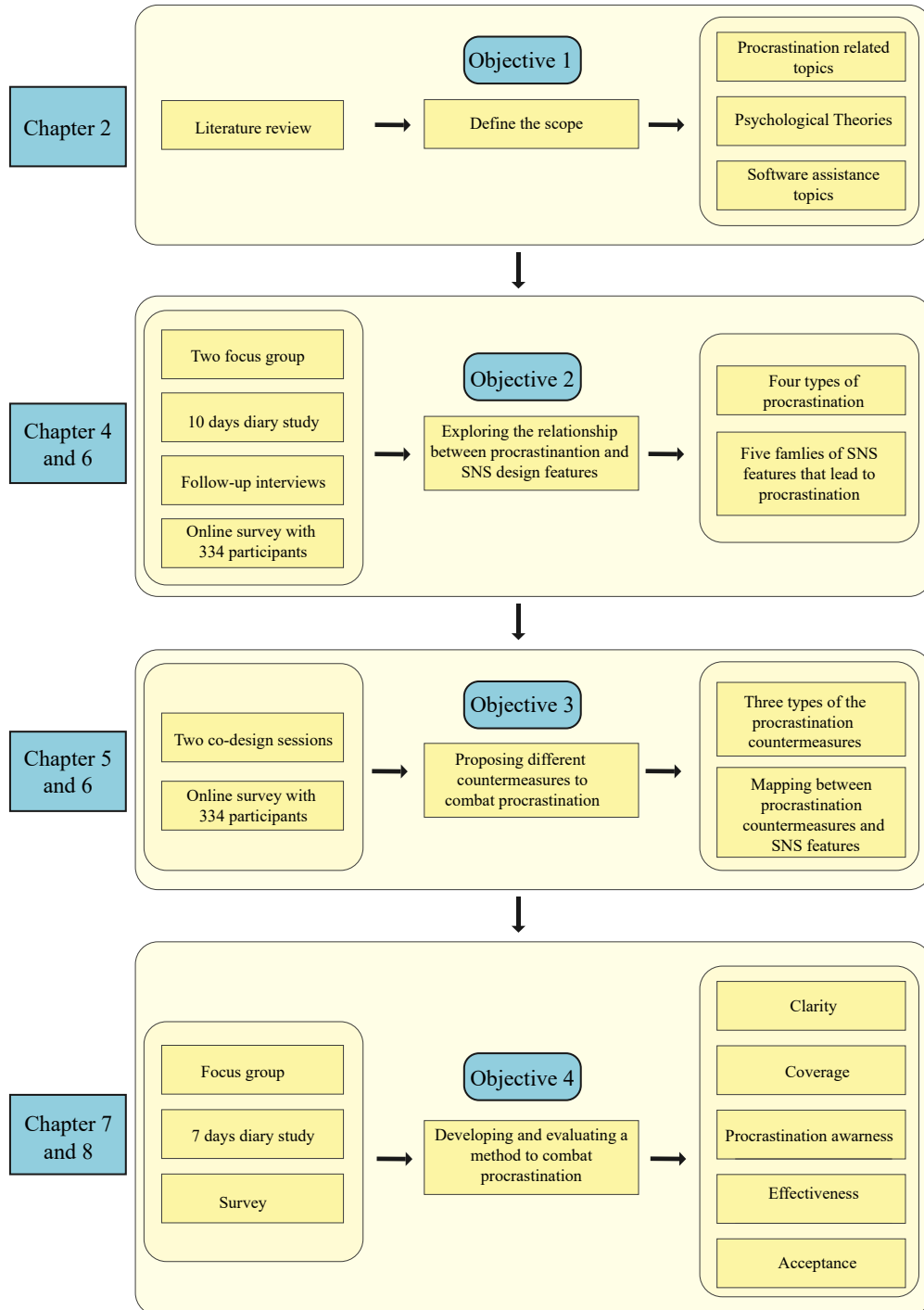


Figure 1: Research Methods and Objectives

1.8 REPORT STRUCTURE

An overview of the thesis is presented in Figure 2. The thesis is structured as follows: Chapter 2 presents a literature review of procrastination and its related topics, behavioural change theories, and potential solutions that could be used in this research; Chapter 3 presents a description of the methodology and research approaches that were used to achieve the research objectives; Chapter 4 presents the exploration study that was conducted to explore the relationship between procrastination and SNS feature design. Meanwhile, in Chapter 5, the findings concerning the countermeasures that could be used to combat procrastination on SNS are presented, as well as the mapping between the SNS features and their customised countermeasures. Chapter 6 presents the results of the online survey that was conducted to examine the findings of Chapters 4 and 5 using a large sample, while Chapter 7 proposes the structure of combating procrastination on social networking sites method (D-Crastinate) that is designed to combat procrastination on SNS; Chapter 8 presents the evaluation study and its findings for the D-Crastinate method and finally, Chapter 9 provides a summary of the thesis and discusses its limitations as well as topics for future work.

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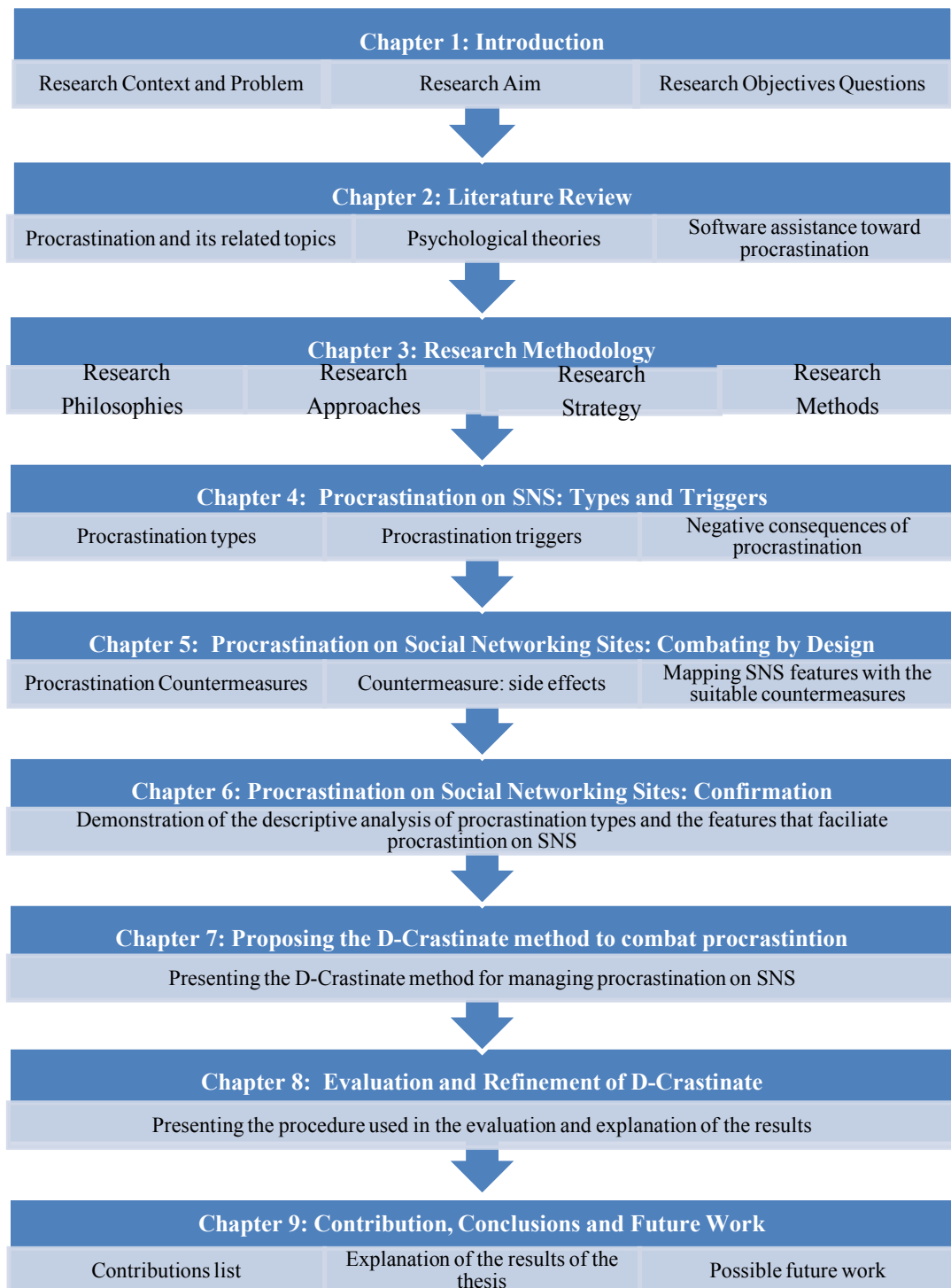


Figure 2: Thesis Chapters

the text. Furthermore, the

1.9 CHAPTER SUMMARY

This chapter presented an overview of the focus of the thesis research, including the problem background, thesis aim, research questions, objectives and publications arising from this thesis. The next chapter will provide a literature review of the main topics related to this thesis.

2 CHAPTER 2: LITERATURE REVIEW

This chapter presents a review of the relevant literature on procrastination. It is divided into three sections which critically analyse the concept of procrastination, related psychological theories, and software assistance techniques that can be used to combat procrastination on SNS.

The first part of the literature review which examines the procrastination literature provides in-depth analyses of the procrastination phenomenon. It discusses concepts such as procrastination detention, the negative result of procrastination and the different forms associated with procrastination such as cyber slacking and personal web usage. This can offer this thesis deep insight into procrastination and its related topics in the context of SNS.

The second part of the literature review examines the physiological theories that explore procrastination and the reasons people procrastinate. It also explores the theories on interventions that seek to ensure that suggested interventions can cover all or most of the aspects that users need to gain more control over their tendency to procrastinate. Being informed by psychological theories and learning from their application in other domains can help to ensure that the suggested interventions will have minimal side-effects and will reduce the possibility of adversely affecting users' experience and well-being.

The final part of this chapter reviews software assistance techniques that are useful in overcoming procrastination. These techniques include persuasive techniques and gamification which have been utilised to overcome procrastination on SNS.

2.1 PROCRASTINATION

In this section, the literature review examines the phenomenon of procrastination, procrastination detention, and the negative consequences of procrastination such as low academic performance, work-related stress, and anxiety.

2.1.1 THE PHENOMENON OF PROCRASTINATION

Procrastination refers to the avoidance or the delay of doing tasks that need to be accomplished by a certain time (Klingsieck 2013). Procrastination creates considerable issues in both the workplace and academia, and may have a significant effect on an individual's quality of life. It can be detrimental in the workplace as it can lower work standards, and on a more personal level it can prevent individuals from achieving goals, even if they are more than capable of meeting them. For example, in academia, some students fail to finish their tasks not because of low intelligence or poor skills but because of procrastination (Ferrari 1991, 2000). In general, the literature on procrastination focuses mainly on two aspects: the first aspect focuses on task performance and goals achievements; the second aspect focuses on personal factors that lead to procrastination such as low self-regulation. In the first aspect, people might procrastinate while working on challenging tasks because of the fear of failure (Haghbin et al. 2012). In contrast, from a personal perspective, people might procrastinate and engage in excessive usage of SNS because of poor time management or low self-esteem (Chen et al. 2016a; Ahmad et al. 2018; Altuwairiqi et al. 2019b). Therefore, this thesis will consider both of these aspects at the countermeasures design stage; for example, reduction techniques can be used to reduce large tasks into smaller ones, providing milestones for each small task and reducing the difficulty of the task.

2.1.2 DEFINITION OF PROCRASTINATION

There are several definitions of the term procrastination. In one of its earliest definitions, procrastination is defined as finishing a job after the optimal time (Silver 1974). Some researchers have suggested as part of their definition that procrastination could create negative side effects, such as anxiety or uncomfortable feelings (Milgram et al. 1993; Steel 2007). This could occur due to the pressure to complete a task or multiple tasks that the individual might not feel capable of doing, which might lead to feelings of inadequacy and possibly have an impact on their mental health at some point. Milgram, for instance, in their conceptualisation of procrastination itemises four relevant elements. Firstly, procrastination is a result of

postponement. Secondly, it produces substandard products. Thirdly, it must be related to a job considered as important by the procrastinator. Fourthly, there is a feeling of frustration as a result of procrastination.

Another definition describes procrastination as self-defeating (Ferrari 1993, 1994). Ferrari categorises procrastination into two ways: functional and dysfunctional. The dysfunctional procrastination occurs only when it creates negative consequences such as the anxiety and feeling of guilt. Functional procrastination refers to the people who use procrastination as a strategy and it does not lead to negative consequences. For example, the delay in working on a current task in order to wait for more information would be seen as functional procrastination (Ferrari 1994). Furthermore, Choi and Moran (2009) introduced the concept of active procrastination where people delay working on their tasks to the last minute. According to Chio and Moran, active procrastination uses time pressure to motivate people to finish their tasks and not necessarily hurt the quality or the productivity of the performed task. Active procrastination seems to be similar to the functional procrastination as the act is used as a strategy to finish the task. However, this conflicts with the views of Milgram as not all procrastinators produce sub-standard products (Milgram 1991). Active and functional procrastination might work for people who perform well under stress, but might have a negative impact on those who struggle to cope on a tight schedule, as they might perform poorly and make mistakes.

This research adopts the following definition of procrastination in describing procrastination to participants who took part in the research studies. Procrastination refers to the voluntary delay of activities that may prevent people from performing certain tasks, potentially leading to negative consequences (Klingsieck 2013). This definition considers procrastination as a voluntary action. It also considers that procrastination might lead or not lead to negative side effects based on the importance of performed tasks and how people might view them. Therefore, procrastination might not always have negative side effects as people might use it to release stress or modify their mood.

2.1.3 CONSEQUENCES AND SIDE EFFECTS OF PROCRASTINATION

This sub-section analyses the negative result and side effect of procrastination on academic performance, work-related stress, and anxiety. The analysis illustrates how procrastination negatively impacts people in these areas. Procrastination could also strongly affect people in other areas, for example by causing digital addiction or affecting a person's wellbeing, and could even lead to mental health issues such as depression if people are under a lot of stress and lack sufficient self-confidence due to their procrastination habits (Constantin et al., 2018). This thesis discusses procrastination in relation to academic performance, work-related stress, and anxiety. These can be examples to show how procrastination could become a fundamental issue that affects the productivity and wellbeing of people.

2.1.4 PROCRASTINATION AND ACADEMIC PERFORMANCE

A considerable number of empirical researches have investigated the relationship between procrastination and academic performance (Howell et al. 2006; Lakshminarayan et al. 2013; Duru and Balkis 2017). The findings showed that procrastination leads to lower grades and a higher rate of course withdrawals. Other studies have found that academic procrastination is negatively correlated with rational beliefs about studying and academic achievement (Aremu et al. 2011; Balkis 2013). Procrastination also added time pressures on students when assignment deadlines are close, and this pressure can reduce accuracy and punctuality which adversely impacts academic performance (Van Eerde 2003). A meta-analysis of 33 studies with a total of 38,529 participants showed a negative relationship between procrastination and academic performance (Kim and Seo 2015). The findings showed that procrastination negatively affects GPA, course grades, and quiz scores. The findings of the meta-analysis suggest that people should ensure that they distinguish between active procrastination and other forms of procrastination in order to avoid becoming negatively affected by it. With active procrastination, people choose to procrastinate but still manage to meet their deadlines, especially those who tend to thrive under pressure. However, in this study the participants were required to self-declare whether they usually tend to procrastinate and how that

procrastination could lead them to experience negative side-effects, such as low academic performance and anxiety.

2.1.5 PROCRASTINATION AND WORK-RELATED STRESS

Work-related stress is an important element of workplace health risks (Mansoor et al. 2011). Work-related stress is an important factor that could lead to job dissatisfaction and illness. Several employers believe that creating stress and adding more pressure on their employees can increase their productivity and reduce the problem of procrastination. However, several researchers suggest that there is a relationship between job-related procrastination and job-related stress, e.g. (Steffy and Jones 1990). This is consistent with another study which suggests that university students who had high level of procrastination experienced stress during their studies (Tice and Baumeister 2018).

In contrast, procrastination could be used to release stress and for mood modification (Jaffe 2013; Sirois and Pychyl 2013). In other words, procrastinators seek pleasant moments or avoid unpleasant situations, generally to avoid the stress associated with that situation (Hofmann and Kotabe 2012). In many cases individuals who are under a considerable amount of stress at work might tend to procrastinate more than usual in order to gain some sense of relief from the pressure they are under. This thesis argues that in some cases, procrastination can be caused by stressful situations, in other cases stress is increased by procrastination, and that there is a fine line between procrastination to release stress and the actual stress that could be created by procrastination itself. This depends on the skills of self-regulation that an individual has. The short and quick happiness provided by procrastination in the short-term challenges the ability to control procrastination especially for those who have low self-regulation abilities.

2.1.6 PROCRASTINATION AND DIGITAL ADDICTION

Digital addiction has become an important field of academic research. Numerous studies have been conducted to investigate how digital addiction occurs and the main elements that

facilitate it (Griffiths 2004; Kuss and Griffiths 2011; J Kuss et al. 2014). Digital addiction refers to the compulsive engagement with digital technology. Online access to SNSs, gambling, and shopping have continued to increase in recent years, leading to excessive use of the Internet and potentially digital addiction. According to (Griffiths et al. 2014), an action is considered to be addictive if it satisfies six core components of addiction symptoms: salience, mood modification, tolerance, withdrawal, conflict and relapse.

- **Salience:** the activity in question dominates the individual's life.
- **Mood modification:** the engagement in addictive behaviours as a means of management of mood to feel better.
- **Tolerance:** the need to spend more time on the activity in order to get the same "buzz" as when initially engaged with the activity.
- **Withdrawal:** the feeling of negative emotions or physical symptoms when the activity is paused.
- **Conflict:** the activity leads to conflict with significant people around the individual or self-conflict.
- **Relapse:** the activity is continued with just the same vigour after attempts to abstain.

SNSs provide pleasurable tasks for their users; thus, users may stay online for longer time which may facilitates procrastination and might lead them to avoid performing their original tasks (Przepiorka et al. 2016). For instance, people who excessively use SNS such as Facebook are likely to procrastinate and are at risk of developing Facebook addiction (Przepiorka et al. 2016; Ryan et al. 2016). People who are addicted to their devices might use them to such an extent that they have a possibly negative and harmful impact on the person's social life, putting a strain on their relationships if they are unable to give other people their full attention whilst on their devices. The same could happen within the work environment, risking bad morale among colleagues and annoyance from superiors if an employee does not

commit fully to their work because they are frequently scrolling through their phone or checking their notifications.

2.1.7 PROCRASTINATION AND ANXIETY

Anxiety is characterised by significant feelings of fear about the outcome of current events and worry about the future (Simpson et al. 2010). Numerous studies have identified a relationship between anxiety and procrastination such as (Stöber and Joormann 2001; Cassady and Johnson 2002; Rahardjo et al. 2013). These studies demonstrate that the level of anxiety and how much people are concerned about fear of failure which may have significant effects on triggering procrastination. The failure of achieving academic targets was found to be one of the factors that increase an individual's anxiety and procrastination (Mohamadi et al. 2012). The failure of achieving targets could increase an individual's stress which leads to worry and anxiety over time. Anxiety also negatively impacts people self-esteem and efficacy which affects their confidence level to achieve their tasks.

2.1.8 DIFFERENT FORMS OF PROCRASTINATION

There are different forms of procrastination in the context SNSs such as the **cyberslacking** and **personal web usage**. The following section illustrates the relationship between these topics and procrastination.

2.1.8.1 CYBERSLACKING

Cyberslacking is a term used to describe employees who access the Internet during work hours for non-work related reasons (Bock and Ho 2009). Cyberslacking can cause several issues including, lower productivity and increased time-wasting. Importantly, cyberslacking may be associated with procrastination because those employees who engage in cyberslacking may be more inclined than other people to avoid performing their original tasks (O'Neill et al. 2014).

Another area in which cyberslacking is prevalent is the use of technology in an education setting. Despite all the benefits that technology offers to modern education, some students still use these tools in a negative way by browsing unrelated websites which is detrimental to their learning. Hence, educational institutes should consider this limitation when deciding whether to use technology in class (McKeachie and Svinicki 2013).

2.1.8.2 PERSONAL WEB USAGE

Personal web usage can be defined as any voluntary act of using the Internet to access non-work-related websites during work hours for personal needs such as online shopping and gambling (Anandarajan et al. 2004). This can occur when employees or students access websites such as SNSs, online shopping or news rather than focusing on their work, causing them to procrastinate and waste time. While personal web usage is seemingly detrimental to work productivity, there is evidence to suggest that people who take a break from their regular work to access Facebook perform their tasks better than those who take a break and sit around doing nothing (Coker 2013). Furthermore, a change in mood and release of stress is widely acknowledged for enhancing motivation which positively increases work performance (Kim et al. 2014). However, people who have low self-regulation find it difficult not only to stop surfing these non-work-related websites and return to work at the end of the break but also to return to a work frame of mind.

2.2 SOCIAL NETWORKING SITES

This section provides an overview of Social Networking Sites (SNS) which is an important component of this thesis. This part includes the different definitions of SNS and the honeycomb model which explains the seven blocks features of SNS and how they work.

2.2.1 DEFINITION OF SNS AND HONEYCOMBED FRAMEWORK

There are several definitions of SNS; Table 2 summarises the most popular definitions. In this thesis, SNS is described as websites that enable people to create online profiles, facilitates communication, and enable users to explore and share information.

Table 2: Suggested Definitions for SNS

Author(s)	Definition/description
Boyd & Ellison, 2007	Social network sites can be defined as web-based services that allow users to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Boyd and Ellison 2007).
Kaplan & Haenlein, 2010	A group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of User Generated Content (Kaplan and Haenlein 2010)
Hogan & Quan-Haase, 2010	They emphasize the social affordances of social media. In this framework, social media afford two-way interaction with an audience, beyond any specific recipient (Hogan and Quan-Haase 2010)
Martini, Massa & Testa, 2013	Also referred to as Web 2.0, these tools rely on active content creation by users or members as a central distinguishing feature (Martini et al. 2013)
Vaast & Walsham, 2013	(use the phrase Electronically mediated social contexts or EMSCs) EMSCs – defined here as social settings in which participants interact mostly or only through electronically mediated means (Vaast and Walsham 2013)

Majchrzak, Faraj, Kane & Azad, 2013.	They use the term social media to refer to a group of Internet-based technologies that allows users to easily create, edit, evaluate and/or link to content or to other creators of content (Majchrzak et al. 2013)
Scott & Orlikowski, 2014	Social media websites are characterized by the active engagement and online contributions of large numbers of people across time and space. Such websites depend predominantly on what is known as user-generated content, provided through members ongoing and often informal contributions (Scott and Orlikowski 2014).

SNSs have various features that enable users to share or discuss content, opinions and experiences (Kietzmann et al., 2011). A honeycomb framework demonstrates seven SNS building blocks that were designed in order to facilitate activities on SNSs (see Figure 3). These framework blocks include identity, conversation, sharing, presence, relationship, groups and reputation (Kietzmann et al. 2011). This framework will be taken as an initial template to define the features of SNS that could trigger procrastination.

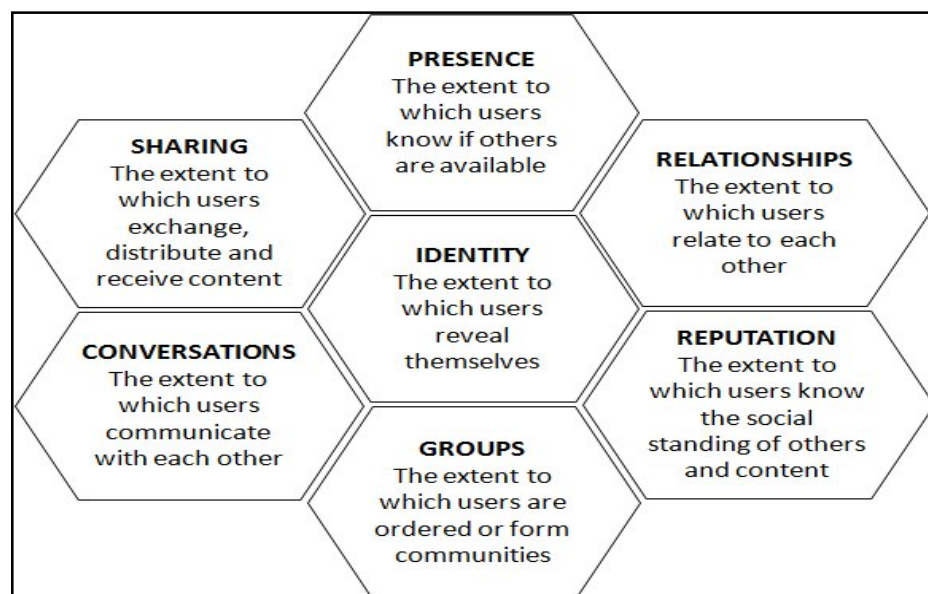


Figure 3: The Honeycomb Framework of Social Media (Kietzmann et al. 2011)

- **Presence block:** presence features describe the features that enable users to get more information about the user's online appearance e.g., current or last presence. The presence features could encourage users to react immediately when they receive notifications. For example, a user's contact might expect an instant reply to their messages when the user appears online. This expectation might put pressure on the user to respond almost instantly even when busy in order to meet their friends' expectations. This could eventually cause users to procrastinate to satisfy their contacts expectations (Blabst and Diefenbach 2017).
- **Identity block:** identity presentation on SNS centres on the user profile, which enables users to make a public or semi-public self-presentation (Wilson et al. 2012). Users can have real photos or avatars and complete a personal profile which could have a listing of their personal information. The user could join groups and post statuses about any updates to get comments from others (Gentile et al. 2012). Users who seek popularity for their account are more likely to frequently check and immediately interact with contacts to build or maintain positive self-image.
- **Conversation block:** conversation block refers to the features that enable users to communicate with each other. The primary aim of the design of SNS is to facilitate conversation among individuals and groups. The conversation features can take different dimensions on the SNS, including tweeting, blogging, and chatting. Features that enable users to interact with each other can also be key motivations for procrastination; for instance, when users interrupt their activities to see what others are up to or when they simply get distracted by a conversation on an SNS whilst working on their main tasks (Utz et al. 2015).
- **Sharing block:** Sharing refers to the extent to which users receive, exchange, and distribute content (Kietzmann et al. 2011). Sharing features can be considered as a way of interaction, but they do not necessarily lead to conversations. For example, a

user can post photos without any text attached to them. The curiosity that others might have to discover what is going on might trigger their procrastination as they access their SNS frequently to explore and see what their friends recently shared (Tosun 2012). The fear of missing out is another trigger where users access their accounts to avoid missing any information or event that are shared by their friends and which provides them with a sense of connectedness and social inclusion (Ryan et al. 2016; Alutaybi et al. 2019a).

- **Relationship block:** Relationship features describe the extent to which users are related to each other (Kietzmann et al. 2011). The relationship in this block means that two or more users have a form of friendship that leads them to share information among themselves, or even list each other as friend or followers. SNS aims to build relationship among users, so the SNS features' design uses the relationship to suggest new users to follow. For example, Facebook shows the list of friends of friends which might trigger a user's intention to follow. Users also can make their profiles public to seek more recognition and increase their account popularity and the feeling of being connected with others (Deters and Mehl 2013). On the other hand, the design of SNS allows users to limit their relationship so they can have secure profiles that can be viewed only by the user's followers.
- **Group block:** group features refer to the extent to which users are ordered or form communities or sub-communities. The groups in SNSs can become bigger and distinct from friends' groups. For example, the user could have a large number of people who follow their account as "followers". Having higher number of followers could generate more profits as users can leverage on their account popularity. Therefore, seeking popularity could force users to build more positive self-image which requires frequent checking on SNS to satisfy their followers' request which increases the possibility of procrastination (Alblwi et al. 2019b).

- **Reputation block:** reputation features refer to the extent to which users perceive their social standing and those of others on SNSs (Kietzmann et al. 2011). Reputation on SNSs also refers to the extent of trustworthiness of the presented content or users themselves. For example, users who have a high number of followers could be perceived as having good reputation or contents that have high number of likes or retweet could be perceived as more trustworthy than those with little or no engagement. Furthermore, the design of reputation block notifies users of accounts who have good reputation and show other users whether these accounts are reliable.

2.2.2 USAGE TYPES OF SNS

Users of SNSs are divided into two categories: passive and active users. A passive user is someone who just browses SNSs and does not generate any content on the platform, whereas the active user is the one who shares or exchanges ideas or views on these platforms (Nechaev et al. 2017). The design of SNS features was made simple in order to attract users' attention and make them more active instead of passive. For example, users can click 'like' icons when they are pleased with a post and there is no need to write or spend a long time expressing a view.

SNSs are not only used to build interaction between active users for entertainment purposes but also business purposes as some websites such as Amazon and eBay were created to replace traditional businesses. Such websites allow users to interact and provide reviews or receive notifications about newly released items. Thus, companies can benefit from these reviews to develop their business or even get free advertisements for their goods to help increase sales.

The main factor that makes procrastination through SNSs different from other types of procrastination is that SNSs promote activities that might increase the tendency of active users to procrastinate. For example, users may receive notifications that trigger their interest and encourage them to stop performing their original task. Therefore, on SNSs users always

expect distraction from notifications when engaging in a task which increases the tendency for time mismanagement.

2.3 PSYCHOLOGICAL THEORIES

This section presents the behavioural change theories and self-concept theories that help to illustrate the reasons behind procrastination (see Figure 4). They include self-determination theory, cognitive evaluation theory, organismic integration theory, self-efficacy theory, self-regulation theory, peer pressure theory, planned behaviour theory, self-image, ideal-image and reinforcement theory. These theories might be the most relevant theories to the research problem.

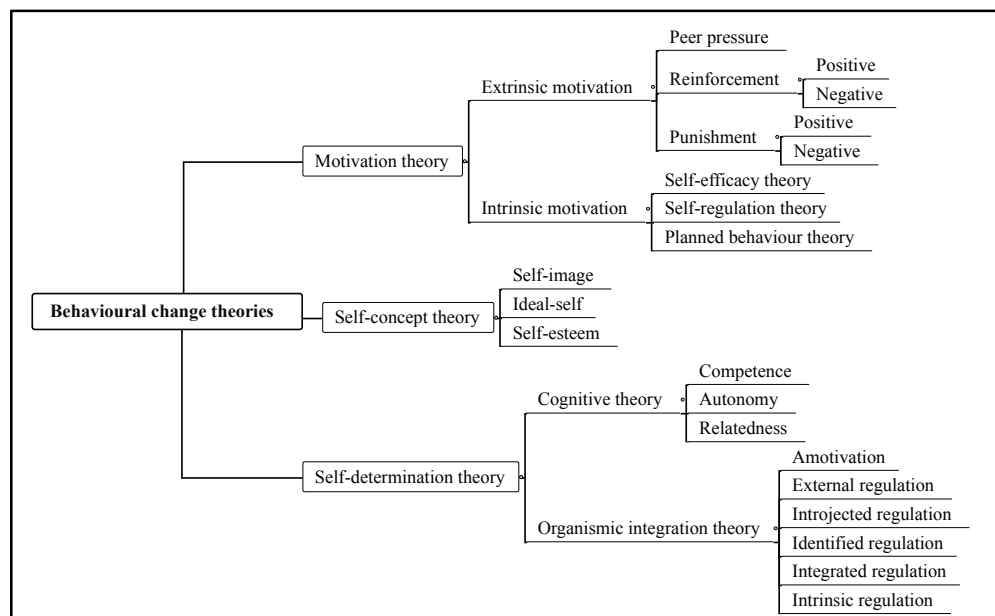


Figure 4: Theories that Contributed to The Research

2.3.1 SELF-DETERMINATION THEORY

Self-determination theory (SDT) is concerned with people's inherent growth tendencies and innate psychological needs. It is concerned with the motivation behind the choices people make without external influence and interference. SDT has two sub-theories: cognitive

evaluation theory and organismic integration theory (Ryan and Deci 2000). Cognitive evaluation theory identifies three basic psychological needs that people have to perceive:

- **Competent:** people have the skills to be able to perform specific tasks.
- **Autonomy:** people have the freedom and control over their actions.
- **Relatedness:** people are connected to others through positive relationships

2.3.1.1 POINTS RELATED TO COGNITIVE EVALUATION THEORY

- Psychological health requires satisfaction of all three needs (competence, autonomy and relatedness); one or two is not enough (Ryan and Deci 2000).
- These three needs are universal.
- Meeting autonomy and competence needs leads to interest/intrinsic motivation.
- Feeling of competence does not enhance intrinsic motivation unless accompanied by a sense of autonomy.
- Relatedness is also important for intrinsic motivation; at least as a backdrop.
- **Intrinsic motivation:** intrinsic motivation can be defined as engaging in a task for the reward inherent in the task such as interest and enjoyment. Basically, the person enjoys what they are doing. For example, users may procrastinate on SNS because they enjoy time spent on SNS.
- **Extrinsic motivation:** extrinsic motivation refers to performing an action in order to obtain a reward or outcome. For example, a user who access SNS and procrastinate there in order to increase their account popularity or to build positive self-image.

2.3.2 ORGANISMIC INTEGRATION THEORY (OIT)

Organismic integration theory is a sub-theory of self-determination theory which makes a further distinction with different types of motivation. OIT has six types of regulation toward behaviour. These regulations vary in terms of the amount of autonomy that a person has and the amount of internalisation (how much a person has taken in value). Essentially, it refers to

how much a person values an activity of motivation (Ryan and Deci 2000). There are different types of regulation as follows:

- **Amotivation (non-regulation):** a person is not autonomous at all and motivation is not integrated at all. Hence, the person does not take any action or just goes through the motions and does not value the activity, does not feel competent and does not expect the desired outcomes to be realised.
- **External regulation:** here the motivation is to satisfy an external demand. For example, a student who creates an account on SNS to remain in good relationship with classmates.
- **Introjected regulation:** the person values an activity and takes in regulation but does not accept it as their own. For example, a user who replies to their friends almost immediately to avoid feeling like they have misbehaved.
- **Identified regulation:** here the person values a goal and an action as accepted or personally important. For example, a user who spent more time on SNS because they wanted to increase their profile popularity.
- **Integrated regulation:** here the person identifies with the importance of the behaviour but also integrates those identifications with other aspects of the self.
- **Intrinsic regulation:** here the activity is enjoyable in itself and based on personal interest. For example, a person who plays video games for long periods because they enjoy it.

2.3.3 SELF-EFFICACY THEORY

Self-efficacy is defined as an individual belief that he or she will be able to accomplish a specific task. An essential component to achieving something is the confidence that they can (Bandura 1977). Self-efficacy drives people's motivation and Bandura referred to self-efficacy as the mind's self-regulatory function which tells them when to try and when to stop. Bandura states four sources of self-efficacy: mastery, modelling, persuasion and physiological

factors. For example, when a user is confident that they can stop procrastinating by using their phone for three hours they will do so, whereas if the user has low self-efficacy they might struggle to stop. It does not mean that when the user has high self-efficacy they will achieve their goal, but high confidence drives many people's motivation to accomplish goals.

2.3.4 SELF-REGULATION THEORY

Self-Regulation Theory (SRT) is a system of conscious personal management that involves the process of guiding one's own thoughts, behaviours and feelings to realise goals (Bandura 1991). Low self-regulation is associated with academic procrastination (Senecal et al. 1995). For example, when a user tries to stop browsing SNSs for three hours to enable them to prepare for an exam and they see a notification telling them that they have received a message from a friend. If the user has low self-regulation, they will go back to their phone again and procrastinate instead of preparing for their exam. SNS designers use powerful and different methods to target as many users as possible by providing an attractive environment that encourages users to stay online. Hence, users might struggle to control their procrastination on SNSs.

2.3.5 PEER PRESSURE

Peer pressure can be defined as the direct influence on people by peers, individuals or groups to encourage them to change their behaviour or attitude to conform with those of their peers (Steinberg and Monahan 2007). It can be a positive or negative influence and most people have experienced it. Peer pressure might lead people to procrastinate or delay their main task. For example, an employee whose job is to reply to customers' emails may notice while working that their colleague was browsing Facebook, so they also stop working to do the same. It was not that their colleague asked them to stop working but they were influenced by seeing that their colleague was not working. Therefore, peer pressure must be considered as one of the factors that might encourage people to procrastinate, especially for undergraduates who may have low self-esteem (Chen et al. 2016b).

2.3.6 THEORY OF PLANNED BEHAVIOUR

The Theory of Planned Behaviour (TPB) links one's beliefs and behaviour towards an action. The theory states that the attitude towards behaviour, subjective norms and perceived control collectively guide a person's intentions and behaviour, see Figure 5 (Ajzen 1991). It also explains how people might influence each other's behaviour and attitudes. In addition, personal beliefs and the confidence of a person about performing an action can predict their behaviour. TPB will be used to measure users' acceptance toward using the developed method for combating procrastination on SNS.

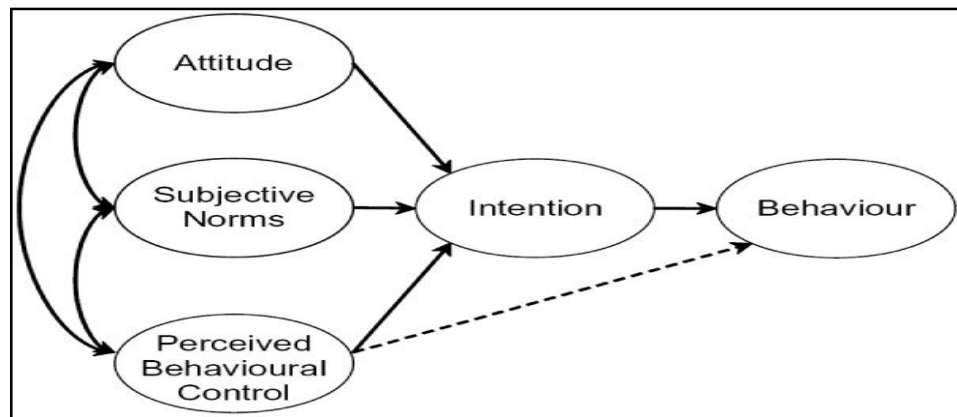


Figure 5: Theory of Planned Behaviour (Ajzen 1991)

- **Attitude towards behaviour:** this concerns positive or negative thoughts and these thoughts are influenced by: (i) behaviour belief; for example, the belief that having lots of followers on SNS helps to generate profits from advertising products. (ii) Outcome evaluation (positive or negative) of the consequences; for example, using SNS accounts are important to find jobs. In this sense, a positive intention leads to a positive attitude which results in performing the action. Moreover, it's important to note that an intention does not mean that the action or behaviour will be performed but if people do not make the intention, they will never predict any behaviour.
- **Subjective norms:** subjective norms are social pressures that people feel from friends or family which encourage them to perform an action. For example, a student accessing SNS during class time because their classmate proposes that browsing SNS

during lectures is a fun way to release the stress that is associated with lectures and helps the student feel better.

- **Perceived behaviour control:** this is more about how the person believes they can do the action. For example, a user is confident that they can stop browsing SNS when they have an important task to perform.

2.3.7 SELF-IMAGE

Self-image is one of the self-concept theories and it refers to how people see themselves and the idea one has of one's abilities, appearance and personality (McLeod 2008). Positive self-image can have a direct impact on a person gaining confidence which can lead to better attitudes in performing tasks. Moreover, in order to improve abilities, skills and behaviour, the first step is that individuals need to understand their strengths, weaknesses and behaviour. These might help individuals to decide what kind of behaviour or skills they need to improve.

2.3.8 IDEAL SELF

Ideal-self is one of the self-concept theories. Ideal self can be described in a simple question: what would you like to be? Thus, when a person has a huge gap between the ideal self and the real self, it might produce a feeling of lack of harmony. The ideal self may help to understand the procrastinator's behaviour before the stage of the solution design which can help people gain more control over their procrastination. For example, when a user procrastinates most of the time at work, the first step to help them control their procrastination is that the person acknowledges they have a problem; then they are working to attain the ideal self.

2.3.9 REINFORCEMENT THEORY

Reinforcement theory is one of the motivation theories that aim to establish how to change people's behaviour and how to reshape this behaviour using three types of procedures: reinforcement, punishment and extinction (Skinner 1984). Rewards are used to reinforce good behaviour and punishments are used to prevent certain undesirable behaviours. In addition,

Extinction is used to stop someone from performing a learned behaviour. According to reinforcement theory, behaviour can be increased or enhanced by positive or negative reinforcement.

2.3.9.1 POSITIVE REINFORCEMENT PROCEDURES

Positive reinforcement usually encourages people to change a behaviour by giving them positive reinforcement and it has been claimed that people are likely to repeat their behaviour when they receive positive reinforcement (Skinner 1984). Positive behaviour receives a reward each time. For example, to increase positive behaviour in the classroom, students who do not access SNS during lectures could receive virtual points.

2.3.9.2 NEGATIVE REINFORCEMENT

Negative reinforcement happens when something already present is removed. The behaviour increases due to escape and avoidance (Chomsky 1959). For example, students who access SNS during lectures will lose their internet connection for a limited time. Table 3 shows the difference between the positive and negative reinforcement and also shows the difference between positive and negative punishment.

Punishment refers to directly removing a reward after observing undesirable behaviour (Skinner 1984). Positive punishment could involve adding something a person doesn't like to deter certain behaviour. Negative punishment could involve removing something a person likes to deter undesirable behaviour. The difference between reinforcement and punishment is that reinforcement tells people what to do and punishment only tells them what not to do. **Extinction** can be used to reduce unwanted behaviour by ignoring certain behaviour in a bid to prevent repetition (Skinner 1984).

Table 3: Differences Between Positive and Negative Reinforcement and Positive and Negative Punishment

Positive reinforcement	Adding something that the person likes to increase a behaviour
Negative reinforcement	Removing something that the person likes to increase a behaviour
Positive punishment	Adding something that the person dislikes to decrease a behaviour
Negative punishment	Removing something that the person likes to decrease a behaviour

2.4 SOFTWARE ASSISTANCE TOWARD COMBATTING PROCRASTINATION

This section presents techniques that can be used by this thesis in order to help users to gain greater control over their procrastination. These techniques include persuasive techniques, gamification.

2.4.1 PERSUASIVE TECHNIQUES

Persuasive technology is a technology that helps to change people's behaviour by gentle persuasion, coercion and influence rather than by pressure (Fogg 2002). Fogg identified three main drivers of human persuasion in the Fogg Behavioural Model (FBM): motivation, ability and triggers (see Figure 6). According to the FBM, to achieve a desired goal, people should have motivation, ability and effective triggers. Hence, the probability of achieving a goal needs to combine all of these three drivers. For example, motivation without a trigger or ability is unlikely to result in success. Fogg classified seven types of persuasive technology tools: Tunnelling, Reduction, Tailoring, Suggestion, Self-Monitoring, Surveillance and Conditioning.

- **Tunnelling:** design the system to show users actions that are required to achieve the desired behaviour. For example, when a user registers on a website, the progress bar illustrates how many actions are needed to finish the process. A good example of the tunnelling is the progress bar for downloading new software which shows users the required steps to finish the downloading process. Hence, users will be more motivated to finish the process when they see the endpoints.
- **Reduction:** use the computer facilities to minimise complex tasks into a few processes in order to make it easier. For example, people who postpone working on their assignments because the deadlines are far away can divide the assignment into small pieces and have closer deadlines for each piece of work. Thus, the person gives each piece of the assignment its due time which could positively increase the quality of the assignment.
- **Tailoring:** encourage people to change certain behaviours by providing them with relevant information. In tailoring the provided information is customised and personalised based on the user's interest or history. This increases the probability that users remain or even increase users' engagement on the persuaded system. The recommended list on YouTube is a good example of tailoring.
- **Suggestion** technology in persuasive system refers to delivering the right information at the right time to the user in order to achieve a certain behaviour. The content of the suggestion could positively motivate users to control procrastination when users receive proper guidance on how to control it or users get suggestions focusing on the need to perform a specific task (Davis and Abbitt 2013). Suggestion technique can take a further step and include user's contacts in order to tell them about the availability of the user; thus, reducing the distraction of notifications which eventually reduces

procrastination. In order to achieve that, the suggestion techniques can integrate with user's calendar to suggest to the user's contacts the availability of the user which reduces the probability of the interaction outside the available time.

- **Self-Monitoring:** This refers to the ability to monitor people and show them their behaviour in certain tasks with the aim of changing that behaviour. For example, provide feedback about the daily usage of SNS for the users. Then users can assess time consumption and might take further actions to reduce the amount of time they spend on SNS. When a user has a goal to reduce the amount of time spent on SNS, self-monitoring helps to compare the actual state with goals state, and users assess their improvement toward achieving the goals (Fabriz et al. 2014). The feedback that users receive frequently can keep users motivated towards achieving their goals and could also increase the feeling of self-efficacy when users gain more control over their behaviour (Zimmerman and Paulsen 1995).
- **Surveillance:** In this technique, users are observed by others, which might add more pressure on users and can encourage users to adopt certain behaviours. Surveillance techniques are widely used for many purposes such as employers monitor their employees' productivity and parents monitor their kids. However, surveillance can also be implemented in the design of SNS where the user can see when their contacts are online and whether they are available. However, this type of surveillance could trigger procrastination when the user stays online and reply to their friends' requests in order to build self-image or to increase their account popularity. Software such as iOS screen time monitors users and provided them with their daily usage of SNS. Users can then assess the provided feedback and manage their usage of SNS better.

- **Conditioning:** this technique encourages users to change their behaviour by using “operant conditioning”. Conditioning could be similar to the reward system in gamification—in order to receive a reward, the user is required to accomplish a specific task.

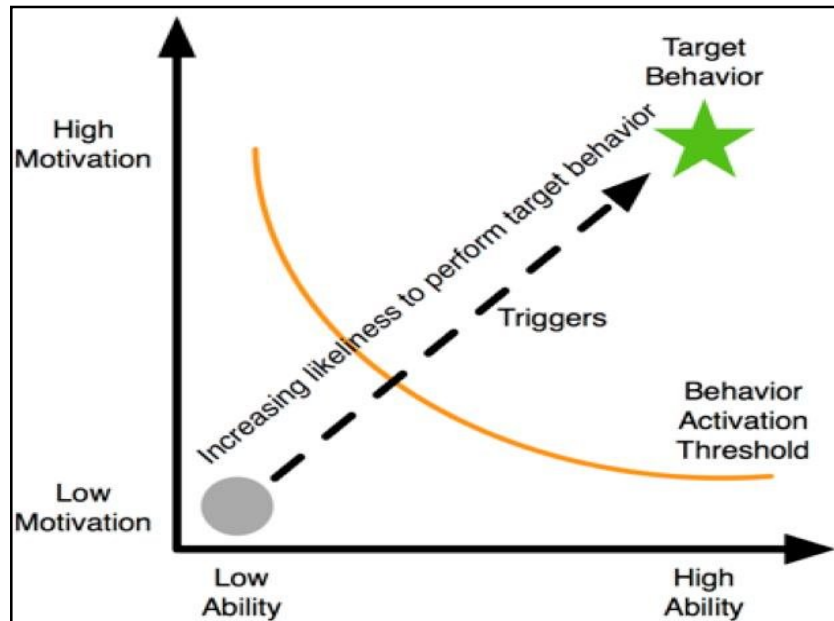


Figure 6: FOGG Behaviour Model (FBM)

2.4.2 GAMIFICATION

Gamification techniques refer to the use of game elements in non-game context (Deterding et al. 2011). Gamification is widely used to increase productivity at work and enhance the work environment. It can also be used to direct people’s behaviour such as reducing the amount of time they spend online or even helping to increase users’ motivation to perform tasks such as walking or eating healthy food. Gamification techniques can nudge users to avoid procrastination and maintain focus on their tasks without the use of force. For example, if a user procrastinates because of the boredom associated with a task, it is possible to gamify the task itself by adding certain techniques such as a points system and a leader board to bring some enjoyment to the task itself.

This research can benefit from using these kinds of techniques to increase users' awareness of their procrastination and motivate them to have greater control of their procrastination; so that in the long run, users can gain more control over their procrastination.

2.4.3 GAMIFICATION DEFINITION

There are several definitions of gamification. Gamification is defined as integrating game elements into their sites, services or community in order to encourage participation (Urh et al. 2015). Alternatively, it could involve the use of game mechanics to engage users in a particular activity (Zichermann and Cunningham 2011). A considerable number of research papers have described gamification as the use of the game design in a non-game context (Deterding et al. 2011).

2.4.4 GAMIFICATION COMPARED TO SERIOUS GAMES

Gamification and serious games both have similar uses and aims which are to motivate and engage users in a particular activity (Susi et al. 2007). The differences between serious games and gamification are that serious games are games that have been designed for a primary aim other than entertainment, whereas gamification is the use of game elements in a non-game context such as leader boards in other areas like marketing in order to increase engagement and effectiveness. Both benefit from offering enjoyment to their users and both encourage participation in such activities.

2.4.5 THE EFFECT OF GAMIFICATION ON BEHAVIOUR CHANGE

The main purpose of integrating gamification elements into an existing system is to engage players or system users to accomplish a task by offering rewards and competitive-based elements such as a leader board or points to refine users' motivation. These elements affect user's behaviour, drive these behaviours to the desired goal and increase enjoyment in a non-game context (Zichermann and Cunningham 2011; Urh et al. 2015). Numerous studies have noted that the addition of game elements leads to a change of behaviour towards a desirable

goal (Cafazzo et al. 2012);(Landers and Callan 2011); (Thom et al. 2012). Some researchers have claimed that the addition of game elements to a non-game context might lead to changes in users' behaviours in the same group, particularly relating to user gender and age. For example, (Malone 1981) noted that there was a difference between what girls and boys liked about adding game elements to a mathematics application. In this sense, the research should consider these factors in order to integrate gamification elements into a system in order to reduce procrastination.

2.4.6 STAGES OF GAMIFICATION DESIGN

The adding of gamification mechanisms into SNS features and tasks environment may have a positive impact on helping users gain more control over their procrastination. For example, if a user procrastinates because of a lack of motivation to perform a task, it may be possible to gamify the process of the task to improve their commitment to the task by adding points in order to increase the user's motivation to perform the task. There are several models that illustrate the stages of gamification designs which are widely used as guidelines for the gamification designs e.g., (Werbach and Hunter 2012; Deterding 2015; Robson et al. 2015; Morschheuser et al. 2017). The following seven stages are the most suggested stages in most of these models. These stages include project preparation, analysis, ideation, design of prototypes, implementation of a design, evaluation, and monitoring.

2.4.6.1 PROJECT PREPARATION

Project preparation is the earliest stage of adding the gamification element into a system. As a first step, there is a need to identify the different issues that can be addressed by using the gamification elements (Werbach and Hunter 2012; Klevers et al. 2015). Furthermore, in the preparation stage, the designers must identify the goals of using the system. Identification of the system goals should focus on the users' needs to ensure that the proposed system satisfies their requirements which can increase their engagements (Deterding 2015). Having clear goals and identifying users motivation can also help to measures the success of the used

elements in the evaluation stages (Werbach and Hunter 2012; Fitz-Walter 2015). Finally, the preparation stage will help to determine whether adding the gamification elements is an appropriate solution to addressing the identified problems (Fitz-Walter 2015; Helms et al. 2015).

2.4.6.2 ANALYSIS

This phase requires identification of the necessary knowledge needed to target users such as their needs and current behaviours. The analysis stage also requires identification of the characteristics of the current system to which gamification elements are been added to (Brito et al. 2015; Deterding 2015). The literature suggests several methods that could help to identify the users' needs and the current system's characteristics such as interviews and surveys (Deterding 2015; Schmidt et al. 2017). After collecting the data, users can be clustered into different user groups. The use of personas to describes the different group is a common practice in the literature (Dignan 2011; Schmidt et al. 2017).

2.4.6.3 IDEATION

After completing the previous two stages and the characteristics of the user and the system are clearly identified, the development of design stages can begin. The first step in developing the gamification elements is ideation. Ideation describes activities to come up with ideas for designing gamification. Brainstorming is one of the popular methods that can be used to achieve this stage. It helps designers to come up with lots of ideas for the gamification design (Rice 2012). Several researchers demonstrated the need for inviting the users to take part in the ideation stage. Users' involvements can help to ensure that the proposed design is likely to satisfy the user's needs, i.e., user centre design method (Abrams et al. 2004). There are several techniques that can help to guide the ideation stage such as game design patterns, board and video games (Herzig et al. 2015; Schmidt et al. 2017). The outcomes of the ideation stage could be a list of ideas that are to be considered on the next stage which is the design of prototypes stage.

2.4.6.4 DESIGN OF PROTOTYPES

After collecting ideas as discussed in the ideation stage, the next step is to design the prototype for the considered design. There are four stages in this phase which include design concept, create the suggested prototype, evaluate the suggested prototype, and plan development. The prototype can be built in the form of paper prototypes and sketches (Deterding 2015; Herzig et al. 2015). After creating the prototype, there is a need to evaluate the suggested prototype to examine whether they meet the defined goals that were identified in the preparation stage. The prototype can help to test the efficiency of the design in its early stage which helps to improve and develop the design until the designs meet the goals defined in the preparation stage (Brito et al. 2015; Deterding 2015). This stage also helps to discover the side effects and the issues that might come up before the implementation of the actual design. The last stage is the development plan which will be handed to the software designer once the suggested prototypes meet the defined goals. The development plan contains all of the information that developers need to follow for the implementation phase (Herzig et al. 2015).

2.4.6.5 IMPLEMENTATION OF A DESIGN

The implementation phase seeks to develop a pilot which can be used for the evaluation of the gamification design (Fitz-Walter 2015). Some researchers have suggested iterative procedures for the implementation phase to ensure that the implemented design meet and satisfy the user's needs (Rice 2012; Werbach and Hunter 2012). During this stage, the implemented design is tested as much as possible with the users to meet their expectation. Once the implemented design stage is completed, the implemented design can move to the evaluation stage.

2.4.6.6 EVALUATION

The evaluation stage examines whether the proposed gamification designed meets the objectives that were identified in the preparation stage. Several methods can be used to carry out the evaluation stage successfully, for example, interviews with the users and surveys

(Francisco-Aparicio et al. 2013; Klevers et al. 2015). Some researcher recommended the use of playtesting method which refers to observing users whilst they use the proposed gamification design (Deterding 2015). Observing participants using the gamification design can address the limitation of the interviews method when some participants fail to describe the technical issues on the design or forget to report them in detail.

2.4.6.7 MONITORING

The monitoring stage can help to develop and improve the design of the gamification mechanism over time. This stage will help to ensure that the gamification systems are updated based on users' needs which increase the efficiency of the gamification mechanism (Mora et al. 2015). This can be achieved by enabling the users to send comments and feedback regarding the design issues or to suggest more features to be included in the next version of the current design. Satisfying users' comments can also increase their engagements with the system.

2.5 CHAPTER SUMMARY

This chapter reviewed the relevant literature on procrastination on SNS and psychological behaviour change theories which can be used to motivate users to gain more control over their procrastination. It also presented a review of persuasive technology and gamification design which the research suggests can help address the research problem. The next chapter presents the research approach that has been used in this research and the methods that were used for participant's recruitment, data collection, and data analysis.

3 CHAPTER 3: METHODOLOGY

Drawing on Saunders et al. (2007) research onion (see Figure 7), the purpose of this chapter is to outline the methodological decisions made in this thesis to address the research question. A justification is given for each of the methods used, and a rationale is provided for the data collection techniques and procedures. At the outset, after specifying the research philosophy used to underpin this thesis (pragmatism), the chapter proceeds through a discussion of the selected research approach (inductive), strategies (case study, ethnography, grounded theory, and survey), choices (mixed-method), time horizon (cross-sectional), and techniques and procedures. In each case, scholarly definitions are given for the various layers of the research onion, the possible options in terms of each stage of the research process are outlined, and the chosen philosophy, approach, strategies, choice, time horizon, and techniques and procedures are examined.

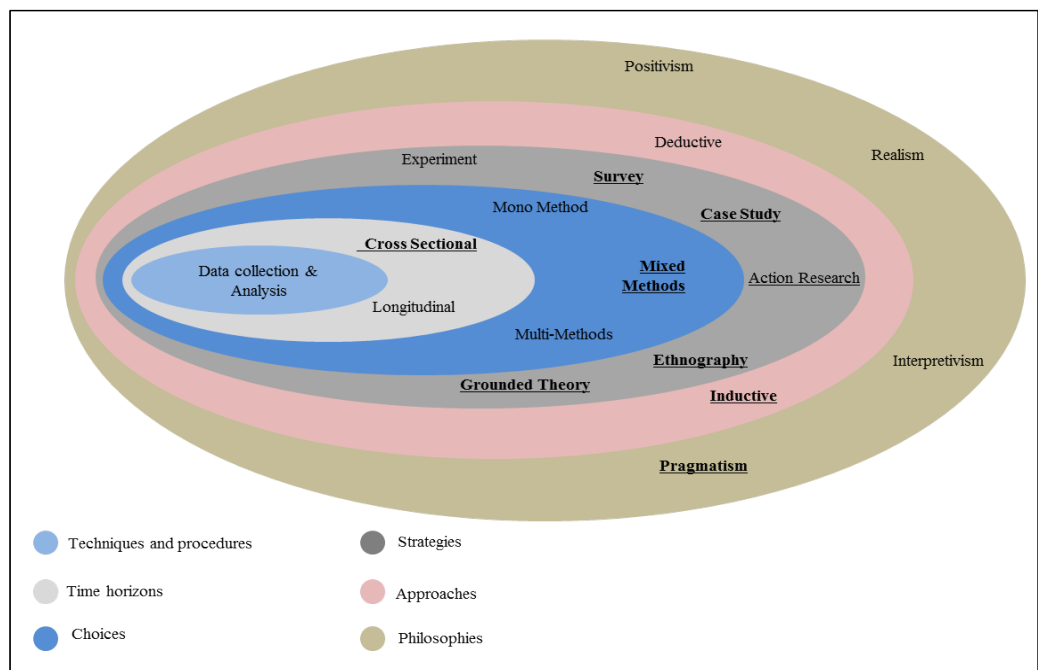


Figure 7: Research Onion with Choices (Underlined) For This Thesis (Saunders et al. 2007)

3.1 RESEARCH PHILOSOPHY

The main philosophical paradigms that researchers can use to guide their research process are examined in this section, namely positivism, interpretivism, pragmatism, and realism. To be specific, a research philosophy represents a “way of seeing” a given research issue, and it serves as a consistent system of ontological, axiological, and epistemological beliefs and assumptions that a researcher holds about the development of knowledge in their field of study (Saunders et al. 2007). Choosing and, furthermore, justifying the suitability of a research philosophy is the first stage of any coherent research process because one’s beliefs and assumptions strongly shape the way in which subsequent aspects of the piece of research are approached (Saunders et al. 2007; Denscombe 2008). An overview of the main research philosophies and their associated data collection techniques and procedures is given in Table 5.

3.1.1 PRAGMATISM

The pragmatist philosophy is grounded in the view that the ways in which social and physical realities can be interpreted are diverse, and thus require multiple modes of inquiry in order to permit intelligibility (Saunders et al. 2007). Hence, researchers who adopt the pragmatist philosophical paradigm allow their research questions to determine the methods of inquiry that they utilise to develop knowledge in their field of study. A range of approaches and strategies, including qualitative, quantitative, and action research, are typically included in pieces of research that are guided by the pragmatism paradigm (Wilson 2014), and these research projects may integrate both positivist and interpretivist perspectives (Saunders et al. 2007).

3.1.2 POSITIVISM

The positivist philosophical paradigm assumes that the development of knowledge in a particular area of inquiry must proceed on the basis of empirical investigations, observations, and – often statistical – measurements and modes of analysis. The positivist ontology sees the

world as constituted of distinct, intelligible (i.e., discernible through observation) components that interact in a regular, ordered, and determined way (Collins 2018). Hence, although research paradigms offer researchers with clearer understandings of the world they are examining, positivists tend not to participate in the studied world (Saunders et al. 2007). Wilson (2014) explained that a positivist researcher's view is informed by the belief that their mode of inquiry can be objective, and that they themselves are independent of the phenomena under investigation.

3.1.3 REALISM

Realists maintain that the external world exists independently of any observers and their theories (Phillips 1987; Saunders et al. 2007). Realists can be divided into critical realists and direct realists, where the former believe that people's observations of the external world are mediated by human sensory apparatuses, while the latter believe that these sensory apparatuses do not interfere, and thus they perceive external realities in a direct way (Saunders et al. 2007). The first step to experiencing the world for a critical realist involves interfacing with the thing itself, while the second is concerned with the cognitive processes that this interaction initiates. According to Saunders et al. (2007), direct realism only accounts for the initial step.

3.1.4 INTERPRETIVISM

In contrast to positivists, interpretivists consider that realities can only be accessed through socially constructed resources, including language, instruments, and consciousness (Myers 2019). Therefore, interpretivism takes human interests, lived experiences, and attitudes into account when examining research issues (Creswell and Clark 2017). The methods associated with the interpretivist philosophical worldview are as diverse as the social realities that the philosophy is initially adopted to investigate, and these methods are predominantly qualitative rather than quantitative. Secondary research is often used in interpretivist research processes,

and non-statistical data and modes of analysis are typically employed to allow human experiences and reflections to be considered.

Rationale for Selecting Pragmatism

Before making a decision about which research philosophy to use for the present thesis, the data collection methods associated with each of abovementioned philosophies were considered. This information is given in Table 4. After considering the implications of adopting each of the research philosophies discussed throughout this section, the decision was made to select the pragmatist philosophical paradigm. The first reason is because pragmatism is concerned with investigating a research issue in the most suitable possible way, and it does not rely as heavily as positivism and interpretivism on rigid systems of assumptions and beliefs (Cohen et al. 2002). At the same time, since this thesis seeks to examine the strengths and limitations of procrastination countermeasures, the pragmatist philosophy's focus on the world of human experience was identified a reasonable way in which to evaluate these strengths and limitations. Additionally, since both quantitative (i.e., questionnaires) and qualitative (focus groups, diary study, and co-design session) data collection initiatives were deemed essential in order to gain adequate insights into the research question, the pragmatist philosophy was considered reasonable.

Table 4: Research Philosophies and Associated Data Collection Methods (Saunders Et Al., 2007).

	Pragmatism	Positivism	Realism	Interpretivism
Data Collection Methods	Mixed methods or multi-method	Large samples	Methods chosen in line with the study's primary topic of concern	Small samples

	Quantitative and qualitative	Structured processes	Quantitative or qualitative	In-depth engagement with participants
		Predominantly quantitative		Predominantly qualitative

3.2 RESEARCH APPROACH

A research approach outlines the broad conceptual framework that a researcher will use to guide and order the actual research activities that they will undertake. The deductive and inductive approaches are the main research approaches, each of which is illustrated in Figure 8.

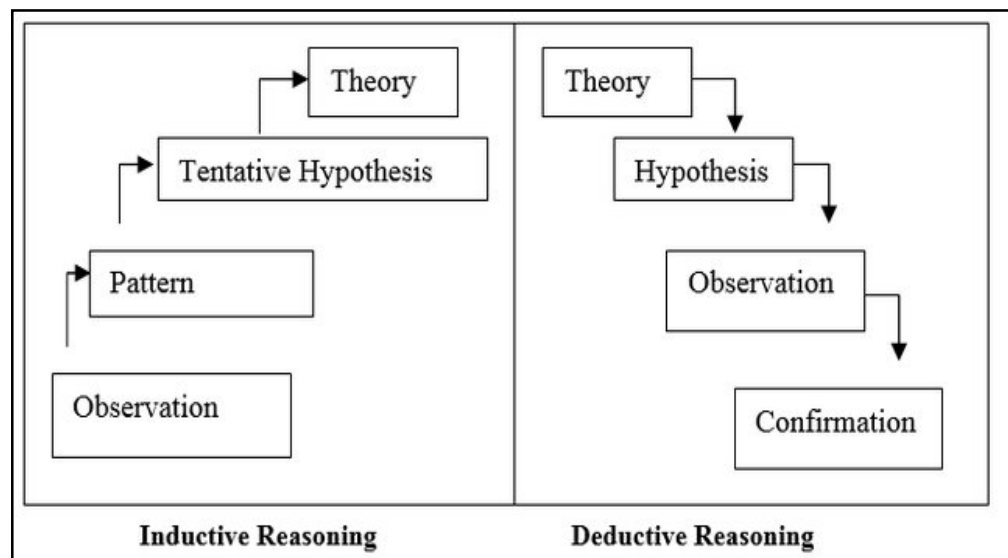


Figure 8: Deductive and Inductive Research Approaches (Saunders et al., 2007)

As Figure 8 indicates, the deductive approach is “top-down” while the inductive approach is “bottom-up”. The theory generation/identification and hypothesis formation stages of the deductive approach and followed by the collection of empirical observations, a process which relies on sampling and, in order to generate generalisable and reliable results, a sufficiently large sample size (Saunders et al. 2007). In turn, the collected data are analysed

in order to confirm or reject the hypothesis, which has implications for the initial theory. Contrastingly, the inductive approach partly reverses this process, beginning with an observation, moving to the interrogation and analysis of these observations (i.e., to discern a pattern), and ending with the creation of a new hypothesis and theory, each of which may be tested using the deductive approach. In this way, the deductive approach moves from the specific to the general, whereas the inductive approach moves from the general to the specific. It is also notable that, when seeking to investigate complex behavioural and social issues, inductive reasoning is valuable because it illuminates causal relationships without the need to identify interpretations of the social world (Thomas et al. 2015).

The inductive approach was selected for this thesis because the researcher intends to leverage the approach's structural flexibility. Additionally, this thesis intends to examine the role of SNS features design in encouraging user procrastination. At the same time, it seeks to identify the various countermeasures that can be used in future SNS designs to mitigate procrastination.

3.3 RESEARCH STRATEGY

Research strategies, which can be explanatory, exploratory, or descriptive, are chosen in order to guide the formation of an overarching plan by which the research question and aim can be addressed (Saunders et al. 2007). Certain strategies are the natural counterparts of the deductive approach and a particular type of philosophy (e.g., the positivist philosophy), while others are closely associated with the inductive approach and other types of philosophy (e.g., the interpretivist paradigm). Specific research strategies including ethnography, action research, grounded theory, and case study (Saunders et al. 2007). A researcher's decision about whether one strategy should be chosen over another, or whether several strategies should be pursued, should be informed by the research question and the overall objectives of the inquiry (Saunders et al. 2007).

3.3.1 ETHNOGRAPHY

As an inductive research approach, the strategy of ethnography is concerned with a researcher's immersion in the social world they seek to gain insights into (Saunders et al. 2007). As such, ethnography is marked by its flexibility, its time-intensive nature, and the acquisition of diverse field observations. Since successful ethnography depends on embedding a researcher into a social setting, it is associated with a range of challenges, most notably the need to establish trust between the researcher and the community in which they will gather data. Furthermore, identifying an effective approach to the evaluation of the obtained qualitative data is an obstacle, but it can be addressed by undertaking follow-up studies (e.g., using focus groups or interviews) with either the same group or similar participants.

3.3.2 EXPERIMENTS

To examine causal relationships between a dependent variable and a collection of independent variables, the experiment strategy can be used (Saunders et al. 2007). As a result, this deductive research approach is often employed in the natural and social sciences, or even in practical and theoretical education-focused research to illuminate "how" and "why" questions.

3.3.3 SURVEYS

Surveys commonly used in the social sciences, particularly business and management research, the survey strategy involves the cost-effective and time-efficient collection of large, quantitative data sets that can be analysed (e.g., using inferential and descriptive statistical techniques) to draw representative and generalisable conclusions about a particular population (Saunders et al. 2007). A fundamental limitation of a survey strategy is that the research findings are directly informed by the strengths of the data collection instrument (e.g., a questionnaire), which may suffer from problems relating to validity. It should be noted that observational methods and structured interviews can also be used as a part of a survey strategy (Saunders et al. 2007).

3.3.4 CASE STUDY

According to Lancaster (2007), the purpose of a case study strategy is to draw on a range of evidence sources in such a way as to illuminate a specific phenomenon in a real-world context. One of the strengths of the case study strategy is its ability to generate contextualised research findings (Morris and Wood 1991). Explanatory and exploratory case study strategies can be used (Saunders et al. 2007), in which the researcher can leverage a range of data collection techniques and procedures (e.g., focus group, interviews, and questionnaires). When case studies are designed in an effective way, they can be used to test theories and examine novel research questions. As discussed by Yin (2012), case studies are commonly chosen for research evaluations in real-world settings, and although they are generally not used in isolation in a research project (i.e., they are typically combined with other strategies), they typically satisfy the evaluation process and assist in the identification of significant findings.

3.3.5 GROUNDED THEORY

Grounded theory is a form of systematic methodology that is used extensively in the social sciences and involves constructing medical theories by gathering and analysing data in a methodical manner (Glaser and Strauss 2017). Grounded theory is a form of research methodology that makes use of what is known as inductive reasoning. Its characteristics offer a sharp contrast to what is known as the hypothetico-deductive model, which is very widely used in scientific research (Glaser and Strauss 2017). Grounded theory research needs to be conducted by first identifying the substantive area of research, after which data that pertain to the substantive area are collected. The data must then be open-coded and memos written throughout the entire process. Theoretical sampling and selective coding must also be undertaken as part of grounded research. Once all of the data have been collected and analysed, an attempt is made to develop concepts and theories from the emergent data (Morse et al. 2016).

Grounded theory is the principal research strategy used to guide the present thesis. This is because it is a natural counterpart to the inductive approach, and also because it is a valuable tool for addressing many of this study's focal points (i.e., the concepts of peer pressure, time management and motivation in relation to procrastination on SNS). At the same time, the flexibility of this thesis, as well as its question-driven nature, are consistent with the hallmarks of grounded theory.

3.3.6 ACTION RESEARCH

Action research is a type of methodological and philosophical framework that is applied in the social sciences. It seeks out transformative change by implementing the process of undertaking action and conducting research, with both processes linked together collectively through a process of critical reflection (Coghlan 2019). The action research method involves participating in an active way in a situation of change, often through an existing organisation or business structure, with research also being conducted simultaneously. Action research can be undertaken by both large and small institutions, and is usually guided or assisted by professional researchers with the aim of bringing about an improvement in knowledge and strategy, as well as knowledge of the surrounding business environment (Coghlan 2019). As part of an action research strategy, the problem to be investigated must first be identified, after which an action plan needs to be developed. After this, data must be collected and analysed, followed by forming conclusions. The theory on which the study is based will be modified and the results of the study reported, followed by a summary (Coghlan 2019). However, action research was not selected for the current thesis because of the limited data about procrastination on SNS. Therefore, the grounded theory strategy was adopted instead.

3.3.7 RESEARCH CHOICES

Choices in the context of a research project are determined by the researcher's decision to engage with qualitative data (i.e., non-statistical), quantitative data (i.e., statistical), or both

(Saunders et al. 2007). Depending on a study's research questions, the most viable choice may be to draw on each type of data and various modes of analysis, or only to use a single one.

Thus, according to Saunders et al. (2007), there are several different types of choices a researcher can make: (i) mono method, which involves the use of a single data collection method with data analysis (i.e., qualitative data collection with qualitative analysis, or quantitative data collection with quantitative analysis); (ii) mixed methods, which combines both qualitative and quantitative data collection methods and analysis techniques, either in sequence or parallel; and (iii) multi-method, which involves the use of several data collection methods with data analysis (i.e., two or more quantitative or qualitative data collection initiatives with quantitative or qualitative analysis, respectively).

In this thesis, the mixed methods choice was decided on because both qualitative and quantitative data collection methods and modes of analysis were used (in Chapters 4 and 5, and Chapter 6). The value associated with a mixed methods choice stems predominantly from the opportunities offered in terms of data triangulation, where the results of the quantitative and qualitative phases of the research project can be used to draw more robust and evaluated conclusions. Additionally, the use of a mixed methods design in this thesis allowed the research to gain insight into the main role of the design features of SNS in triggering procrastination, and also to explore the influences on the views of the participants in terms of desirable countermeasures.

Time Horizon

Cross-sectional and longitudinal time horizons are the main types identified by Saunders et al. (2007), and the choice made about a research project's time horizon must be informed by the research strategy, the research question, and the methods used. Cross-sectional studies collect data from a population at a specific point in time (e.g., examining the views of participants on one occasion following an event), whereas longitudinal studies gather data from a population at multiple points in time in order to assess changes in certain variables

(e.g., examining how the views of participants following an event change over the course of a month, year, or a longer period). In this study, the cross-sectional time horizon was chosen not only because it leads to a more cost-effective and more straightforward project, but also because addressing the research question did not require an investigation of changes in target variables over time. In particular, the study explores the features that trigger user procrastination on SNS, as well as the countermeasures that can be mobilised against this. Working closely with users, the study sought to establish a multi-stage anti-procrastination system to guide users about how they can identify what causes them to procrastinate and, moreover, to provide personalised countermeasures to prevent this.

3.4 TECHNIQUES AND PROCEDURES

As the central element of the research onion, a study's techniques and procedures can be considered the various methods and analysis processes used to recruit participants, calculate sample sizes, collect data in a way that minimises bias and maximises reliability, transferability, or generalisability, and analyse data in a way that promotes the acquisition of informative insights. In this section, the various data collection and data analysis techniques and procedures used for the present thesis are explored and justified. An overview of the data collection methods used in this thesis is given in Table 5, along with an explanation of the location in this document where their application and results are discussed in depth.

Table 5: Summary of Data Collection Methods

Data Collection Methods	Type	Location Used
Focus groups	Qualitative	Chapter 4 and 8
Diary study	Qualitative	Chapter 4 and 8
Follow-up Interviews	Qualitative	Chapter 4

Co-design	Qualitative	Chapter 5
Survey	Quantitative	Chapter 6 and 8

3.4.1 DATA COLLECTION

Given that this thesis adopted the inductive approach, it moves from data collection and analysis to the formation of hypotheses and theory generation. In this section, an overview of the data collection methods used in this thesis is given. Here, only a general description is offered for each of the methods. For a discussion of the manner in which these methods were implemented, as well as the results generated from applying each method, the reader should turn to the corresponding chapter noted in Table 5.

3.4.1.1 FOCUS GROUPS

As a cost-effective way to gather rich and diverse information from a group of participants (Lazar et al. 2017), focus groups are structured discussions that take place within a sample group for the purpose of eliciting specific types of data pertaining to a research issue (Saunders et al. 2007). The researcher's responsibility during a focus group session is to coordinate the discussion, to gather targeted information without influencing the participants and affecting their responses, and to maintain the discussion within predetermined boundaries (Saunders et al. 2007). The size of a focus group depends on the available time and resources, as well as the research topic under investigation, but most focus groups range from 4-12 participants (Saunders et al. 2007). The limitations of focus groups include the potential for certain participants to become dominant, thereby preventing the views and opinions of others from surfacing and being heard. In this study, a focus group was used to gather the initial findings relating to how people perceive procrastination on SNS, to identify various types of procrastination and the countermeasures associated with each one, and to explore aspects of SNS functionality that could promote procrastination. The researcher presented different

scenarios in the focus groups to stimulate discussions around the research topics, and every member of the group was encouraged to participate. A comprehensive explanation of the focus groups used in this thesis is given in Chapter 4.

3.4.1.2 INTERVIEWS

Interviews allow researchers to collect valid and reliable qualitative data that is directly relevant to the study's aims, objectives, and questions (Saunders et al. 2007). Effective interviews gather data in a precise way in relation to the research issue, and they tend to serve a specific purpose. As a case in point, exploratory interviews may be conducted in order to assist a researcher in establishing their study's requirements, and the challenges associated with interviews of this kind are distinct when compared to those which aim to resolve predetermined research problems. According to Saunders et al. (2007), the following are the main types of interviews: firstly, structured interviews, in which a standardised set of questions are given to every participant, yielding clear and focused answers that can be directly compared; secondly, semi-structured interviews, in which both structured and unstructured (i.e., follow-up and clarification) questions are posed to participants, potentially with the ordering of the questions being changed based on the participant and the flow of the interview; and finally, unstructured interviews, where instead of pre-defined questions, the researcher knows about the loose direction they want to follow with the participant, and thus can interact freely over the course of the discussion. For the present thesis, follow-up interviews were also conducted with the participants to verify the data collected through other channels (e.g., in their diaries), thereby increasing credibility and reducing bias.

3.4.1.3 DIARY STUDY

This qualitative method involves the creation of documents by the research participants that log details and personal experiences pertaining to specific life events as they occur, or as soon as possible after they occur (Lazar et al. 2017). In this thesis, diary study represented a useful way to examine why and how specific aspects of technology were employed in a natural setting. Additionally, the use of diaries enabled the researcher to gain rich insights into a social

phenomenon, principally because they motivated the participants to reflect on their experiences in ways that were not possible through interviews and focus groups.

Several approaches can be taken to facilitate diary study as a data collection method, including time-based design (which includes interval design and signal-based design) and event-based design (Bolger et al. 2003). Time-based design involves the creation of diary entries at specific times, which may be fixed or random. This approach is chosen when the researcher is interested in continuous experiences that can be examined over the course of a specific time period (e.g., investigating fluctuations in mood over the course of a day) (Bolger et al. 2003). As for event-based approaches, this involves the logging of information after specific events occur. In this approach, it is critical for the participant to describe the event that preceded the note-taking activity, since this ensures that the researcher has access to the full context, and thus can draw useful inferences from the data. Event-based designs are suited for research projects that are centred on specific phenomena, processes, or events, particularly those that may be marked by their rarity or level of isolation. As a case in point, Jensen-Campbell and Graziano (2000) used an event-based design for their diary study of interpersonal conflict in adolescence.

In this thesis, diary study was used to enable the researcher to expand on the findings gathered from the focus groups regarding the types of procrastination that the participants engaged in, and also to illuminate the factors identified by the participants as the potential drivers of procrastination on SNS. Another consideration that was crucial to pay attention to for the present thesis was that time-based and event-based designs may overlap in certain respects. At the same time, these designs can be combined when appropriate to increase the robustness of a study's approach, and also to increase the coverage of the data artefacts that result from the diary study process. As a case in point, Mohr et al. (2001) used both event-based and time-based designs to examine alcohol consumption and related interpersonal experiences in varying settings.

3.4.1.4 CARD SORTING

Card sorting may be used by researchers to collect data in situations when it is essential to determine how individuals categorise, evaluate, and understand information (Barrett and Edwards 1995). According to Upchurch et al. (2001), the term “card sorting” was coined in a research project that used index cards with a term on one side (i.e., a word or a phrase) and, on the other side, definitions of the term or additional information. As noted in the literature, there are two main types of card sorting exercises: firstly, closed card sorting; and secondly, open card sorting.

The closed card sorting is valuable in cases where a researcher’s aim is to illuminate participants’ perceptions of the information included in their conceptual framework. When compared to open card sorting, closed card sorting is more evaluative. This is because it allows participants to evaluate information, and then these assessments are assigned to labels or categories supplied by the researcher. The approach assists in clarifying ambiguous classification levels, and it offers researchers insights into the most-used, most useful, and most irrelevant labels associated with their conceptual framework. Some researchers may modify the closed card sorting method in order to establish a semi-open approach. This involves conducting a closed card sorting exercise with the participant, but enabling the participant to add new groups, remove existing groups, or change group names.

As for the open card sorting approach, it is comparable to the open-ended question approach, mainly because researchers present respondents with questions relating to specific phenomena so as to gain information relating to their views. The flexibility of the approach stems from the fact that it may elicit diverse responses from the participants, which can subsequently be used to discover themes, labels, and novel concepts that may be useful to the researcher, and which the researcher may not have thought of previously. When the literature pertaining to the research issue is underdeveloped, this is a valuable generative and exploratory technique, which stands in contrast to the evaluative nature of the closed card

sorting approach. For the present study, the open card sorting technique was applied in order to plan and enhance the finding themes and their sub-themes.

3.4.2 DATA ANALYSIS

The purpose of this section is to provide an overview of the data analysis techniques used throughout this thesis.

3.4.2.1 THEMATIC ANALYSIS AND CONTENT ANALYSIS

This data analysis technique is useful when the researcher has access to a qualitative (i.e., non-statistical) data set in which they aim to discern and report on themes and codes (i.e., sub-themes) (Braun and Clarke 2006). The details involved in a thematic analysis process may differ depending on the researcher conducting the process, but it is worthwhile to pursue a coherent, structured process to ensure that the codes and themes which emerge from the process are reliable and valid. According to Braun and Clarke (2006), the process involved in thematic analysis can be divided into the following stages: firstly, becoming familiar with the qualitative data set; secondly, establishing preliminary codes; thirdly, searching for and identifying initial themes; fourthly, reviewing the identified themes; fifthly, defining the identified themes; and finally; writing up the results.

It is noteworthy that the principle that underlies both content analysis and thematic analysis is the same, namely in that it seeks to decompose a large piece of text into the smaller units of content on which it is based, and which rest at its foundation. However, although various points of similarity exist between the two modes of analysis, content analysis is generally viewed as being more appropriate for the straightforward reporting of common issues, whereas thematic analysis allows researchers to gain a richer and more comprehensive account of the data set (Vaismoradi et al. 2013). With this distinction in mind, as well as the strengths associated with thematic analysis when compared to content analysis, the former approach was used in the present thesis to identify themes relating to the SNS features that may promote procrastination (see Chapters 4 and 5). Nevertheless, content analysis was also

used to examine the data gathered through evaluation sessions, primarily to assess the utility and acceptance of the proposed anti-procrastination method (see Chapter 8).

3.4.2.2 MEMBER CHECKING

Member checking, which relies on the collection of informative feedback from research participants, is used to evaluate the qualitative data gathered over the course of a research initiative (Lundahl et al. 2010; Birt et al. 2016). When member checking is employed, it lowers the likelihood of researcher bias because it promotes the internal verification of the interpretations made. Member checking was used in the present thesis to ensure that the researcher's data analysis outcomes were credible from the point of view of the research participants (Doyle 2007). The process can be completed one-on-one, where a researcher conducts an interview with one of the participants, or it can be coordinated in the context of a focus group session.

3.4.2.3 DESCRIPTIVE STATISTICS

Descriptive statistics and various data visualisations were used in this study to provide general insights into the questionnaire data, to account for the sample population's characteristics in an intelligible and manageable way, and to ensure that reasonable quantitative interpretations of the collected data could be acquired. Further details relating to this quantitative data analysis technique are given in Chapter 6.

3.5 DESIGN APPROACHES

In this section, the participatory design approach and the user-centred design approach are examined, both of which are widely used in the literature to involve stakeholders, including users, in the design process. Gaining insight into user interactions with SNS and their requirements in relation to these platforms is critical in understanding how procrastination can be mitigated. At the same time, it can assist in identifying the optimal scenarios that may limit the risk of incorrectly implementing specific countermeasures for procrastination, which

would negatively affect the user experience. Ultimately, actively involving users in the design approach can heighten the degree to which the proposed design is likely to be accepted in practice, principally because each user's preferences are used as the foundation on which the design is established. In the following two sections, an overview is given of the participatory design approach and the user-centred design approach.

3.5.1 PARTICIPATORY DESIGN

Participatory design (PD), commonly referred to as co-design, involves bringing users directly into the design team, thereby ensuring that their decisions and preferences begin to inform the software development process from the earliest stages (Sanders 2002). The design intentions of PD and user-centred design (USD) are comparable in that both seek to centre the system lifecycle on users. A key point of differentiation, however, is that PD places a greater emphasis on user engagement at the design stage.

It is well-documented in the literature that including users in the design process can yield a range of benefits. For example, Kensing and Blomberg (1998) noted that, when a piece of software is being designed to assist in the completion of working tasks within a corporate setting, the managers who oversee employees whose responsibility it is to complete such tasks are typically interested in ensuring that workers themselves are included in the software development process. One of the reasons for this is that the inclusion of the individuals who ultimately use the software in the design process ensures that it will leverage, be based on, and, moreover, not interfere or inhibit their ability to exercise their skills. A critical challenge associated with a PD process of this kind is that, when users are included in the design process, other stakeholders may drown out their voices, which highlights the necessity of effective management of the situation.

Almost all anti-procrastination techniques rely on group and social activities, with prominent examples including leader boards and achievement badges. As such, these tend to rely heavily on social comparisons. In view of this, the achievement of a satisfactory design

is dependent not only on the involvement of users in a classical manner (i.e., in terms of discovering and validating user needs) but also throughout the design process. The development of anti-procrastination techniques can be identified and agreed upon at the earliest stages of the software lifecycle.

The initial result in this thesis is given in Chapter 4, the purpose of which is to identify user expectations and to determine what SNS features promote procrastination. Additionally, drawing on the assistance of the individuals who participated in this research project, the researcher drew up a list of anti-procrastination techniques that could help users gain greater control over their time management, and to limit the side-effects of any introduced countermeasures.

3.5.2 USER-CENTERED DESIGN

According to Norman and Draper (1986), user-centred design (USD) is a broad term used to refer to design practices that draw on user preferences and requirements to inform the system under development, thereby promoting system usability and productivity. A central feature of USD is the inclusion of a robust testing process that evaluates the system's validity (Abrams et al. 2004). According to Eason (1987), users can be divided into three categories: firstly, primary users, who directly use the system; secondly, secondary users, who use the system periodically or indirectly; and finally, tertiary users, who are impacted by the fact that the system is used. In order to implement a system successfully, the design process must take into consideration the widest possible range of stakeholders and users. Nevertheless, Meho and Rogers (2008) noted that the design team is only required to represent users who are affected by the system.

As noted by Abrams et al. (2004), one approach to user involvement in the design process is as follows: firstly, at the outset of the design project, to draw on questionnaires and interviews to illuminate user expectations and needs; secondly, soon after the design project has been initiated, to conduct supplementary questionnaires and interviews linked to the

sequence of work; thirdly, early in the design lifecycle, to include a broad group of stakeholders in focus groups, thereby identifying their requirements, expectations, and issues with the completed design work; fourthly, to conduct an on-site observation to gather environmental data, which should be undertaken at the same time as the preceding stage; and finally, during the preliminary and middle phases of the design lifecycle, to undertake simulations, walkthroughs, and role-plays to assess various design options and, simultaneously, to discover user requirements in greater depth.

3.5.3 SCENARIO-BASED APPROACH

According to Carroll (1997), a scenario is a story that involves agents, each of which has objectives and participates in a sequence of events and actions. As defined in the Oxford English Dictionary, a scenario refers to “the outline or script of a film, with details of scenes or an imagined sequence of future events”. A range of scenarios should be considered throughout the design lifecycle not only to inform the details of the system under development but also to assist in testing and evaluation processes, and to discern user requirements (Monk et al. 1993; Sutcliffe and Carroll 1998). At the same time, Rolland et al. (1998) explained that the principal objective of considering scenarios is to provide an account of the real-world situation, as well as the captured requirements.

In the present research, the scenario-based approach was used to stimulate focus group discussions and co-design sessions. Further details are provided in Chapters 4 and 5. The approach proved useful in engaging participants about the research problem and, alongside this, to allow the participants to understand the main concepts associated with the research. As a result, the participants could become immersed in the project, and scenarios could be proposed also as warm-up initiatives, thereby prompting the participants to develop their own scenarios to explain how procrastination occurs or how specific techniques could be leveraged to counteract procrastination. In this way, novel countermeasures could be identified with rich ideas to address every dimension of the research issue.

3.6 ETHICAL CONSIDERATIONS

Ethics are the norms, standards of behaviour, or moral principles that guide people's interactions with others in the world (Bell et al. 2018). When conducting research projects that involve human or non-human animals, it is critical for researchers to consider ethical issues that may arise (Saunders et al. 2007). Before implementing a research design, the first step for any researcher should be to apply for and, in turn, acquire ethical approval from an official ethics committee (i.e., at a university or research institution). Additionally, (Saunders et al. 2007) noted that researchers should seek ethical approval from any gatekeepers to funding opportunities, since this could impact the question of whether or not the research design can ever be implemented.

A fundamental principle of research ethics is that, when dealing with human participants, their rights must be safeguarded. No participant should be included in the research project who did not provide voluntary and informed consent and, for those who do provide this, their right to withdraw from the study at any point, their right to privacy, and their right to security and anonymity must not be undermined. In order to ensure that these rights are appropriately handled throughout the research process, clear systems must be in place, and coherent processes must be followed. For example, evidence of consent must be gained, participants should receive information sheets which fully outline what their participation entails (including risks and rewards), and data rights and protection must be clearly explained.

Ethical approval for the present research project was obtained from the Bournemouth University Research Ethics Committee (BUREC). Furthermore, measures were taken to ensure that the level of risk the participants were exposed to upon participating in this research was no greater than the risk they would encounter in the course of their daily life. Pre-obtained consent forms were signed by every participant, and these forms included information that the participants were required to read about their rights. Additionally, an information sheet was

provided which fully explained the nature of the procedures involved in the research (e.g., the research objectives, questions, roles of the participants, data protection practices, and anonymity assurances). Identifying information was removed from all of the data gathered from the participants, after which these were stored in a secure location.

4 CHAPTER 4: PROCRASTINATION ON SNS: TYPES AND TRIGGERS

As mentioned earlier, the literature is limited to identifying the relationship between procrastination and the design of SNS features and whether SNS has responsibility for facilitating procrastination. Therefore, this chapter is designed to explore the relationship between procrastination and SNS features. The aim is to identify certain prominent features and context of usage which are typically associated with various kinds of procrastination. In this chapter, different types of procrastination and the general perceptions of people who procrastinate and others who are affected by procrastination will be investigated. In addition, different countermeasures will be identified that could be integrated into the future design of SNSs to help users gain more control over their procrastination. The main findings of this chapter are published in (Alblwi et al. 2019b).

4.1 FIRST PHASE: FOCUS GROUP DESIGN

The study is designed to explore common factors in SNSs that may contribute or relate to procrastination. Several possible factors have been identified in the literature and these include escapism (Taneja et al. 2015), habitual usage (Vitak et al. 2011) and fear of missing out (Blackwell et al. 2017). In the focus group, a particular novel aspect is the exploration and understanding of the role of software features in facilitating procrastination. Moreover, the study will explore how SNS's users perceive the relation between procrastination and social media; both people who procrastinate and people who are affected by procrastination. In addition, the study will explore the potential for novel SNS's advanced features that future software could incorporate to aid users have more control on their procrastination when using SNS's.

Two focus groups sessions were conducted with a total of sixteen participants. In order to enhance the discussion and avoid clustering and digression, the participants were

divided into two sessions; the first session comprised nine participants and the second had seven participants. The focus group questions were based on four base questions. These four questions were designed to fill the gap that has been identified in the empirical literature regarding providing more details about the nature of the role of SNS design in facilitating procrastination.

- What is the general perception of procrastination and social media?
- What are the different types of procrastination on SNSs and users' motivation for facilitating procrastination?
- What are the relationships between these types of procrastination and SNS features?
- What are the types of procrastination countermeasures that can be facilitated through SNSs? What are the participants' views about incorporating them in future SNSs; i.e. their acceptance?

During the first fifteen minutes of each session, a short presentation was given by the researcher to ensure that the participants were fully briefed regarding the concepts of the study, such as the research problem and the persuasive techniques that could be used in the future to mitigate the procrastination problem. After that, several persuasive techniques were presented as an initial solution that could help to overcome the research problem. In the second part of the focus group, three scenarios were discussed. These scenarios provide examples that explain how people procrastinate when using SNSs. In addition, participants were encouraged to write down certain techniques that may help to overcome the scenario problems from their perspectives or from the persuasive techniques that were presented earlier (see appendix 1).

Sampling

Non-probability sampling (more specifically, convenience sampling) was used to recruit the participants. This particular method offers certain advantages such as the simplicity of

sampling and the ease of data collection which can be facilitated in a short period of time (Castillo 2009). Also, this sampling technique helps to gain initial data about the topic and determine whether or not the research requires further action (Bryman 2015). They distributed the advertisement for the focus group using a student email list as well as among student groups on Facebook. The participants were also encouraged to bring their peers to the focus group sessions. The study's inclusion criteria require participants to have self-reported that they procrastinate most of time, be aged over 18, and be active participants on SNSs (see appendix 2). Based on the sampling criteria, sixteen participants were recruited for this study (9 male, and 7 female). The sample size should not be too small because this would make it difficult to obtain significant findings but nor should it be too large because this would make it difficult to undertake a deep case analysis (Bryman 2015).

4.2 SECOND PHASE: DIARY STUDY

In the second phase the study was conducted a diary study in order to evaluate the focus group finding and to elaborate in the initial finding of the focus group. The diary study sought to confirm the focus group findings and seek additional formation regarding how SNS features may facilitated users to procrastinate. It has also sought to name the countermeasures that were reported by the participants as useful techniques to help people gain more control of their procrastination. The participants were asked to record their stories once they felt they were procrastinating and send these stories to the researcher via WhatsApp. Daily reminders were sent to each participant in order to remind them to report their stories. They were also required to share a minimum of one story each day. A template of the procrastination story was sent to the participants in order to help them to use this template when recording their stories to ensure that data bias was avoided (see appendix 3). The template was designed to cover the study aspect and was discussed and approved by the research supervisory team. The research benefits from using this method because it involves the participants reporting their thoughts,

feelings and behaviour repeatedly in real time and in different contexts which enhance the findings' credibility (Fraley and Hudson 2014).

In the diary template, participants confirmed which SNSs they are use when procrastinating. Moreover, details were given for the task that the participants were working on or were supposed to be working on in order to ensure they were procrastinating. Furthermore, they provided details about the triggers that led participants to start browsing SNSs and the activities that they were performing on SNSs when procrastinating. In addition, participants were required to describe the difficulty of controlling procrastinating in each story and what the different elements were that made them procrastinate for a long time. On top of that, participants described the countermeasures and how they would expect these countermeasures could help to control procrastination.

Sampling

The study was conducted with sixteen participants, seven females and nine males. Their ages ranged between 18 and 40. The participants who participated in the focus group also participated in the diary study. Using the same participants for the second phase of the study helped the researcher to gather valuable information because the participants are already familiar with objectives of the study.

4.3 THEMATIC ANALYSIS

Thematic analysis used in order gain a deep insight into the focus group data. The thematic approach is widely used for data analysis in qualitative research. It is used as a method to identify, analyse and report patterns. Hence, these patterns are important to the description of the phenomena. Thematic analysis offers many advantages to researchers because of its flexibility, it can summarise key features of a large body of data and can generate unanticipated insights (Braun and Clarke 2006). The researcher collected the data and then the six stages of thematic analysis were applied. At the first stage, the researcher familiarised

himself with the data and read it many times to understand clearly what the participants had said. Then, in the second stage, the researcher started generating initial codes for each sentence or word that related to the study topic. In the third stage, the researcher mixed the coding and generated the related themes. In the fourth stage, the researcher reviewing the themes as some of the themes were deleted and some themes merged together. In the fifth stage names were given to the final themes. Finally, the researcher started writing the final finding (Braun and Clarke 2006). Table 6 showed an example of how themes were identified from participants' codes during the thematic analysis stages.

Table 6: An Example of The Thematic Analysis

Data extract	Code
<p>The notification is the worst feature that leads them to procrastinate when they are focussing on their work</p> <p>They need to set their priorities and impose caps before they start browsing SNSs</p>	<p>.. SNS features</p> <p>.. Type of procrastination (emerging task)</p> <p>.. Countermeasure (goal setting)</p>

4.4 PROCRASTINATION AND SNS DESIGN FINDINGS

In this section, procrastination on SNSs is categorised into four distinct types: avoidance, escapism, emergence and mood modification. Moreover, procrastination triggers are revealed, as well as the SNS features that facilitate and increase procrastination. The findings are summarized in Figure 9.

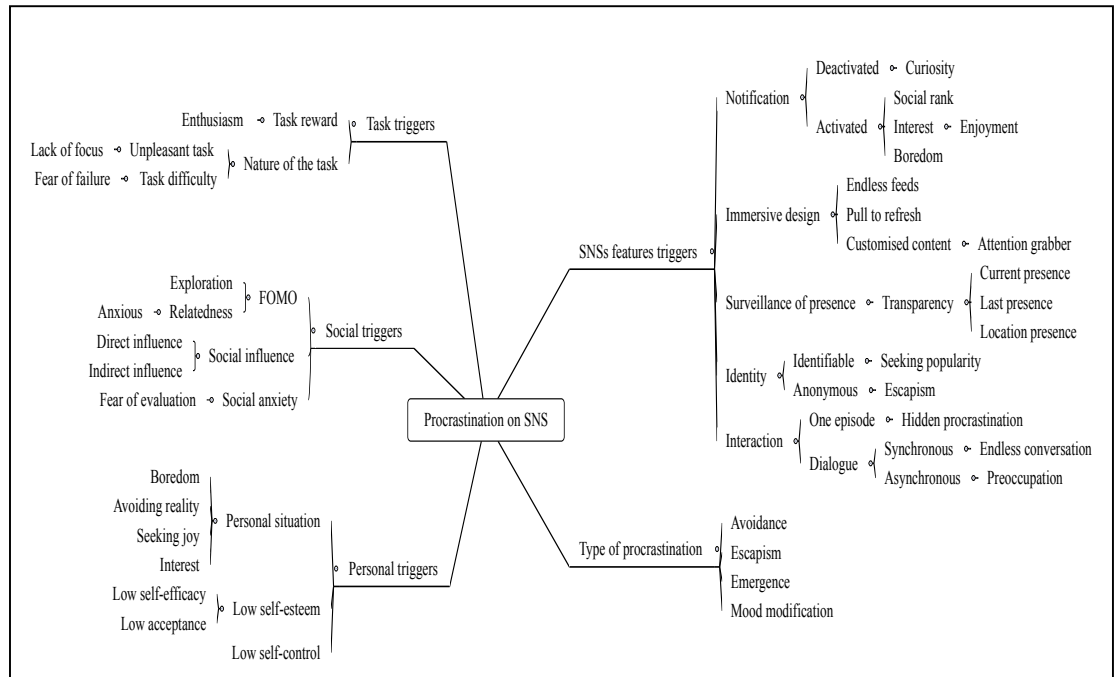


Figure 9: Procrastination Types and Triggers

4.4.1 PROCRASTINATION ON SNS: GENERAL PERCEPTION

Participants indicated that they usually use SNS, and eventually procrastinate, to relieve stress and refresh their mood. However, they were receptive to receiving software-assisted support to gain more control of their procrastination. Participants, who were generally students, acknowledged that procrastination on SNS has a significant effect on their academic performance and it is generally seen as time wasting. Furthermore, participants noted the fine line between procrastination as a way to relieve stress and it being seriously harmful behaviour. One participant stated that *“procrastination may be a good thing if it relieves stress because this could improve the quality of work produced but it should be well controlled.”* In addition, people who are affected by their peer procrastinators claim that procrastinating may become *contagious*, especially if they are in the same place. One participant said: *“If someone procrastinates [on SNS], they may distract others, especially those in the same class”* deterring them from doing their primary task and encouraging further procrastination.

4.4.2 PROCRASTINATION ON SNS: TYPES

The following section presents the four types of procrastination which includes avoidance, escapism, emergence and mood modification.

4.4.2.1 AVOIDANCE TYPE

Avoidance can be defined as the action of keeping away from or not doing something that needs to be done. In the case of procrastination, avoidance is what people are often inclined to do when they face unpleasable or unenjoyable tasks by delaying starting to work on them (Ferrari et al. 2005). Based on what was derived from the analysis, the lack of motivation to start doing a task might mean avoidance. Lack of motivation can occur because of an individual's limited intrinsic or extrinsic motivation to perform a task. However, the use of SNSs could be more intrinsically motivating and more enjoyable than the original delayed task. Unlike traditional tasks and interactions, SNS can provide instant rewards for users which increase their extrinsic motivation to stay online. For example, when a user posts a photo they might get instant rewards such as "likes" or positive comments. This reward might persuade users for to continue the usage of SNS and avoid the priority task. A participant said that "*the comments and notifications are designed to attract people to stay online*" without considering whether this will then encourage them to ignore their original tasks and jobs.

4.4.2.2 ESCAPISM TYPE

Escapism can happen when ignoring real life problems, anxiety and depression by immersing in SNS (Griffiths 2000). In some cases, such escapism is correlated with procrastination. Some people tend to delay or avoid dealing with financial difficulties, loneliness or fear through being in alternative, often unreal, environment online (Warmelink et al. 2009). One of the triggers is the feeling of low acceptance from peers during a group activity which encourages users to share ideas on SNSs and get better response. SNS features allow and probably persuade users to customise their profile and create a list of people who they like to follow, i.e. the eco chambers through collaborative filtering algorithms applied to news and

posts. This technique helps to build an alternative reality consisting only from what a person like to hear and see and this makes SNS and ideal escape environment for users who experience negative feelings in their real lives. Some participants argued that SNSs allow them to have anonymous accounts and that anonymity encourages them to express their real self without being identifiable by others. This persuades users to stay active for a long time even if being active has a negative impact on other important tasks. Some users preferred their alternative online life to their real life, and those people tend not to perceive time spent on SNSs as procrastination. Instead, they may feel procrastination if they do not fulfil the task of their online persona, e.g. gamers gathering online for a virtual battle.

4.4.2.3 EMERGENCE TYPE

Emergence type of procrastination can happen when people focusing on a task such as attending a lecture or writing a paper, get distracted by SNS task which then trigger procrastination online. The emerged task might lead people to stop focusing or delay work on the original task, which harms the productivity of their work (Mark et al. 2015). With SNS being a continuous medium for communication, there is always a threat to get distracted. One of the participants reported that: *“the notification is the worst feature that leads me to check and then procrastinate when I am focussing on my work”*.

4.4.2.4 MOOD MODIFICATION TYPE

Mood modification type of procrastination occurs when a user procrastinates to experience a better feeling. Mood modification is also, one of the six core components of behavioural addiction, including addiction to SNS, which has been considered by (Griffiths et al. 2014). Mood modification refers to the subject experience that people report as a result of engaging in a particular activity and can be seen as a coping strategy (Griffiths et al. 2014). However, mood modification in SNS occurs when a person visits SNSs to change their mood instead of working on their tasks. For example, when a user thinks that there might be some stress associated with a task they need to perform, they might start accessing SNSs in order to relieve the stress and build some confidence. One participant said: *“while I was working I felt stressed*

so I decided to have a look on Facebook” and comparing the high level of joy on SNS with the stress that is associated with the task, users find it challenging to stop procrastinating. One participant commented: *“even when I realized I was procrastinating and, it was hard to stop”*.

4.4.3 PERSONAL TRIGGERS

This kind of persuasion trigger refers the personal context and can be divided into three sub categories; personal situation, low self-esteem, and low self-control.

Personal situation refers to personal needs, feelings and emotions that lead users to procrastinate. Personal situations are divided into four sub-categories which include *boredom*, *avoiding reality*, *seeking joy*, and *interest*. *Boredom* is widely believed to be an important trigger of procrastination because most of the participants reported that they tend to procrastinate to combat a boring, not necessarily challenging, task and change their mood. A participant said: *“There was no reason for procrastinating other than that I was feeling bored so chose to go on Instagram”*. *Avoiding reality* happens when a person faces a situation that they do not believe they are able to deal with it due to low self-efficacy. They then start accessing SNSs and avoid working on it. For example, a participant said, *“I was browsing YouTube to see some funny videos instead of working on important task that need full concentration that I find difficult”*.

The emotional need for joy, *i.e. seeking joy* plays an important role in explaining people’s procrastination. SNSs provide their users with different types of activities that might deliver high levels of enjoyment such as chatting with friends, keeping up to date with their fans and sharing good moments with others. In addition, *interest* is associated with *personal situation* and can trigger procrastination. SNSs can be persuasive through customizing and personalizing the content based on user interest in order to seize their attention for more SNSs usage which can result in procrastination. For example, *hashtags* are presented to the user to match their recent search and browsing.

Low Self-esteem can be defined as the negative evaluation of oneself, or abilities (Neff 2011). Low self-esteem has been found to be one of the procrastination triggers that often leads people to avoid or delay performing a task (Scher and Ferrari 2000). Low self-esteem is divided to two subcategories which include *low self-efficacy*, and *low acceptance*. Self-efficacy is defined as an individual belief that someone will be able to accomplish a specific task. An essential component to achieving something is an individual's confidence that they can achieve it (Bandura 1977). There is evidence that *low self-efficacy* has been found as one of the predictors of procrastination (Wolters 2003; Steel 2007). For example, when a SNS user has low confidence to perform a task like sharing ideas during class time, this may encourage them to avoid focusing on the class and instead procrastinate more via SNSs. Some participants noted that *“People use SNSs to express their ideas under a nickname when they are not confident enough about what they are sharing”*.

Low acceptance refers to the feeling of not being recognized or appreciated by others. Participants said that SNS allow them to share whatever they want without feeling any pressure, they get a level of satisfaction from their friends on SNSs, and they feel less inhibited or incompetent. Moreover, for people who have low relatedness and feelings of not being accepted by others, SNS may meet their needs and allow them to create relationships and find new virtual friends. Hence, they might feel appreciated, understood and less lonely without looking at the meaning of that in practical terms, i.e. their job and reality. For example, some participants mentioned that while being a teenager, she used to *“use SNSs to be accepted by other peers”*.

There is an association between procrastination and **low self-control** (Wilson et al. 2010; Lee-Won et al. 2015). A study that explored the relationship between low self-control and Facebook noted that the enjoyment of browsing Facebook makes students lose track of time and that can causes delays to tasks that needed to be done such as writing a paper or preparing for an exam (Rosen et al. 2013). However, most of the diary and focus group participants noted that users who have low self-control typically find it difficult to stop

accessing SNSs due to the level of enjoyment and temptation that SNSs provide. This enjoyment can be achieved as a result of persuasive features like customized and personalized content which trigger interest or stimulate curiosity for new information.

4.4.4 SOCIAL TRIGGERS

Social triggers denote the family of triggers related to the users' human relationships and interests. Social triggers are divided into three sub-categories: *fear of missing out (FOMO)*, *social influence*, and *social anxiety*.

FOMO has been defined as a desire to stay continually connected with what others are doing to avoid missing important events and content (Przybylski et al. 2013; Alutaybi et al. 2019b). However, the strong desire to keep up to date with what is happening on SNSs and what people do seem to be one of the most important triggers of procrastination. Hence, users start to access SNSs to ensure that they do not miss anything. Participants mentioned some SNS features are much persuasive and lead them to procrastinate such as Snapchat stories and users' status which are temporarily valid, i.e. scarcity (Cialdini 1987). One participant said: "*Snapchat stories encourage me to read them because they will disappear after 24 hours*". *Exploration* features can also be associated with FOMO and these features tempt users to explore and seek more information about particular content. For example, when a user checks their SNSs accounts to avoid missing any information, they usually start to explore more information related what they started to explore. A participant said, "*I was watching video on YouTube and then other videos appeared, so I watched a few more*".

Social influence might persuade users to procrastinate. Social influences can persuade SNS users to procrastinate either *directly* or *indirectly*. Indirect influence happens when people normalize checking SNS because are doing the same. One participant said: "*seeing others browsing Facebook during the class encouraged me to do so*". Direct influence can occur when somebody asks other peers, in person or online, to access SNS for an interesting content, e.g. via tagging them in a picture or a post.

Social anxiety can lead SNS users to procrastinate mainly because of the *fear of evaluation*. Fear of evaluation is maximized when users have low self-efficacy and limited confidence which adversely affect their intrinsic motivation to perform the task. SNS enable users to personalize their accounts by organizing a list of followers and banding together those who have inconsistent views which helps to avoid having negative reactions (Oinas-Kukkonen and Harjumaa 2009).

4.4.5 SNS FEATURES TRIGGERS

The following section presents the features of SNS that may facilities procrastination. These features include notifications, immersive design, identity, surveillance of presence, and interaction.

4.4.5.1 NOTIFICATION

Notification features can be described as enhancing connectivity and up-to-datedness via user alerts when a user interacts with particular services (Dawot and Ibrahim 2014). Most of the participants agreed that notifications distracted them while they are working on a particular task and encouraged them to start accessing SNS. Therefore, notification seems to be the first trigger that usually facilitates procrastination. Notification can lead to procrastination in its two modalities; *deactivated* and *activated notification*. *Deactivated notifications* seem to persuade users to procrastinate indirectly because they are more tempted to know whether they received messages when a notification is muted. This may trigger user *curiosity* to access SNS. Hence, when the user browses SNSs they tend to compensate and perform other activities, such as chatting or searching for information. In contrast, *activated notification* may trigger user procrastination directly. Thus, clicking on the notification will lead users to start accessing SNSs and other activities might emerge. One participant said: “*I started browsing more and procrastinating when I got a notification through promoting a discount code for online clothes*”. It can be argued that there are other creative ways a notification may solve the dilemma, e.g. collecting notification from different social networks in one place to

demotivate further browsing and providing a recap-like notification which will be a way in the middle between active and deactivated notification.

4.4.5.2 IMMERSIVE DESIGN

Immersive design; can lead users to stay online for a long time because of the fear of missing temporal content such as snap chat stories. Moreover, an SNS feature such as *endless feeds* could persuade users to procrastinate while using SNSs by simply continuing to view other posts. For example, Twitter's never-ending newsfeed offers continuous browsing for extended periods of time. One participant said: *"I continued to procrastinate just scrolling through Twitter's home page"*. The *Pull to refresh* feature is designed to constantly remind users of the perpetual nature of newsfeeds. For example, when a user updates their newsfeed on Twitter, the *"pull to refresh"* icon appears, increasing the expectation of seeing something new, even if nothing comes up. This feature persuades users to stay online even for a matter of seconds to see what could follow. In addition, the *customized content* feature aims to provide content based on the user's experience or their previous browsing history profile. This also occurs by providing links or alternative content linked to the content that a user is viewing at a given time. Hence, alternative content may trigger users' interest to continue viewing content, increasing the overall user usage. One participant reported that: *"When I watch a video I find others on the recommended list that attracted me"*.

4.4.5.3 IDENTITY FEATURES

Identity features are the features that allow users to profile and represent themselves, e.g. choosing a name, avatar, status, motto and profile picture (Kietzmann et al. 2011; Dawot and Ibrahim 2014). Some users tend to use real information to represent themselves, whereas others prefer to use made-up identities. Users who use identifiable or real information might feel pressured to spend more time and *"gain more popularity and social influence"*. Craving popularity in turn triggers continuous usage in order to gain more followers which leads to further procrastination. In other cases, user popularity facilitates financial gain from advertising products or even by proliferating the popularity of other users. Therefore, a user

might stay active for longer in order to satisfy their followers and increase their account reputation. SNS features allow users to increase their popularity by showing popularity information on other followers, i.e. social proof (Cialdini 1987), thus increasing the popularity competition between them. *Anonymous* users prefer to use fictitious information to represent themselves on SNSs for reasons, such as privacy and freedom to express views which might be controversial, or being more relaxed and comfortable about their online presence (Kang et al. 2013). One participant noted that: *“Using a nickname increases the users’ confidence to talk without being worried because they are anonymous”* and this leads to an extensive time on SNS as well.

4.4.5.4 SURVEILLANCE OF PRESENCE FEATURE

Presence features refer to the extent to which users know if others are available (Kietzmann et al. 2011). Using presence features, people can share some details about their location or the times they are active. **Surveillance of presence feature** causes procrastination by broadcasting the user’s status as online and active. Therefore, once the user starts accessing SNSs, they may feel they are being monitored by others increasing the pressure to respond to any request from their contacts or followers. A participant said, *“because two blue ticks appeared I’m forced to reply”* which means she felt that the system was monitoring her presence which forced her to spend sometimes chatting at the expense of her work. Similarly, SNSs monitor their users through the feature of **transparency**, which captures information about their SNS access history which includes *current presence*, *last presence* and *user location*.

Current presences feature identifies if a user’s contacts are currently online. Some participants claimed that appearing online when they receive a message forces them to reply to these messages in order to maintain good relations with their friends and avoid losing them. One participant said: *“because I appeared online I had to start the conversation”*. Moreover, while the user appears online this may trigger starting a conversation because other users may expect that user is available at that moment. This expectation adds pressure on users to reply

which can result in procrastination. Similarly, *last presence* feature adds pressure on users by encouraging them to access SNSs to respond to and interact with others. For example, when a user's status shows that they were recently active, it provides an indication to others and increases their expectations of receiving a response. This expectation could have a significant effect on user procrastination by enticing responses to message request in an attempt to maintain good relations with other users. A participant said: "*I procrastinated on WhatsApp as I opened my friend's message page and closed it without replying to her messages which means that two blue ticks appeared to her*". Furthermore, the presence of *user location* might also facilitate procrastination. For example, when a user posts a photo on Instagram, their location appears to others. Hence, the location information might trigger further interest in posts originating from the same location, triggering further usage.

4.4.5.5 INTERACTION FEATURES

Interaction features on SNSs are the features that allow users to interact with others. Several research studies suggest that the main motivation for users to be active on SNSs is to use the features that allow them to interact with their peers (Smock et al. 2011; Suki et al. 2012). These features were divided into two subcategories based on the nature of the interaction as *one episode* and *dialogue*. *One episode* interaction refers to a single, non-repeatable interaction, such as liking a post or re-tweeting. This type of feature is seen as a procrastination trigger because users keep checking their SNSs in order to see how many likes or re-tweets they have received, especially those interested in their level of popularity. One of the participants said: "*I posted a photo about my trip to Paris and I kept thinking about the number of likes I got for it, so I couldn't focus on my work*". Hence, the *one episode* feature enables users to get social reward which increase their extrinsic motivation to frequently check for more reward. *Seeking popularity* may associate users to procrastinate as SNSs allow users to count how many *likes* and *retweets* they have gained on each post. Moreover, *one episode* features may trigger user *curiosity* about their own post. For example, when a user posts a photo on Instagram, they may start thinking about user feedback, both positive and negative

feedback. Over time, the user may begin to feel worried why others are ignoring the post if no one engages with it, which in turn can lead to the emergence of hidden procrastination. On the other hand, when the user receives feedback on their post, such as likes or comments, this may lead to further posts in order to increase their followers' satisfaction and gain more popularity.

Dialogue features refer to continuing interaction between SNS users, such as chatting features, and comment sections. This type of interaction may increase procrastination as many participants of the focus group and the diary study reported that chatting with others increased their SNS usage which leads them to procrastinate. Interaction within a *dialogue* can be divided into two sub categories: *synchronous* and *asynchronous*. In the *synchronous dialogue* the nature of the interaction requires both users to interact with each other at the same time, which makes users more motivated to keep interacting due to the frequency of responses. A participant said: “*I continued to chat with him for more than half hour*”. Therefore, users who have low self-control tend to procrastinate more because they find it difficult to stop the interaction which can result in seemingly *endless conversations*. The threat of *endless conversations* is increased when the user expects a quick reply and the feature shows that the other person is “*typing*” or “*recording*.” This may increase user expectations to see something new which triggers continued usage. In contrast, *asynchronous* refers to communication in which data can be transmitted intermittently rather than in a steady stream which can lead users to be *preoccupied* by thinking about received responses.

4.4.6 TASK TRIGGERS

Task triggers has been identified as one of the procrastination predictors (Pychyl et al. 2000). Some people might tend to procrastinate because of the **nature of the task**. For example, the task itself is unenjoyable, stressful or frustrating which prevents them from dealing with it or might lead to *lack of focus*. Also, *task difficulty* can lead SNS users to avoid performing a given task because of the *fear of failure*. At the same time, **the reward of a task** may have a

significant effect on how individuals perform a task, and the reward can be *intrinsic* or *extrinsic*. *Intrinsic motivation* can be defined as engaging in a task for the reward inherent in the task such as interest and enjoyment, whereas *extrinsic motivation* refers to performing an action to obtain a reward or outcome (Ryan and Deci 2000). The task reward has significant effect on user's *enthusiasm* to perform the task.

4.4.7 NEGATIVE CONSEQUENCES OF PROCRASTINATION

Additional factors related to the negative side effects of procrastination were identified in this section. Feelings of guilt, increased levels of stress and task switching were found to be the negative consequences of procrastination.

4.4.7.1 RABBIT HOLE WANDERER

Rabbit hole wanderers open up their phones for a specific reason but then open something else on their phone. As a result, the user wastes their time, feels disappointed and may not be able to remember the original task that they intended to perform, thereby causing them to waste yet more time. They disappear down the rabbit hole and become distracted by less important and less urgent tasks. Some of the participants claimed that the main thing that facilitated them to procrastinate is changing their aim when they start browsing SNSs. For example, when a participant received a notification about a birthday she said: *"I felt the need to go to my friend's profile and wish her happy birthday."* However, once she started browsing Facebook she fell down to the rabbit hole and started performing other activities that she did not intend to do as she said: *"Unfortunately, this has led me to use SNSs to do various other activities such as looking at news, replying to messages and updating my profile."*

4.4.7.2 FEELINGS OF GUILT

Feelings of guilt are considered to be one of the side effects of procrastination that some users experience when they realise their procrastination. There are different types of guilt such as feeling guilty about the time spent on SNSs instead of working. For example, one participant said: *"I felt the need to go back to my work and this feeling is kind of feeling guilty and this is*

how I stop browsing Facebook.” Moreover, some users may feel guilty about ignoring others on SNSs when they receive notifications from them. Feeling guilty because of ignoring others on SNSs may facilitate users to procrastinate because once a user replies to the message it might be unexpected and other SNS activities emerge that lead to longer procrastination.

4.4.7.3 INCREASED LEVEL OF STRESS

Procrastination may increase the level of stress for SNS users, especially for those who have very close deadlines. In some cases, people may surf SNSs to relieve stress and this could work with them for some time. One participant said: *“I was feeling stressed filling out the application so I chose to open the message as it seemed more fun to reply and begin a conversation.”* However, there is a fine line between realising you are experiencing stress and becoming more stressed as realising stress may lead people to become more stressed if they do not have control over their procrastination. One participant claimed: *“Browsing Facebook and avoid working on my theses made me nervous.”* Therefore, users should be aware of how to control their procrastination to avoid becoming more stressed when they are trying to relieve stress.

4.4.7.4 TASK SWITCHING

Media-induced task switching has a significant negative impact on students’ performance and well-being (Rosen et al., 2013; Xu et al., 2016). As a result, several studies have underlined that media-induced task switching during work hours is usually driven by high pleasure elicited by media activity and low self-control over the switching behaviour (David et al. 2015; Van Der Schuur et al. 2015; Xu et al. 2016). Procrastination via SNSs has negative side effects on users’ study moods. It is widely acknowledged that when a person focuses on their work, they tend to procrastinate for a while using SNSs and this makes it difficult for them to get back to their work again. One participant said: *“when I realised that I was procrastinating, I stopped and went back to my work but I could not go back to the study mood again.”* Hence, people will find it difficult to return to their work because of the different levels of enjoyment

they experience: the level of high enjoyment that is delivered by SNSs compared to the stressful mood caused by work.

4.4.8 SUGGESTED COUNTERMEASURES

This section presents the countermeasures that were chosen by the participants to help them gain more control of their procrastination. The countermeasures include reminders, self-monitoring, goal setting, time restrictions and suggestions.

4.4.8.1 REMINDER

Reminder systems remind users of their target when using the system (Oinas-Kukkonen and Harjumaa 2009). Hence, this technique can be used to help people to manage their time and keep track of things. The participants argued that these techniques help them to gain more control of their usage and a message that reminds them about their usage would help to raise awareness and gain more control over their procrastination. Different types of reminders were mentioned in the focus group and diary study such as reminders about the time wasted, reminders about the number of videos that have been watched and reminders about the task that should be worked on. Therefore, it was suggested that an app should be designed that connects to the SNS accounts in order to remind users about their usage. This would raise awareness so that they could gain more control over their usage. One of the participants said: *“the app would automatically show warnings if too much time is spent on a social media app.”*

In this sense, the app will allow users to customise the time as well as the type of reminder such as a sound alert and change in screen colour. Some participants claimed that *“a reminder would help stop me from procrastinating as I would be reminded to stop and go back to what is important”*. Therefore, the reminder technique seems to be needed and has high acceptance among users to help them gain more control over their procrastination. Moreover, some users are aware of their procrastination but wait for someone to remind them about procrastination because one participant said: *“Being told by someone or something other than me would make it easier to stop procrastinating as I don't often listen to my inner thoughts”*.

furthermore, (Davis and Abbitt 2013) investigated the impact that short message service (SMS) reminder systems have in terms of helping students to avoid procrastination and increase academic performance. They noted that reminder techniques have a positive impact on academic procrastination, performance and overall self-regulation skills. Moreover, (Goh et al. 2012) reported evidence of successful SMS implementation and its benefits for academic performance and self-regulated learning.

4.4.8.2 SELF-MONITORING

The system should provide means for users to track their performance or status (Oinas-Kukkonen and Harjuma 2009). Software checks the calendar and suggests to the person that they have a forthcoming activity. Hence, the user will be able gain more control over their procrastination, especially if the status appears for others to see it. Hence, they would not expect the user to reply. Furthermore, providing users with feedback about their usage such as time spent online and different locations that have a high amount of usage may help users to become more aware of their procrastination. So, they can figure out how to control their procrastination. Hence, one participant said: *“the app should show something like, at the end of the week and month, the total amount of time spent on social media. This way the user would be aware of how much time he is wasting.”*

4.4.8.3 GOAL SETTING

Goal setting can be defined as the development of an action towards achieving a goal that has been decided at an earlier stage (Teo and Low 2016). By using this technique, a feature could be added that allows users who use SNSs for chatting with others to write the topic of the discussion in order to nudge them to talk about this topic and avoid additional topics. Moreover, this feature may allow users to decide how long they want to stay online for. When that period of time has elapsed, the user will be automatically signed out. One participant suggested that *“we need to set our priorities and impose caps before we start browsing SNSs.”* In addition, users will benefit from setting a goal before they start browsing SNSs because this will increase their motivation to stay on the same task and avoid performing other tasks

that increase the amount of time wasted. It will also give users a sense of purpose and direction which makes them think before they start browsing SNSs about controlling their usage and avoiding procrastination. One participant noted that *“goal setting is working for me because it helps me to focus on one thing.”*

4.4.8.4 TIME RESTRICTION

Time restrictions are essentially the maximum time that a user can stay online or the period of time that a user cannot access SNSs. For example, the user can decide times at which they would not be able to access SNSs or this can be linked to their calendar. Hence, it would be beneficial to design an application that checks the user's calendar and then stops them from browsing SNSs during working hours. Some participants argued that *“the app should be able to block certain social media during work time.”* On the other hand, the user may decide to set up how long they want to stay online and then the app will keep track of their usage. Once it reaches the time limit, the app will sign the user out and stop them from browsing SNSs for one hour. Therefore, the user may start to gain more control of their usage, especially for those who have low self-control and find it difficult to stop browsing SNSs and return to their tasks. Some participants noted that *“designing an app that can block all SNSs after using them for five minutes for example. When I browse Instagram for five minutes, the app will automatically close the network and this will continue for one hour. Then it will allow me to browse SNSs again.”*

4.4.8.5 SUGGESTION

The system could suggest that users carry out certain behaviours during the system use process (Oinas-Kukkonen and Harjumaa 2009). For example, have you thought about your homework? One of the participants said: *“this type of suggestion may put people under stress”* whereas another participant said, *“stress is what we need to control our procrastination”*. In this sense, the participants do not mind having some stress in order to control their procrastination. Hence, a mobile application will be built to track users' calendars. Then the app will generate automatic suggestion texts based on the users' behaviour and these

suggestions will be sent once the user starts to procrastinate. Furthermore, the user may receive two types of suggestion. The first type is a suggestion to motivate the user to continue performing their task by sending a text message with positive sentences in a green colour. The second type of suggestion is to send a text message to raise users' awareness to avoid procrastination and this message may be in a red colour. Thus, the user can set up these sentences when they sign up to the application.

4.5 CHAPTER SUMMARY

This chapter sought to gain a better understanding of the phenomenon of procrastination and how SNSs contribute to it. Specifically, it sought to investigate and explore general perceptions about procrastination and SNSs, the different types of procrastination on SNSs, whether there is a relationship between SNS features and procrastination, and finally the countermeasures that help users to gain control of their procrastination. In order to achieve these objectives, two focus groups sessions were conducted with total of sixteen participants and then thematic analysis was used to gain insight and a deeper understanding.

The findings of this study revealed that there are links between SNS features and procrastination and these features clearly facilitate users to procrastinate which can have a negative impact on their performance and increase their level of stress. Different features such as notifications, conversation and identity features were found to be triggers that led users to procrastinate on SNSs. Different triggers can facilitate people to procrastinate such as task context, personal triggers and software triggers and these have been briefly explored above. Finally, different persuasive techniques were identified and deeply explored to help users to gain more control over their procrastination.

5 Chapter 5: Procrastination on Social Networking Sites: Combating by Design

In the previous chapter the researcher identified the families of SNSs features that have partially responsibility in facilitating user's procrastination on SNS. These features were briefly explored how they encouraged users' procrastination and the finding of the previous study noted the needs of having such techniques to help users to combat their procrastination. Therefore, the researcher conducted co-design sessions in order to identify the different techniques to help users to gain more control over their procrastination and the modality of application. The researcher adopted co-design method to allow users to take part in deciding what type countermeasures are needed to combat their procrastination on SNSs and how best to apply them.

This particular chapter is designed to elaborate in the identified countermeasure in the previous chapter which can be integrated in the future software in order to help users to combat their procrastination. It also aims to identify the side effects of each techniques and the modality on how can be seamlessly implemented without affecting user's experience. The main findings of this chapter are published in (Alblwi et al. 2019a).

5.1 CO-DESIGN METHOD

The researcher adopted co-design methodology to collect the participants' data. Co-design refers to the involvement of users in the stages of the production process in order to produce valued outcomes (Prahalad and Ramaswamy 2004). Co-design session is a beneficial tool to gain deep feedback about how users view the research problem and how the solution can be designed (Payne et al. 2008). The research benefits from using co-design approach because it leads to better understanding of the user needs and this can increase the opportunity of providing stronger solutions due to the different ideas that can be discussed (Song and Adams

1993) . However, co-creation approach involves six steps which include identify, analyse, define, design, realize, and evaluate (De Koning et al. 2016).

5.1.1 CO-DESIGN STUDY: PURPOSE

The study is designed to elaborate and identified the countermeasure techniques that can be used in future designs of SNSs in order to combat procrastination and provide details of how best to apply them. Based on the findings of the previous study, the research identified various families of SNS features that facilitate users to procrastinate. It is expected that the findings of the current study will illustrate different families of countermeasures that will help to combat procrastination. Moreover, the study will explore the side effects for each technique and the modality of the application that can best help to minimise these side effects. In addition, the study will explore whether allowing participants to map between families of SNS triggers and countermeasure families helps users to identify what are the most suitable techniques to combat procrastination.

5.1.2 CO-DESIGN: QUESTIONS

- What are the different techniques that can be embedded into future designs of SNS in order to combat procrastination?
- What are the expected side effects of applying these countermeasures?
- How can countermeasure techniques be seamlessly embedded in SNS without affecting user experience?

5.1.3 CO-DESIGN: PROTOCOL

Two design sessions were conducted with a total of four teen participants. In the sessions, the researcher presented the previous finding of the exploration study which has been done to the exploration stage. Then, participants were encouraged to discuss different scenarios that illustrated how procrastination happened in SNSs and how SNS features designed to facilitate users to procrastinate (see appendix 4). The scenarios were designed based on the finding of

previous study. Participants also were encouraged to utilize different techniques and how they would like to perceive them in the future design of SNS in order to combat procrastination. Finally, the researcher encouraged participants to map between the families of SNS features and the families of the countermeasures. This achieved by using card sorting technique. The researcher used open card sorting which offer more flexibility by allowing the participants to suggest some new techniques to combat procrastination.

5.1.4 CO-DESIGN: SAMPLING

The convenience sampling method was used to recruit the participants for the co-design sessions. Participants who already participated in the previous study were called to participate again which helps to increase the efficiency of the data collection because those participants are fully briefed with the research problems. However, six participants who are not able to take part on this study were replaced with anew participants which helps to discover new views and ideas. Replacing the participants did not affect the collected data because the co-design sessions did not require the participants to have previous knowledge about how procrastination occurs on SNS. A detailed presentation was also provided about the previous findings to ensure that all of the participants were familiar with the objectives of the study. The study inclusion requires participants who self-reported that they tend to procrastinate most of their time and would like to gain more control over their usage. It requires also participants who aged over than eighteen, and be active on SNSs.

5.1.5 CO-DESIGN: ADOPTED TECHNIQUES

The researcher adopted three techniques during the designing sessions in order to enhance the credibility of study and to ensure the data bias is avoided. The methods that were used include standard personal introduction, storytelling, and brain storming.

- **Standard personal introduction:** the researcher gave a short presentation about the procrastination and overview about the previous finding. This help

to immerse the participants with the research problem and for warm up activity to get participants involve in the designing sessions.

- **Story telling:** participants were provided with different stories to explain how procrastination on SNSs occur which help them to recognise the main problems of procrastination. Then they were encouraged to seek innovative solutions. The stories give the study problems a sense of life which encourage deep thinking in solving it.
- **Brain storming:** through the scenarios participants were encouraged to think and loudly share their ideas with others. These ideas were critically analysed and evaluated by other participants in order to find proper solutions. Participants also encouraged designing the techniques they would like to see in the future software to combat their procrastination.
- **Card sorting** tools were used to help participants to map the families SNS features that trigger user's procrastination with the suitable technique they would like to use to combat those triggers. Mapping SNS features triggers with the best techniques that combat these triggers can help users to figure out what is the appropriate solution for their case instead of utilizing all of the techniques to combat procrastination on SNS.

5.1.6 CO-DESIGN: ANALYSIS

The researcher adopted thematic analysis method to formulate the relevant and useful finding of the design sessions. Thematic analysis is used to search for themes that emerge to the description of the study problems in qualitative data(Braun and Clarke 2006). The process of the thematic analysis involves six steps which include getting familiar with the data, generate initial codes, search for themes, review themes, define themes, and report the data (Braun and Clarke 2006). In the first stage the researcher transcript the recording of the design sessions and read it several times which lead to get familiar with the data. Then, in the second phase the researcher started to generate the initial coding which help to reduce the lots of data into

small chunks. The initial codes can be any words or sentences that related to the study problem. In third phase, the researcher started to capture themes. For example, some codes can clearly fit with each other so this can be transferred into a theme. In the fourth stage the researcher reviewed the themes and some of them were deleted and others were emerged into another theme. In the fifth stage the researcher defined the final themes and the sub themes and how these themes are related to each other. Finally, the researcher started to report the finding of the study.

5.2 CO-DESIGN FINDINGS

In this section, the countermeasure techniques are categorised into three distinct types: *socio-technical*, *technical*, and *task motivation tools*. These types help to illustrate the different types of countermeasures that can be embedded in the future SNS design. Technical and socio-technical countermeasures seek to combat procrastination once users start accessing SNSs, while task motivation aims to prevent procrastination from occurring by motivating users to keep working on their original tasks. Figure 10, 11, and 12 summarise the findings of the co-design sessions. Moreover, in this section, it is discussed how to embed the countermeasure into SNS designs without adversely affecting the user experience.

5.2.1 PROCRASTINATION: SOCIO-TECHNICAL COUNTERMEASURES

In this section, appropriate countermeasures are presented that can be used to combat procrastination. This includes goal setting and calendar integration, see Figure 10. Socio-technical countermeasures focus on the relation among the senders, recipients, and the device.

5.2.1.1 GOAL SETTING

Goal setting refers to the development of an action plan that motivates individuals to follow and achieve the desired goal (Locke and Latham 1990). Goal setting is considered an effective strategy for encouraging users to change their behaviour and empowerment in terms of having more control over their SNS usage (Consolvo et al. 2009). Hence, having goals and

discovering what motivates users to achieve these goals, will guide users through the process of the goals achievements. Goal setting involves steps which guide users to set their goals and increase the possibility of achieving them. Goal settings process typically follows five main guidelines: setting a specific goal, defining measures, ensuring goals can be attained and relevant to the person and having sufficient time to achieve (Rubin 2002). Following these steps can reduce the tendency to procrastinate and can help users of SNS to gain more control over accomplishing their goals. However, in the design sessions participants claimed that they usually access SNS without knowing how they are going to spend their time or have a clear idea of how much time they are going to spend on SNS. This leads to procrastination which causes users to neglect their original tasks. One of the participants of the study said that “the future design of SNSs should include a part to help users set their goals and keep reminding them about their goals to avoid procrastination.” Other participants discussed how setting goals could be implemented within the design of SNS. Based on those suggestions, the design features were divided into two sub-categories: priority, and goal declaration.

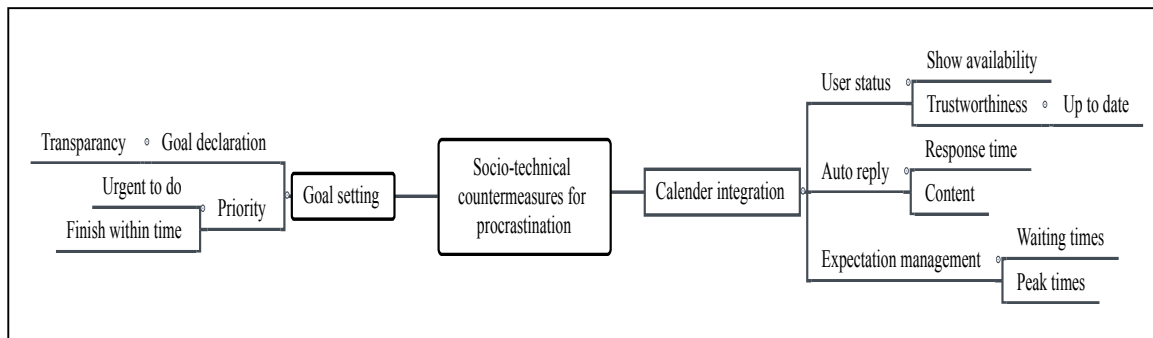


Figure 10: Procrastination on SNS: Socio-Technical Countermeasures

Priority: When users have multiple goals to accomplish at the same time, they can decide the time they need to accomplish each task and determine the level of urgency for each task. This can help users to determine which goals are more important and why clearly. Setting goal priorities helps users to track their progress and avoid spending time on non-urgent or unimportant tasks. Goal priority can help users to take control of their actions by determining the design process towards accomplishing their goals. It has been shown that people who have

a specific goal to focus on paying more attention to it than a collection of goals, which leads to better performance compared to others who work without setting a specific goal (Rothkopf and Billington 1979; Locke and Latham 1990). Therefore, the urgency level and time frame allocated can help to determine the priority of the tasks.

Concerning how to implement the priority technique into the future design of SNS, the findings of the design sessions suggested that the urgency level of the goal needs to be considered when setting goals so that users can decide the level of goal priority and whether it is an urgent goal. If users have more than one goal, the priority technique can use the urgency level to decide which goal users should receive more motivation to complete. Therefore, based on the degree of urgency, users can receive reminders and suggestions about their goals to motivate them for goals achievement and at the same time avoid information overload and irrelevant or less interesting reminders. A participant said that “the app can allow users to list their priorities and based on that automated suggestions can be sent”.

Finishing within time is another factor that was suggested by the participants in the design sessions to help users to determine their priorities. It is also seen helpful for users to accomplish their goals successfully and minimise the threat of procrastination. Setting a suitable timeframe for specific goals can help users to monitor their progress, while it helps to complete the task within the allotted timeframe. It has been found that people who have poor time management behaviour, such as leaving tasks at the last minute, experience work-related stress and low academic performance (Walter and Siebert 1981; Macan et al. 1990).

Goal declaration: Declaring goals to contacts and colleagues can help users to avoid getting pressure when they ignore other users’ comments and requests on SNS. For example, when a user receives a notification or a message while performing a particular task, it may cause them to procrastinate by feeling the urge to check and respond in order to maintain a good relationship with others and build a positive self-image despite having other active goals and tasks disrupted. Goals declaration as a countermeasure can help user to avoid

procrastination by showing user's contacts the availability time of the user. Hence, users can avoid procrastination and still build a positive self-image when they fulfil their promises and respond once they get free time. A user can have the option that allows them to be more transparent and provide more details about their goals to inspire trust. One participant said: *"I usually procrastinate by responding to my contacts' requests on SNS to maintain good relations with them. If they realise that I am busy they will not distract me"*.

5.2.1.2 CALENDAR INTEGRATION:

The calendar integration is one of the countermeasures that were proposed by the participants of the design sessions to help them to combat their procrastination on SNSs. The calendar integration technique is divided into three sub-categories: user status, auto-reply, and expectation management.

User status: User status represents the present situation of an individual on SNS when those users are active. The status can also be used to share certain information with others such as user availability. However, participants suggested that the visibility of user status to *show the availability* of the user can help to combat procrastination on SNS. User status can indicate to other users whether the user is available or busy. However, some users tend to use the same status for a long time without making a change which often harms the *trustworthiness* of the status feature. One participant said: *"I have seen people who have not changed their status for more than three years."* This has a significant effect in terms of trusting the status of those users, rendering it irrelevant. Therefore, user status can be integrated with the user's calendar to keep it updated to increase the likelihood of others trusting it and avoiding distraction which will, in turn, lead to reduced procrastination.

Autoreply: The autoreply technique can help to reduce the pressure that the recipients and the sender to manage their expectations of each other well in terms of *response time* and also priorities, e.g. "I am dealing with the high workload at the moment. I may take longer to reply to your message". This technique manages senders' expectations because they can know

when they might receive responses. As a result, the autoreply can help in the optimisation of time management for both senders and recipients. Autoreply is divided into two sub-categories: *response time* and *content*. Both categories have different benefits in terms of empowering the autoreply technique to help users gain more control over their procrastination.

Response time refers to how fast other users can receive the autoreply and whether the autoreply can be sent instantly upon receiving a notification or if it is controlled by the users themselves. It was debated at length in the design sessions of this study whether an instant automated reply can help both the sender to avoid procrastination more than the controlled reply due to the time that the user spends thinking about whether or not to send the reply, depending on the message received. One participant said: *“I would not use the autoreply if I received an important notification.”* Meanwhile, some participants suggested that *“Using autoreply to tell others about the time that they can get a response help to avoid procrastination and reduce the pressure that senders might have to interact”*. They can still override that if the message is important.

Autoreply content and its framing can have a significant effect on the recipients’ reaction and belief in the message. The content can be personalised or general. For example, each user can receive an autoreply that includes their name so that user might feel their request has been given more attention. In the general content, all users can receive the same content on the automated reply.

Expectation management: Users who use SNS to maintain or seek popularity might use SNS excessively to meet others’ expectations and avoid disappointing them which can result in procrastination. However, managing the sender’s expectations can reduce the pressure that the receiver feels when they receive a notification through. For example, when a user receives a notification, the sender is unaware whether the receiver is available. This might put some pressure on the receiver to access their SNS and interact, which might lead to procrastination. Therefore, the sender’s expectations can be managed better if the sender

knows more details about the time that they can expect a reply. This can be achieved by considering certain factors that include the length of time to wait before getting a response, and the *peak time* at which the user is usually busy.

Concerning the modality of the calendar integration, the participants suggested that SNSs should be integrated with the user's online calendar or the to-do-list and the goals that users declared and based on that the user status will suggest whether the user is available. This technique can help to manage senders' expectations and reduce the pressure that receivers feel when they receive a notification enticing them to interact. Also, the auto-reply can be customised based on the closeness of contact and other criteria and preferences. For example, the user can customise the autoreply for those who are deemed to be important or close to them but provide more general content for others. One participant said: *"I prefer to generate the autoreply to have some more information about me to some contacts so they will know I appreciate their request."*

5.2.2 TECHNICAL COUNTERMEASURES

This section presents the technical countermeasures designed to help users combat their procrastination. These countermeasures focus on the relation between the user and their device. The technical countermeasures were divided into three sub-categories that include reminders, self-monitoring, and suggestions (see Figure 11).

5.2.2.1 REMINDER

Reminder is a persuasive technique that can be used to help users tackle their procrastination on SNSs (Oinas-Kukkonen and Harjumaa 2009). Reminder techniques can be integrated with the user goals or calendars, to send reminders that motivate users to have more control over their procrastination. When users have planned a change in their behaviour and set up measures and tools for that, including a reminder, it suggests that they have the intention to achieve that change. Behaviour change literature claims that initiating and strengthening the intentional goal is an important factor in transforming these goal intentions into actual

behaviour (Ajzen 1991). The ease of implementing these intentions depend on how confident people are about their ability to transform these intentions into actual behaviour (Bandura 1977). For example, when a user intends to stop procrastinating while working on their original tasks, they are more likely to do so when they are confident about their ability to control their usage. Therefore, the reminder technology helps remind the users about their intentions when they deviate from it, e.g., by sending them an alert or vibration. The strength of the user's intention can be increased when the time of reminders and their frequency are sensitive to the user's context. Users can be reminded about various responsibilities such as a subject reminder, usage reminder, and context sensitivity reminder.

Subject reminder: With the subject reminder, users can set a reminder about the tasks that need to be performed. For example, users procrastinating on SNS can receive reminders which help to raise their awareness and motivate them to stop procrastinating. Users can be reminded either about current tasks, new tasks, or alternative content. The participants claimed that users can have the option to decide how they would like to receive reminders, whether in the form of vibrations, sounds or changing the screen colour, e.g. using green, amber, red lights.

Usage reminder: The usage reminders can be used to remind users about the time they tend to spend on SNS. For example, when a user accesses an SNS, the reminder technique will monitor their usage and issue reminders accordingly. Users will have the ability to design those reminders and their frequency. Hence, based on usage, the number of reminders can be increased, and the way of delivering those reminders can be changed. For example, users can receive a reminder if they spend more than 30 minutes on SNS and then a new reminder after a further 15 minutes, with another after a further 5 minutes. Increasing the number of reminders would lead to alarming users and result in them focusing on the importance to stop to procrastinate. A participant said that “the frequency of the reminders and the content can strongly affect users' decisions to stop procrastination”. This can be debated as sending

multiple reminders can also lead to ignoring the initial reminders expecting another reminder to come close to the deadline.

Context sensitivity: Some users can set a reminder based on their location, such as being on campus and having to attend a lecture. The reminder technique can integrate with the user's location and different reminders can be sent when the user procrastinates. The context

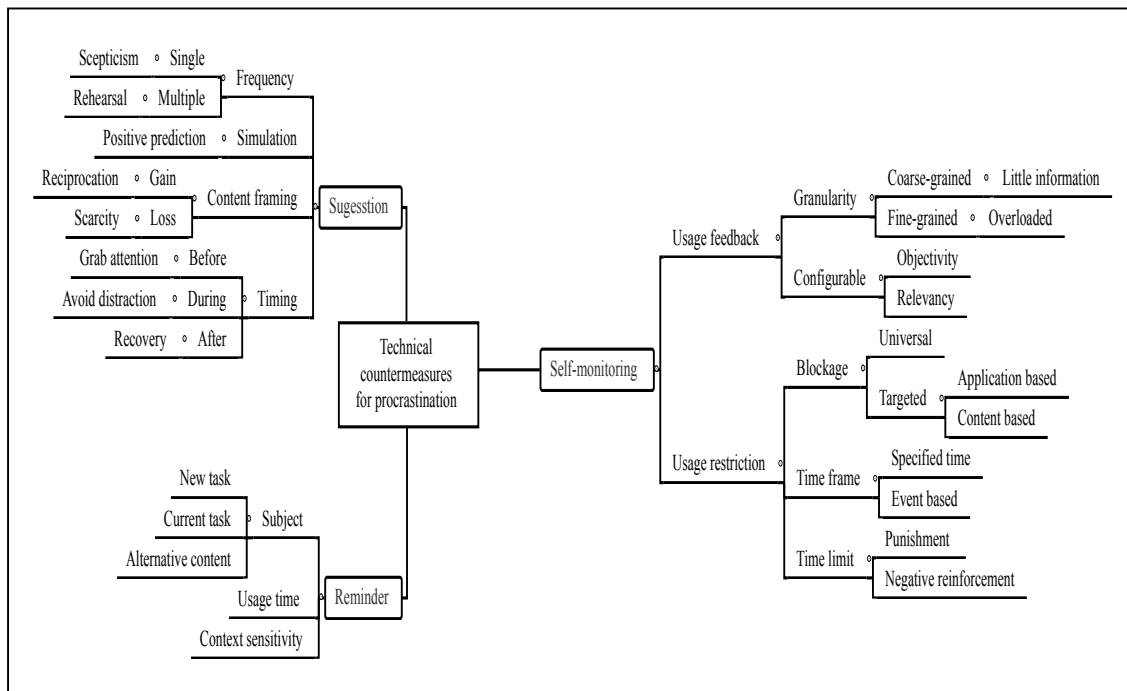


Figure 11: Procrastination on SNS: Technical Countermeasures

sensitivity reminder might appear immediately when a user accesses their SNS in a certain context and let them know that SNS access conflicts with their expected tasks in that context. The users can design the content of the message they would like to receive the reminder when they access SNS in particular locations. The ability to choose what users would like to receive can help to minimise any side-effects associated with the messages and whether messages are strong enough to motivate users to stop procrastinating.

The participants suggested that users should have the ability to decide the best way to remind themselves about their procrastination, and the *frequency* of the reminders. Some users can stop procrastinating when they receive the first reminder, whereas other needs

multiple reminders combined with an option to lock certain social media. A participant proposed that: *“the number of reminders should be increased and the time between these reminders should be reduced if the user does not stop procrastinating.”* Also, when a user interacts with others, the reminder could be for both users to help them stop procrastinating. One participant said: *“If I got a reminder while chatting, this could increase my stress to stop procrastinating because other users do not know about my procrastination.”* Therefore, reminding both users at the same time could help to reduce the pressure that users feel when they withdraw from the interaction.

5.2.2.2 SELF-MONITORING

Self-monitoring is one of the persuasive techniques that can be used to motivate users to reduce their usage of SNS which can lead to raising awareness about procrastination (Oinas-Kukkonen and Harjumaa 2009). Self-monitoring is divided into two subcategories: usage feedback and usage restriction.

Usage feedback: In this category, users can be provided with details about their usage to increase their awareness of procrastination. Based on these details, users can see how procrastination might harm their productivity, how often they become distracted while increasing user attention to the importance of regulating their SNS usage. Users can receive *fine-grained* or *coarse-grained* usage details. Fine-grained usage data provides richer feedback concerning the type of applications being used, the length of usage, user location and interrupted activities while procrastinating. The coarse-grained format provides fewer details. These include general usage about SNS and which apps dominate user usage. However, the participants proposed to have configurable feedback, where users can choose the level of details in the feedback. This can help to get both objective and relevant data and avoid abundance in data leading to distraction and information overload. In contrast, the lack of feedback on user procrastination might prevent users from taking informed action to change their usage style. This suggests conflicting requirements in users around the desire to have brief information and at the same time be able to take a fully informed decision.

Usage Restrictions: Usage restrictions refer to the techniques that can be used to prevent or complicate users' access to SNS once they fail to meet the user restriction conditions. Usage restrictions are divided into three sub-categories: blockage, timeframe, and time limit. Blockage techniques prevent users from accessing SNS once they procrastinate and deviate from their original tasks. The blockage can be universal for all SNS accounts or could be targeted at a specific application or the content that users view while procrastinating.

Another type of usage restriction is the *timeframe* which represents the period the user has to work on their original tasks. The timeframe can be *specified time* or *event based*. Hence, users are not allowed to access SNS during a given timeframe and will not be able to receive any notifications. Users can decide the *time limit* they wish to set for SNS access, and once exceeded their usage will be limited. This technique can help users to set goals and rehearse them to increase the control they have over their usage. The time limit technique can *punish* users and sign them out, thereby requiring signing in again after a while. However, *negative reinforcement* can also help to prevent users from accessing SNS for a limited time.

The modality of self-monitoring techniques can allow users to decide what kind of monitoring styles and tools they would like to use in order to reduce potential side-effects resulting from using the feedback and time restriction techniques. Some users can have more controllers over their usage so they just need to know certain information and feedback about their usage. However, some users may experience some difficulty in stopping their procrastination when utilising their usage feedback due to their low self-control. Therefore, further actions, such as restricting them from browsing SNSs for some time, will be needed to help them stop procrastinating. One participant said: "*preventing me from accessing SNSs during the class is more helpful because I cannot stop procrastinating by my own*".

5.2.2.3 SUGGESTION TECHNIQUE

Suggestion refers to the informative process that shall help people in their thoughts, feelings, behaviour and decisions (Hall 1928). Suggestion can affect how people remember things and

even how they act or behave based on the expected response. The expected response refers to when someone expects something to happen; their behaviour and reactions will contribute to matching that prediction (Albarracin and Wyer Jr 2000). For example, if an introvert student expects that rehearsing their presentation in front of the mirror will increase their confidence during the actual presentation, this expectation may play a significant role in increasing their confidence. However, the use of technology to deliver different kinds of suggestions can encourage users to follow these suggestions by being proactive and data-driven (Oinas-Kukkonen and Harjuma 2009). The suggestion can be more powerful when it causes users to do a series of actions through incremental suggestions rather than one suggestion (Mathew 2005). When implementing the suggestion techniques, the design process should consider four factors: frequency of suggestions, simulation, content framing, and timing of the suggestion.

Suggestion frequency: The number of times users can receive suggestions might have a significant effect on encouraging them to follow the suggestion and reduce the likelihood of procrastinating. Some participants claim that multiple suggestions can increase their worry to stop procrastinating. For example, one participant said: “I usually ignore the suggestion the first time like I do with my alarm every morning by pressing snooze.” In contrast, others proposed that a single suggestion works for most people because they take it seriously from the first time since they know there is no possibility of receiving more suggestions. Therefore, a single suggestion can increase user scepticism whereby users are afraid of not receiving more suggestions. In contrast, multiple suggestions can utilise rehearsal as a technique providing them with scenarios to practice and get them ready for performing the task at hand and also their usage control tactics, e.g. rehearsal on how to tell friends online in advance about time limitation and the framing and phrasing of the language used when opting out from an online dialogue and interaction.

Simulation: Refers to the scenarios of usage suggested to the user to see and reflect on how procrastination happens and its effects and alternative usage styles. This shall allow users to think on their own procrastination and make a self-assessment of it and its harm. The

content of the messages can be textual in the form of certain sentences that have a strong inspirational effect, aimed at keeping users motivated; alternatively, it is possible to use images instead of text. For example, a metaphor like a tree can be shown to reflect adherence to plans with green leaves for being on time and brown and green leaves to reflect degrees of deviation. Hence, when users are presented with simulation, they can visualise in a more user-friendly way their status around procrastination and predict the outcome and perhaps change their strategies.

Suggestion framing: Refers to how suggestion content is phrased and the tone used to it. Some people prefer to know that harm and loss caused if they do not follow a recommended practice. Others refer a framing where they can be presented with the benefits that can be gained from following the suggestion. Hence, the suggestions can be loss-framed or gain-framed. Gain framing focuses on the good things that can happen if users follow the suggestions. Cialdini demonstrated that the rule of reciprocation is to try to repay what other people and actions provided to us (Cialdini 1987). Hence, when a user knows that they will achieve something once they follow the suggestion, they are more likely to behave based on the suggestion. For example, if the users do not procrastinate when preparing for an exam, they will have a better opportunity to get a good mark. In contrast, loss framing focuses on the negative things that will happen if users do not follow the suggestions. For instance, users who do not attend lectures might fail the exam. Therefore, framing the messages that users receive in the suggestion can affect their behavioural decisions and encourage them to follow the suggestions. According to the prospect theory, people's choices are sensitive to how information is framed (Tversky and Kahneman 1981). Hence, the scarcity principle suggests that people will follow the suggestion when they feel they have limited resources or options and they can be lost if they do not (Cialdini 1987). The framing of the message can also exploit this by showing people the opportunities and their time-limited nature.

The timing of suggestions: One of the important factors that were emphasised by the participants is whether users should receive suggestions before, during or after the original

tasks that need to be performed. The suggestion can be sent before the task starts to grab the user's attention, and hence lead the user to focus fully on the tasks. Similarly, users can receive suggestions during the task when they receive an ad-hoc interaction or when they try to use SNS so that they remain motivated and avoid getting distracted that can result in procrastination. Furthermore, once a task has been completed, users can receive suggestions for a recovery time to refresh their mood and prepare them for any upcoming tasks and also to positively reinforce their achievement.

In terms of *the modality of suggestion*, different approaches were proposed concerning how participants should receive suggestions. About the frequency of the suggestions, users could receive single suggestions when they tend to procrastinate, with the number of suggestions increasing based on their level or duration of procrastination. For example, if they ignore the first suggestion, they then receive another suggestion with the same or different content. Receiving multiple suggestions can influence users to stop procrastinating and get ready for their original tasks. Of course, such suggestions should not in themselves become a nuisance and users can have the option to decide what type of content they would like to receive. This can influence their commitment to the decisions they made earlier when they designed the suggestion (Cialdini 1987). Framing the content of the suggestion can take different approaches. Some participants prefer to receive the suggestion in red to highlight the importance of the suggestion. For example, one participant said: *"the suggestions should be in red to attract the user's attention."* Also, some participants suggested that the suggestion could also be used to remind users to set their goals. Hence, based on the goals that users want to accomplish, the suggestion countermeasure can integrate with these goals and send motivational suggestions to help users continue their progress.

5.2.3 TASK MOTIVATIONS

In this section, it is discussed how users can be motivated to continue working on their tasks before the tendency to procrastinate takes place. Based on the study findings, task

characteristics were found to be one of the factors that usually affect the tendency to procrastinate on SNSs. Task-related procrastination happens when users procrastinate because of a lack of motivation or the difficulty of the task whereby users avoid performing a task due to their fear of failure. Therefore, gamifying tasks can be a solution to enhance a user's motivation to complete them. Task motivations were divided into three sub-categories: *commitment*, *Reward* and *milestones* (see Figure 12).

Task commitment: Refers to the ability of an individual to demonstrate a focus on undertaking tasks for some time without distraction (Renzulli et al. 1986). Renzulli claimed that it is not possible for an individual to experience high achievement without high task commitment. There is an associated relationship between task commitment and job performance which means that when users have a high commitment to their tasks, this can reduce the possibility of procrastination (Vandenberghe et al. 2015). Furthermore, users might tend to lose their commitment when they have doubts about their ability to complete the task successfully or have a fear of evaluation which can negatively impact their task commitment (Senecal et al. 1997; Seo 2009). The commitment to a task can be driven by the user's motivation to perform the task. According to self-determination theory, users should have three basic psychological needs: autonomy, competence and relatedness (Ryan and Deci 2000). Therefore, to motivate sufficient commitment should satisfy, to varying extents, those three needs. Furthermore, when users demonstrate their task commitment either to themselves or via a public commitment, this appears to have a positive impact on task completion (Cialdini 1987).

Task reward: It is one of the factors that can motivate users to perform the task. For example, when the task has a sizeable reward, either intrinsic or extrinsic, this reward can have a significant effect in terms of increasing the user's enthusiasm to perform the task. The participants of the design sessions suggested that users could even be motivated by simple rewards such as adding points to some tally once users complete a task. Similarly, during the task, some form of motivational feedback was also considered to be useful. Such feedback can help users to maintain their progress and to ensure that they will continue to progress and the motivation will not be affected by the long time spent progressing the work. One participant said: "when the deadline is far away from the starting point, my motivation starts to decrease". Furthermore, the feedback that the user receives when working can also be personalised, to reflect their progress (see 3), to increase its effectiveness, and ensure that they remain motivated to complete their tasks.

Task milestone: Describes the tracking of the task's progress to accomplish them. Dividing tasks into different milestones can help to manage better the progress of the task which helps to ensure the quality of the work by reflecting it in different phases (Srivannaboon 2009). Furthermore, when users accomplish each phase, they can be rewarded to motivate them to complete the new phase. When the task is reduced into small phases and each phase can have a timeline to be monitored, this can help users to keep their progress under control and track their performance which decreased the chance of procrastination (Kambhampati 1995). A task's milestones also help users to build their self-esteem especially when they get motivating feedback. The information about progress feedback can help users to reflect on their performance and planning and have clear ideas about the next stages before the

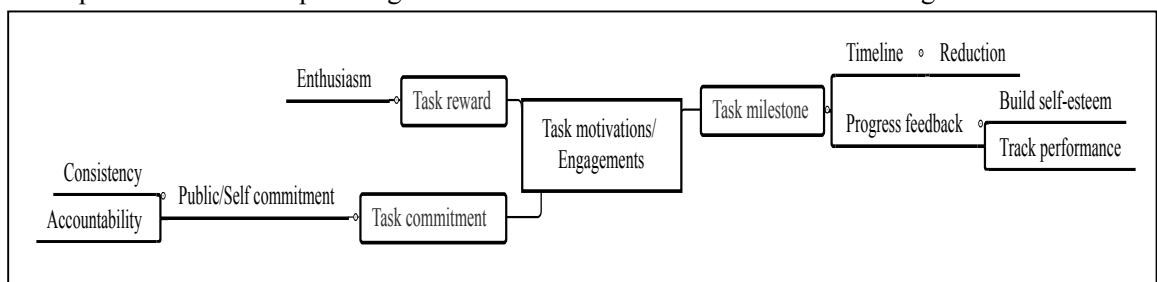


Figure 12: Procrastination on SNS: Increasing Task Motivation and Engagement

completion of the task (Nicol and Macfarlane-Dick 2006). Control theory suggests that people can change their practice when there is a gap between the goal they would like to achieve and their current behaviour to minimise that gap (Carver and Scheier 1982). The feedback that users receive can help to guide and motivate users to accomplish their goals and minimise the gap between their current behaviour and their desired behaviour (Larson et al. 2013).

The modality of task motivation is around how to gamify the commitment of the task which can help to keep users motivated to complete their original tasks and reduce the possibility of procrastination. In the design sessions, participants suggested different techniques to motivate users to complete their tasks successfully. These techniques include task *reduction* and *reward*. The reduction techniques refer to the action of dividing the task in smaller parts. The reduction can help to reduce the difficulty of the task that users might face when they deal with a particularly large task. Providing users with a *progress bar* was one of the most important strategies suggested by the participants. One participant said: “*while I am performing a task I feel less motivated to complete it because I do not know how long I need to finish*”.

Task *reward* is another technique that users wanted to help combat procrastination. The reward can be either during the task or after the task has been completed. During the task, users can be rewarded for each milestone they achieve such as a reminder about the work that has been done. One participant said: “*users can be thanked for the work they have achieved and motivated to complete the rest, such as ‘well-done, you’ve done 70% of the work and still need to do 30%’*”. This kind of reminder triggers users’ extrinsic motivation by appreciating their work so that they can feel motivated to accomplish the whole task. Another type of rewards that have been proposed by the participants is to compare users’ progress with that of their colleagues by showing how many points’ users have gained or the number of tasks that have been accomplished. Comparing users’ achievement can increase competition between users which can increase their commitment to tasks and reduce the possibility of procrastinating. Also, some participants suggested that the task reward should be personalised

for each user which could have a significant effect on an individual's motivation. Personalisation refers to the adaption of the output to the individual user instead of treating a group of people (Oinas-Kukkonen and Harjuma 2009).

5.2.4 COUNTERMEASURE: SIDE EFFECTS

Participants discussed the countermeasure they would like to see in the future software design and noted some expected side-effects for each countermeasure. The next section discusses the expected side-effects associated with each technique.

5.2.4.1 REMINDER TECHNOLOGY SIDE-EFFECTS

There are certain expected side-effects that need to be considered when applying reminder technology. These side-effects include reminder ignorance, stress and the reminder to stop interacting with others. One participant said, "users might ignore the reminder and keep continuing their usage." In order to minimise this side-effect, the participants suggested that the frequency of reminders should increase over time as users procrastinate; e.g. a reminder after 10 minutes and then a second reminder every 5 minutes. Moreover, if the user continues to ignore the reminder, the new design can restrict them from using SNS for a certain period of time. Another side-effect is that users' stress levels might increase when they receive a reminder to stop interacting with others but their acquaintances do not receive the same reminder. Participants suggested that to reduce stress, the reminder should be sent to both users.

5.2.4.2 SUGGESTION TECHNOLOGY SIDE EFFECTS

Some side-effects need to be considered when applying suggestion technology to combat procrastination. These side-effects include distracting suggestions and harmful content. Sending suggestions to users might distract them during their working hours, so the time when the suggestions are sent should be considered by allowing users to decide when they would like to receive suggestions. Another side-effect is that the content of the suggestions might harm the user experience when it has strong framing. Allowing users to set up the content that

they would like to receive can have a significant effect in terms of motivating users to have more control over their procrastination. For instance, some users might prefer to receive gain frame content, whereas others would like to receive loss framed content.

5.2.4.3 CALENDAR-BASED SIDE-EFFECTS

The only side-effect highlighted with regards to the calendar-based techniques concerns privacy. Users might worry whether their privacy will be affected when others know about their goals or calendars. Therefore, the participants suggested that the content should be visible for others about whether or not a particular user is available without providing any explanations about what tasks that user is currently performing. However, to increase trustworthiness, users can personalise their calendar-based techniques to make calendars or goals visible for those users.

5.2.4.4 USAGE RESTRICTION SIDE-EFFECTS

Restricting the use of SNSs can increase the possibility of experiencing certain side-effects including stress, running away from using SNSs, and hidden procrastination. When users are restricted from accessing SNSs, this can increase their stress due to their sudden loss of access to SNS. In order to prevent that stress from occurring, users can receive reminders about the time left before restrictions being imposed. Moreover, hidden procrastination can happen if users expect to receive notifications from others during times of restrictions. To help minimise this side-effect, participants suggested that calendar-based techniques should show the availability status to others which can help to reduce the possibility of receiving notifications.

5.2.4.5 USAGE FEEDBACK TECHNOLOGY SIDE-EFFECTS

Feedback about users' usage can lead users to become overloaded with information that they do not need to deal with which causes difficulty in understanding the information being provided. Being overloaded with information describes the difficulty of understanding an issue due to the amount of information which can adversely affect users' decisions when they deal with the data (Keller and Staelin, 1987). Information overload can also occur when users

receive irrelevant data that is of no interest to them. An increased amount of irrelevant information can reduce the decision-makers' abilities due to the time needed to identify the relevant information, thereby reducing the effectiveness of decision-making (Well, 1971; Streufert, 1973). For instance, when a user wants to know in total how many hours they tend to spend on SNSs on a daily basis, irrelevant information could include details of the activities that user tends to do. This irrelevant information can cause users to have too much data that leads to information overload. Therefore, the modality of the app will help to minimise this side-effect by enabling users to establish what kind of data they would like to receive as feedback in order to improve their awareness about procrastination on SNS. This can help to filter the information that users receive, thereby making it easier for users to take appropriate action to combat their procrastination.

5.2.4.6 PROCRASTINATION ON SNSS CLASSIFICATION BASED ON USER'S SELF-CONTROL

It is widely believed that procrastination relies on the user's control and whether they maintain good control over their use of SNSs. Based on the research captured from the data analysis, there are three types of the countermeasures to combat procrastination on SNSs. First among these are the countermeasures that aim to raise user awareness about their procrastination such as providing users with feedback about their usage. Then users can understand how good control reduces procrastination without requiring any further intervention. Secondly, some users have medium control over their usage and they require a certain intervention to help them combat their procrastination. These users are aware of their procrastination but they tend to procrastinate because of the pressure they experience while interacting with others. Therefore, in order to reduce the pressure that users face, certain interventions can be used such as calendar-based interventions to show others the availability of a particular user at a given time. Thirdly, some users do not have any control over their procrastination due to their low self-control and they experience difficulties stopping their procrastination on SNSs. For

those users, advanced intervention is needed to prevent them from accessing SNSs at certain times when they are working on their original tasks.

Table 7 classifies the countermeasures based on the level of control that users have over their usage; i.e. whether users have good, medium or low levels of self-control. Table 7 presents also explanations of users' characteristics as well as examples of the suggested countermeasures.

Table 7: Procrastination Classification Based on User's Self-Control

User type	User description	An example of the countermeasure
Good self-control	Users are aware of their procrastination and need some information to combat their procrastination.	Providing users with feedback can help them to understand their level of procrastination.
Medium self-control	Users who tend to procrastinate because of the pressure they experience from others.	Feedback is not enough; there is a need to show other users their status to reduce the pressure to procrastinate.
Low self-control	Users who have low self-control and cannot stop procrastinating.	Users need more intervention such as preventing them from accessing SNS for some time.

5.2.5 MAPPING SNS FEATURES WITH THE SUITABLE COUNTERMEASURES

During the discussion of the design sessions, the researcher highlighted certain techniques that the participants were suggested to combat their procrastination. Participants were recommended the best techniques that work for each family of SNS features. Therefore,

before utilising the relevant technique, users need to figure out what the features of SNS are that trigger their procrastination. Customisation of the countermeasures can help users to utilise what is the most suitable technique for them to gain more control over their procrastination. The following sub-sections present the families of SNS features and the selected countermeasures.

5.2.5.1 NOTIFICATION FEATURES

The most relevant techniques that can help to combat the procrastination that occurs as a result of the notification features are showing the user's availability, sending suggestions, and utilising auto replies. Showing the user's availability can reduce the pressure that users feel when they receive notifications so they are unlikely to procrastinate. Furthermore, receiving suggestions at the same time as the notification can help to motivate users to avoid procrastination. In addition, an auto reply can help manage the expectations of others by making them aware that this particular user is unavailable and will not respond until they have some free time.

5.2.5.2 IMMERSIVE DESIGN FEATURES

Participants in the design sessions suggested self-monitoring, usage reminders and time restriction techniques to help combat the procrastination that can occur as a result of immersive design features. Monitoring a user's usage can help to send reminders to those users based on their preferences, such as the time or the type of the reminder. Some users might be unable to control their procrastination even after receiving the reminders so the more advanced step can be taken to restrict their use based on either a time limit or timeframe.

5.2.5.3 SURVEILLANCE OF PRESENCE FEATURES

Regarding users who procrastinate because of the surveillance of presence features, participants noted certain techniques to help combat this problem. First, the user can receive an auto reply to make users aware about their availability and when they can respond to the request. This technique can manage the expectations of others because they will not expect a

quick reply. Secondly, users can be reminded about their priorities so they can decide whether to continue procrastinating or return to their urgent tasks.

5.2.5.4 INTERACTION FEATURES

Most of the participants claimed that interaction features are responsible for most of their procrastination on SNS. The countermeasure that can combat this kind of procrastination include reminders for both users, using a timer for the interaction, and making visible the user's availability based on their calendar. The participants claimed that reminding only the user who procrastinates can exacerbate their stress, whereas reminding both parties can help them to find an excuse to stop interacting which can result in better control over their procrastination. Furthermore, the timer will be visible to both parties and it is possible to integrate with user's calendar to decide when users should stop interacting with others. In addition, showing users' availability can help to manage the expectations of others and reduce the pressure that users feel when failing to respond to messages which can result in controlling users' usage and reducing the tendency to procrastinate.

5.2.5.5 IDENTITY FEATURES

Users who procrastinate on SNSs in an attempt to develop a positive self-image or seek popularity for their accounts might manage their procrastination better by applying techniques such as usage feedback, auto reply, goal setting, and time restrictions. Usage feedback can help raise a user's awareness about how many hours they procrastinate so that the user can take appropriate action to reduce their procrastination on SNSs. The auto reply function can help users to build a positive self-image when they declare the time at which they will be able to respond to any request on SNS. Thus, declaring to others when they can get a response will help them to better manage their expectations and build a positive self-image when others receive responses at the time the user states. Furthermore, goal setting can help users to better manage their time to decide when they want to be online and when they should be working on other tasks. Therefore, users can receive reminders and suggestions to motivate them to

follow these goals. Based on their goals, users also can decide when they would like to be restricted from using SNS, either in terms of a timeframe or a time limit.

5.3 USERS REQUIREMENTS VS EXISTING TOOLS

Our suggested countermeasures are meant to help users to reduce and regulate procrastination. However, they may also come with their own risks and side-effects. This also applies to de-facto tools provided by the industry. For example, in iOS Downtime¹, users can schedule a time for muting the phone and avoiding notifications and their distraction. The downtime tools can introduce a risk whereby users keep thinking about whether they have received important notifications; i.e., hidden procrastination and fear of missing out. Hence, such tools should come with richer settings allowing people to decide upon alternative and socio-technical measures such as the one that was proposed around suggestion, rehearsal and simulation. Another example from the iOS Downtime tool, users only have the option to select one block time in which they will be unable to receive any notifications. Table 8 presents a comparison between the proposed procrastination countermeasures in the area of usage regulation and the iOS Downtime tool.

Our suggested techniques and countermeasures allow users to customise the blockage time tool and what to block based on the types of the app and the content of interaction and to be integrated with their own calendar. This allows for greater personalisation and context sensitivity and increases acceptance and relevance. However, this also comes with additional costs in terms of requiring users to set up plans. There is a need for further research to ascertain the readiness of users to take the time to set up such plans, and how they perceive the cost/benefits of the additional effort. It is expected that this will also relate to several factors such as their technical skills and confidence and their perception of the need to make behavioural changes.

¹ <https://apple.co/2OW7DG2>

To empower existing tools, the findings suggested that online time management should be more fine-grained and sensitive to the content of the usage, its context and user status. The autoreply suggested in this paper has a richer format and setting to those tools in current communication software. The auto-reply is intended to support the broader aim of managing user's expectations; both the sender and the receiver in an informative personalised style. Procrastination is viewed as a social pressure problem in part. Importantly, the tools are suggested to reduce the pressure on all communicating parties.

The countermeasures and their modalities of application were discussed with the aim of reducing their potential negative side-effects. In future work, this knowledge will be used to develop a method to help users identify the features and usage styles of SNS that trigger their procrastination and choose and configure suitable countermeasures that can help them to gain more control over their procrastination. It is expected that this method will be based on persuasive design and personalisation as the role of personality traits, culture and self-control in the acceptance and efficiency of such tools will also be acknowledged.

Table 8: Downtime in iOS Screen Time VS Recommendation

Comparison criteria	Current Downtime iOS Screen Time	Suggested design
Frequency of time blockage	Enable users to only have one time block	Enable users to have more than one time block, i.e. schedules and timeframes
Modality of setting time blockage	The user sets the time manually	Manual and automated based on users' calendar and user context
User status	Senders are unaware of the receiver availability	Senders are aware of the receiver's availability, meaning that the receiver can have less pressure to interact

Effectiveness on managing other expectations	It does not manage senders' expectations	It contains an auto-reply to manage senders' expectations
Stakeholders	Only focuses on the relationship between the user and the device	Focus on the relation among the user, the device and other contacts

Summary of what users expect from the anti-procrastination tools to be introduced to future social media:

- *Making* users more aware of how procrastination harms their productivity
- *Guiding* users to understand their current situation by providing them with feedback and guidance on how to gain more control over their procrastination.
- *Having multiple stages to achieve results*; helping users to control their procrastination in different stages such as feedback, a more advanced stage with reminders, and then the use of restrictions if required.
- *Flexibility* to enable users to decide the suitable techniques to use to avoid negative side-effects such as reactance.
- *Reducing* the pressure that users feel to respond to notifications while working on their tasks by making other contacts aware of their availability.
- *Managing* other contacts' expectations, e.g. by showing them when they will receive a response and the time remaining for a chat.
- *Supporting* and motivating users to complete their original tasks; for instance, using task reduction and progress visualisation.
- *Gamifying* the commitment to the task to bring the fun that users experience on SNS into the work task environment.

5.4 CHAPTER SUMMARY

This chapter has aimed to provide a better understanding of user needs and how users could combat their procrastination. The modality of the countermeasures that can be used to combat procrastination on SNS has also been explored. The study highlighted the countermeasures that need to be considered as part of the future design of SNS in order to address user procrastination. Some of these countermeasures are already incorporated into emerging tools, such as iOS Screen Time and Google Digital Wellbeing, to help users to manage their online time. However, these techniques mainly focus on the interaction between the user and the device, for example usage limits and feedback. This study has shown that some users procrastinate because of the pressure they feel when they become distracted, which in turn forces them to respond to SNS prompts in order to develop or maintain a positive self-image. In doing so, the study paid particular attention to the inclusion of three aspects of countermeasures: the user, the device, and society. This can help reduce the pressure that leads users to procrastinate, allowing users to gain greater control over their usage.

6 CHAPTER 6: PROCRASTINATION ON SOCIAL NETWORKING SITES: CONFIRMATION

In the **previous chapter 4 and 5**, this thesis identified the qualitative findings of the types of procrastination, SNS features that triggers procrastination, and the suggested countermeasures to combat procrastination. In this chapter, a questionnaire has been conducted to examine the whole qualitative findings with a sample of 334 participants. The findings were also used to analyse a commercial tool, Google Digital Wellbeing, as a mainstream tool in this area and suggest enhancements. The main findings of this chapter are published in (Alblwi et al. 2020).

6.1 QUESTIONNAIRE STRUCTURE

This questionnaire sought to examine the qualitative findings of the previous chapters with a sample of the population. This helps to ensure that the main features were established that may facilitate procrastination on SNS and their related countermeasures to combat it. An online questionnaire was distributed using student mailing lists in both the UK and KSA. Leaflets and posters featuring the invitation and link to the survey and its QR code were also distributed on the campuses of two universities (see Appendix 5). The questionnaire sought to examine the extent to which the respondents agreed with the findings of the exploration stage, namely the focus group, diary study, and the co-design session. The survey also asked questions in relation to personality, self-control and culture, with the aim of studying their effects on the selection and agreement of procrastination occurrences and their countermeasures (see Appendix 6). The inferential analysis in relation to that effect will be examined in future work. A total of 334 participants (147 female and 187 male) successfully completed the questionnaire. The selection criteria involved participants who had at least one active SNS account and also self-declared that they significantly experience procrastination on SNS. The survey was active for four weeks.

6.1.1 PARTICIPANTS' DEMOGRAPHIC INFORMATION

This section sought to collect information about the participants who took part in the questionnaire. This information includes the participants' ages; countries; genders; how they feel about their procrastination; how many hours they procrastinate for on SNSs; which apps they usually use when procrastinating; and how many hours the participants think their friends might spend procrastinating.

6.1.2 PERSONALITY TRAIT SCALE

In this section, the researcher used a self-trait questionnaire to measure the users' behaviour and styles. This can be used to examine the relationship between the big five personalities and procrastination types, features that facilitate procrastination, and the countermeasures for combating procrastination. Personality traits can be defined as a description of people in terms of their behaviour, emotions and feelings (Creswell and Clark 2017). Personality traits were classified into five factors: openness to experience, agreeableness, extraversion, conscientiousness, and emotional stability. Table 9 provides a description of each factor (Krauss 2005). To measure personality traits, (Perkins 2002) developed a scale of 10 items which uses a five point Likert scale ranging from strongly disagree (1) to strongly agree (5). Scores for the BFI-10 scales are as follows: Extraversion: 1R, 6; Agreeableness: 2, 7R; Conscientiousness: 3R, 8; Neuroticism: 4R, 9; Openness: 5R; 10 (R D item is reversed-scored) (Perkins 2002). However, understanding the relationship between procrastination on SNSs and personality traits can help to provide a more robust solution to combat procrastination which can consider the preferences of these solutions based on the user's personality. It can also help to give advanced predictions regarding whether some personalities might procrastinate more than others.

Table 9: Personality Trait Types and Their Description

Construct	Description: the extent to which individuals tend to be . ..
Openness to experience	. . .curious, intellectual, imaginative, creative, innovative, and flexible (vs. closed-minded, shallow, and simple)
Agreeableness	. . .helpful, good-natured, co-operative, sympathetic, trusting, and forgiving (vs. rude, selfish, hostile, uncooperative, and unkind)
Extraversion	. . . sociable, talkative, optimistic, ambitious, assertive, reward-seeking, outgoing, and energetic (vs. introverted, shy, reserved, quiet, and unadventurous)
Conscientiousness	. . .organised, responsible, dependable, neat, efficient, and achievement-oriented (vs. disorganised, lazy, irresponsible, careless, and sloppy)
Neuroticism	. . . calm, self-confident, stable, resilient, and well-adjusted (vs. neurotic, nervous, insecure, fearful, and anxious)

6.1.3 SELF-CONTROL SCALE

To measure self-control, the researcher used a scale for the short version question that was developed by (Borsari and Carey 2001). This scale contains 13 questions that were designed to quantify an individual's ability to maintain good self-control over their behaviour and attitude. The self-control scale uses a five point Likert scale ranging from 'not at all' (1) to 'always' (5) and scored as follows:

- The italicised questions in the scale (2, 3, 4, 5, 7, 9, 10, 12, 13) should be reverse scored (subtract score from 6)

- The total score is 13 - (the total each respondent might have).

6.1.4 TYPES OF PROCRASTINATION

This section sought to examine the different types of procrastinators using a large sample and illustrate the degree to which these types represent the participants. The researcher also enabled the participants to suggest a new type of procrastinators. In the exploration stages, the researcher identified four types of procrastinators. First, the avoidance type whereby people procrastinate to avoid performing unpleasant or difficult tasks. Secondly, the mood modification type whereby people procrastinate to refresh their mood and experience a better feeling. Thirdly, the escapism type whereby people procrastinate in order to distance themselves from their real-life issues. Finally, the emergence type whereby people become distracted by SNS notifications while performing their tasks.

6.1.5 FEATURES OF SNS THAT MAY FACILITATE PROCRASTINATION

This section sought to examine the features that may facilitate users' procrastination and whether participants suggested new features. The exploration stages revealed five families of features that may facilitate users' procrastination: notification features, surveillance of presence features, identity features, interaction features, and immersive design features.

6.1.6 COUNTERMEASURES FOR COMBATING PROCRASTINATION ON SNS

This section sought to examine the five families of countermeasures that were identified in the design sessions to combat procrastination on SNSs. In the exploration stages, participants mapped the different families of features that facilitate procrastination with the best countermeasures to combat that procrastination. Based on the classification, the researcher allowed the participants to decide what they wanted for these choices in order to decide the best countermeasure to combat each family of features. The researcher also allowed the participants to suggest more countermeasures that they would like to see in future designs of SNSs.

Table 10 presents the questions and the insight they provide to give a clear idea about the purpose of each question:

Table 10: Breakdown of The Questions and The Insight They Provide

Types of procrastination on SNSs	
Likert scale of 1 (strongly agree) to 5 (strongly disagree)	
Questions	Insight
I often procrastinate to avoid working on unpleasant or difficult tasks	Identifying the extent to which respondents believe that unpleasant or difficult tasks can lead them to procrastinate on SNSs
I often procrastinate to change my mood and feel better	Identifying the extent to which the respondents believe that browsing SNSs changes their mood and can lead them to procrastinate on SNSs
I often procrastinate to distance myself from real-life issues	Identifying the extent to which the respondents believe that procrastinating on SNSs can help them to avoid dealing with real life issues
When I receive a notification, I check it and spend time on that despite having other tasks to perform	Identifying the extent to which the respondents believe that receiving distracting notifications leads them to procrastinate on SNSs
The features of SNS that may facilitate procrastination	
Questions	Insight

I often delay working on my tasks because I am busy checking notifications on social media	Identifying the extent to which the respondents believe that the notification features on SNSs cause them to procrastinate
When I send a message to someone, I keep checking whether or not they have received, read or replied to my message	Identifying the extent to which the respondents believe that the surveillance of presence features facilitates procrastination on SNSs
I procrastinate on social media to maintain positive interaction with people and respond to them in a timely fashion	Identifying the extent to which the respondents believe that trying to maintain a positive interaction or build a positive self-image can lead people to procrastinate on SNSs
When I am involved in chatting, I find it difficult to stop procrastinating and complete my tasks	Identifying the extent to which the respondents believe that the interaction features of SNSs cause procrastination on SNSs
On social media, I spend more time than I initially intended due to seeing relevant content suggested to me automatically	Identifying the extent to which respondents believe that immersive design features trigger procrastination on SNSs
Task motivation/engagement tools	
Questions	Insight

I am more motivated to work on tasks that have rewards such as virtual points for each accomplished level and performance quality	Examine the effect of gamifying tasks to motivate people to gain greater control over their procrastination
I would like to specify different milestones for my big tasks and have a deadline for each milestone	Examine how people perceive the reduction technique and whether it can help to manage their procrastination
Declaring my work commitments to my contacts on social media would help me to commit more to fulfil them and reduce the peer pressure to engage in unnecessary conversations	Examine whether respondents believe that telling others about the tasks they have to do would reduce the pressure that users might feel to procrastinate
Countermeasures to combat procrastination on SNSs	
Questions	Insight
When you are likely to procrastinate because you are checking notifications and engaging with their content, which of these software techniques would help you to combat procrastination?	Identify the countermeasure the respondents prefer to use to combat procrastination that occurs as a result of notification features
When you spend more time on social media than you initially intended because of the relevant content that social media suggests to you, which of these software techniques would best help you to combat that?	Identify the countermeasures the respondents prefer to use to combat procrastination resulting from immersive design features

When you send a message to someone and you keep spending time checking to see if they have received it, read it or replied, which of these software techniques would help you to combat that procrastination?	Identify the countermeasures the respondents prefer to use to combat procrastination that occurs as a result of surveillance of presence features
When you procrastinate, and reply to your contacts' requests in a timely fashion, primarily to maintain good relations or positive interaction, which of these software techniques would help you to combat that procrastination?	Identify the countermeasures the respondents prefer to use to combat procrastination that occurs as a result of identity features
When you procrastinate because you are chatting with your friends, which of these software techniques would help you to combat that problem?	Identify the countermeasures the respondents prefer to use to combat procrastination that occurs as a result of interaction features

6.2 QUESTIONNAIRE: PILOT STUDY

The pre-testing pilot demonstrated its significant impact in terms of improving the quality of the questionnaire and helping to avoid unexpected issues that might lead to uncorrected data (Morgan 2007). Furthermore, it has been suggested that the pre-testing questionnaire should be conducted with a small number of people (roughly ten). The current study pre-tested the questions of the survey with seven participants (4 male and 3 female). In the pilot study, the researcher also measured the time that the participants needed to complete the whole questionnaire, which ranged from five to eight minutes. The pilot study helped to improve the quality of the questionnaire and clarify any confusing questions. In the pilot study, the participants were required to read the questions openly and identify any questions that they considered to be confusing or difficult to understand. They also discussed their understanding of each question with the researcher and offered suggestions to improve visualisation. Based

on these findings, some questions were rewritten and some questions were accompanied by additional examples in order to ensure that the actual participants would be able to easily read and understand the content of each questionnaire.

6.3 QUESTIONNAIRE: SAMPLE AND DISTRIBUTION

The researcher used “Qualtrics” software to build and distribute the questionnaire. Using online software to gather the data helped the researcher to increase the number of participants due to the different times and places those participants could answer the questionnaire. Furthermore, using the “Qualtrics” software increased the visual quality and motivated people to complete the questionnaire because this software enables participants to use their smartphones, laptops and tablets to fill in their answers. The researcher also added a progress bar to show participants when they could expect to finish which reduces the possibility that they may withdraw before completing the survey. The researcher distributed the link for the questionnaire using a student email list and also among student groups on Facebook. More than nine hundred individuals were invited to complete the questionnaire and a total of 334 participants successfully completed the questionnaire.

6.4 QUESTIONNAIRE: DESCRIPTIVE ANALYSIS

The participants’ responses to the questionnaire were scored and entered into the SPSS software package. The statistical packages SPSS version 19 was used for all data analysis. Descriptive statistics were used to establish that the data sample was normally distributed. In addition, the descriptive analysis helps to present the data in different groups to show what percentage of the respondents agreed with the previous findings of this research. In other words, the study examined whether the previous findings of the exploration stages and design sessions were representative in a large sample and this can help to generalise the findings of the current research.

6.5 PROCRASTINATION ON SNS: RESULTS AND DISCUSSION

The results are divided into four sections: demographic information, types of procrastination, task engagements tools, features of SNSs that facilitate procrastination and the correlation between SNS features and procrastination types.

6.5.1 DEMOGRAPHIC INFORMATION

The total number of participants who answered the full questionnaire was 334 (187 male, and 147 female). The respondents represented a total of 26 different nationalities. However, 163 (49%) of the respondents were from the United Kingdom, 120 (36%) were from Saudi Arabia, and the other nationalities contributed by 51 (14%) of the respondents. In this thesis, statistics were only provided in relation to the proportion of participants of different nationalities; nationality and its relationship to procrastination will be examined in future work. Having participants of different nationalities completing the questionnaire would help the research, and help determine whether there are cultural differences when it comes to procrastination. In other words, future research could examine whether the countermeasures for combating procrastination on SNSs are universal and can be applied around the world.

6.5.2 GENERAL PERCEPTION OF PROCRASTINATION

The respondents were asked about their feelings regarding procrastination on SNSs to examine how they perceive this issue. This can help to understand the users' ability to change their behaviour to gain better control over their procrastination on SNSs. Figure 13 shows that 88 (26.3%) of the participants were unhappy with their procrastination and 127 (38%) were somewhat unhappy. However, 30 (9%) were happy with their procrastination on SNSs and 89 (26.6%) were somewhat happy with it. This might give an indication that those users who are happy with their procrastination might procrastinate in a controlled manner which can help them to recover from intensive work or otherwise feel better. It has been demonstrated that managed procrastination might help people to recover from intensive work because it helps to relieve stress which can have a positive impact on work productivity (Croker et al. 2009).

In contrast, people who are unhappy with their procrastination due to failing to maintain good control over their procrastination or due to the pressure they experience when receiving notifications may need some form of intervention to manage their procrastination so that they can procrastinate in a healthy way.

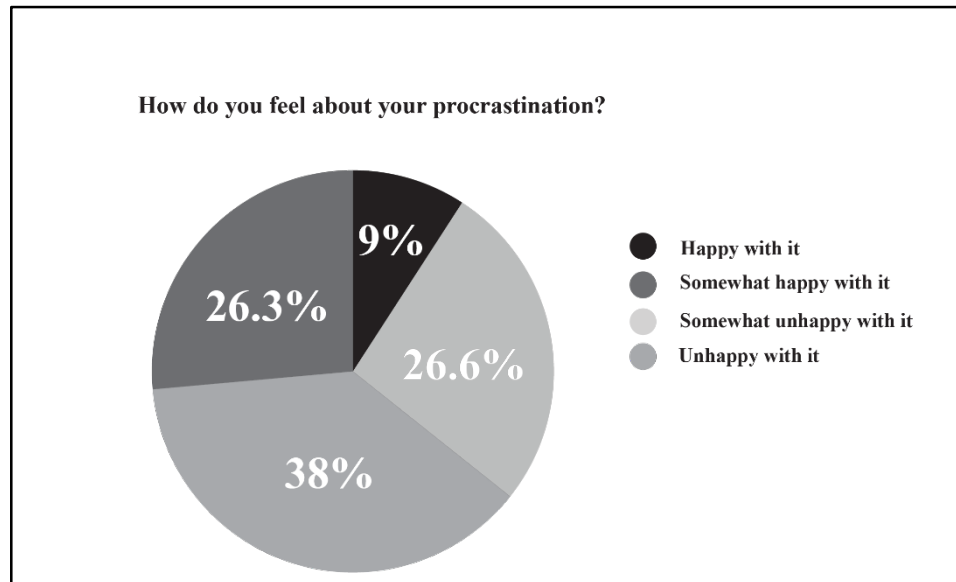


Figure 13: How Respondents Feel about their Procrastination

6.5.3 COMPARISON OF HOW PEOPLE ESTIMATE THEIR PROCASTINATION TIME WITH THEIR FRIENDS

In Q5 and Q7, the respondents were asked to self-report the average time they often spent procrastinating on SNSs and how many hours the respondents estimated that their friends procrastinated on SNSs. The results show that the respondents spent around 4.8 hours per day procrastinating on SNSs. The minimum time spent procrastinating was 1 hour and the maximum time was 19 hours with a SD of 3.1 hours per day. Furthermore, the respondents estimated that their friends procrastinated more than they do with an average time of 5.6 hours per day (see Figure 14). The respondents underestimated their procrastination compared to their friends which indicates that they may be trying to give themselves the excuse that they are not the only people who procrastinate. Hence, when people think that others suffer from

the same problem, this might reduce their motivation to find a solution and can be an obstruction to addressing the issue of procrastination.

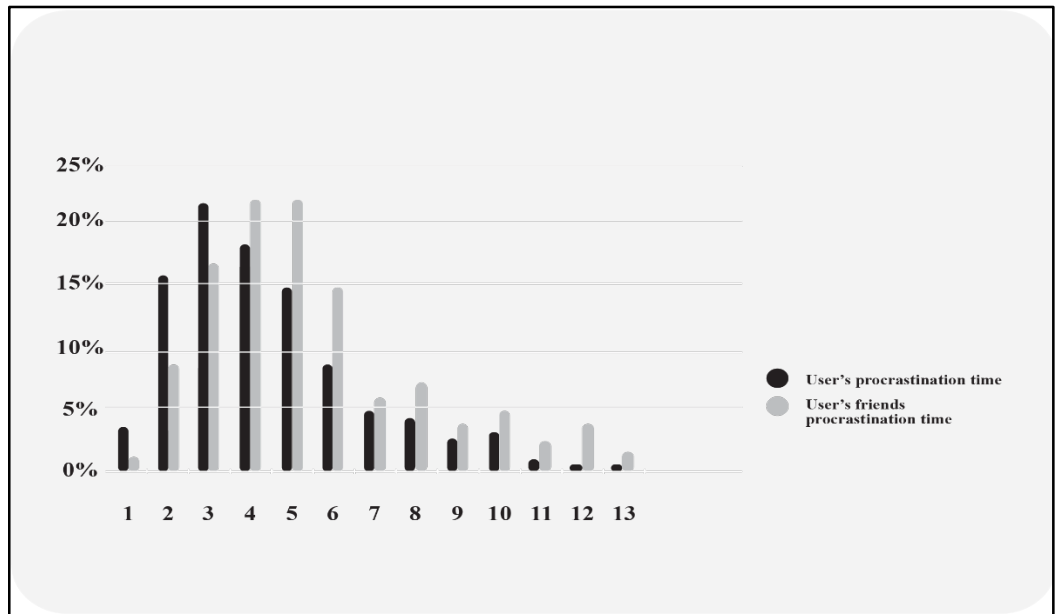


Figure 14: Users' Daily Procrastination Time Compared with their Friends

6.5.4 TYPES OF PROCRASTINATION

This section examines the motivations behind users' procrastination and which type of procrastination the respondents engage in. The type of procrastination includes avoidance, mood modification, escapism, and emergence. These types were identified in the previous stages of the exploration and design sessions. However, the questionnaire examines the extent to which the respondents agreed with these four types (see Figure 15).

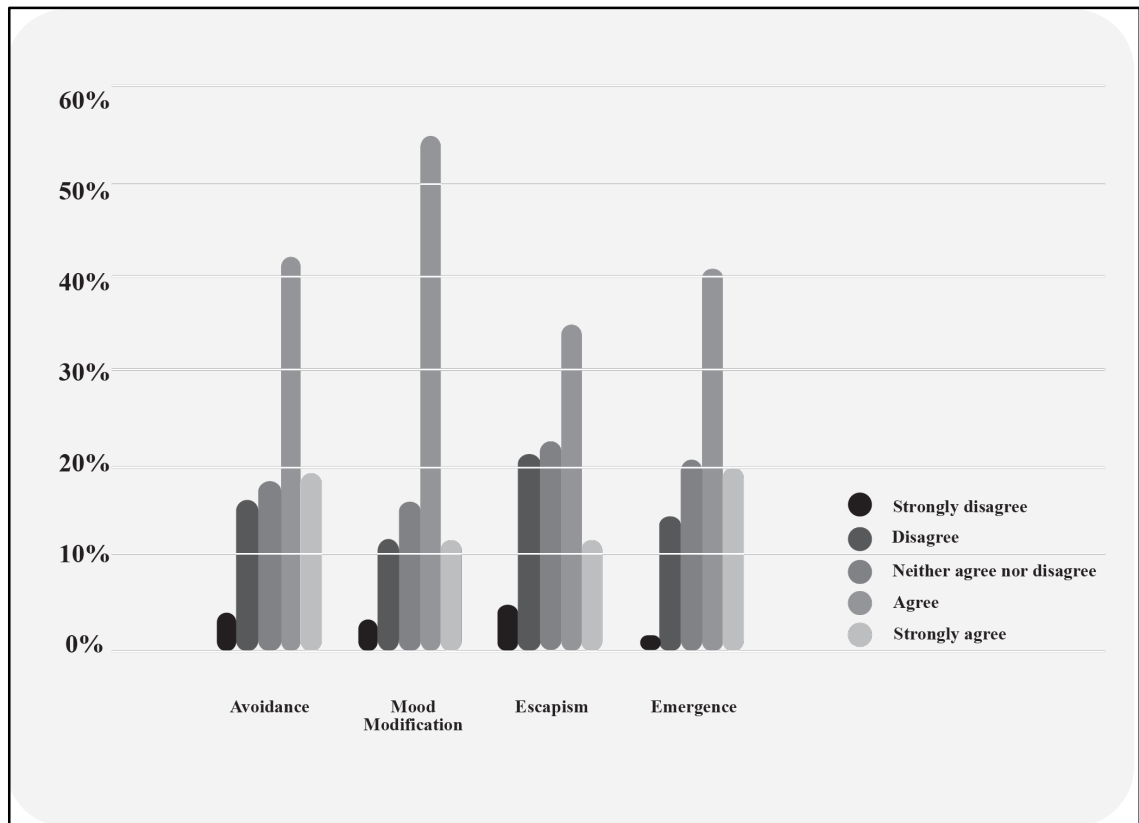


Figure 15: Procrastination Types

6.5.4.1 AVOIDANCE TYPE

The results demonstrate that 207 (62%) of the respondents agreed that procrastination on SNSs was used to avoid working on unpleasant or difficult tasks. Out of the 207 (62%), 37 (18%) strongly agreed with this reason. This supported the fact that the characteristics of the task have a significant impact on task engagement (Steel 2007). Steel identified two task characteristics that may affect procrastination. First, people tend to perform more pleasurable tasks rather than frustrating ones. Secondly, the tasks that offer a short-term reward are more preferable to those offering long-term rewards. SNSs provide users with instant rewards such as “likes” and “positive comments.” These types of reward may have a significant impact on encouraging users to procrastinate even if to do so is harmful for their productivity. However, 67 (20%) did not agree with the avoidance type of procrastination and chose other types which indicate that procrastination on SNSs can happen for different reasons.

Avoidance motivation is also linked to procrastination on SNSs where people tend to procrastinate rather than attempt difficult tasks because of fear of failure (Mitchell 1986). The main role of the avoidance motivation is to focus on danger outcomes if the task is not achieved successfully which can lead people to experience low motivation to perform their tasks (Duffy 1987; Tashakkori and Teddlie 2003).

6.5.4.2 MOOD MODIFICATION TYPE

Procrastination to recover from intensive work might be healthy if it increases work productivity but it also presents a challenge in terms of self-control to return to the task at the right time. The respondents who believe that procrastination on SNSs can help them to recover from work and feel better feeling amounted to 227 (68%). This illustrates that two-thirds of respondents might use SNSs for work recovery and stress relief. Procrastination is associated with people's feelings and emotions (Tashakkori and Teddlie 2010). Thus, if those people have low self-control and low self-esteem, they may struggle to control their procrastination relative to others who can maintain good control (Hofstede 2011). Moreover, 50 participants (15%) of the respondents disagreed with this assumption. This is consistent with a number of studies which suggested that procrastination on SNS might increase stress due to close deadlines (Roth and Cohen 1986; Alblwi et al. 2019a). Therefore, when people delay working on their tasks, their stress can increase due to the fact that when the workload increases, the associated stress can intensify. From this perspective, procrastination is always considered to be a harmful behaviour that often negatively affects task performance and productivity.

6.5.4.3 ESCAPISM TYPE

One of the procrastination predictors is escapism whereby users might procrastinate to escape from their real-life issues. Some studies found evidence of a relationship between procrastination and escapism; people might procrastinate to distance themselves from their real life issues (Szulevicz et al. 2016; Alblwi et al. 2019b). Similarly, the results show that almost half of the respondents agreed that procrastination on SNSs might help to distance

them from their real-life issues 157 (47%). In contrast, 93 (28%) of the respondents disagreed with this type of procrastination and have selected other types.

6.5.4.4 EMERGENCE TYPE

The main key to the difference between general procrastination and procrastination on SNSs is that SNSs promote procrastination to their users so that users can become distracted by notifications at any time. Therefore, notifications seem to be the first trigger that facilitates user procrastination when working on tasks because they are just one click away from starting to procrastinate (Anastasei and Dospinescu 2018). Various factors can contribute to procrastination such as low-self-control, low self-esteem, the user's mood and their emotions. For example, when a user receives a notification and they have high self-control, they might manage to avoid procrastinating and remain focused on their tasks. However, the result of this study showed that there was high agreement regarding the fact that emerging notifications can easily distract people and facilitate procrastination on SNSs. 207 (62%) agreed with that situation whereas around 56 (17%) of the respondents disagreed. These results support the earlier arguments that different personalities can significantly affect efforts to manage procrastination.

Informing users that they have received messages can trigger their curiosity or create a habit of checking to see the messages and then return to their tasks (Szulevicz et al. 2016). However, when users view the messages, other features of SNSs such as showing them that users are online can add pressure to respond in order to avoid being misunderstood by others. The user might feel hooked and that they cannot easily maintain good control over their procrastination. Reactance also triggers procrastination whereby users might receive personalised notifications that trigger their interest, thereby causing procrastination (Anastasei and Dospinescu 2018).

6.5.5 TASK ENGAGEMENTS AND MOTIVATIONS

As demonstrated in the previous sections, the task's characteristics have a significant impact on procrastination. Therefore, this section examines the extent to which the respondents believe that implementing certain techniques into the task environment can motivate people and increase task engagement (see Figure 16). Consequently, it can reduce the possibility of procrastinating on SNSs. The previous findings of the exploration stages and design sessions suggest some techniques such as rewards, reduction, and task commitment declaration. However, the results show that the majority of the participants (220 (66%)) preferred the reduction tools, whereas 30 (9%) of the respondents disagreed with their use. The gamification tools were the second most popular option because more than half of the respondents 190 (57%) agreed that it can motivate them to avoid procrastinating. Concerning the commitment declaration tool, the percentage of respondents who disagreed and agreed were almost identical at 110 (33%), this suggests that users view these tools differently. Some users would prefer not to share their work commitments with others because they thought this could affect their privacy. Another reason could be that sharing details of work commitments puts them under greater pressure to complete tasks on time which might contribute towards work-related stress.

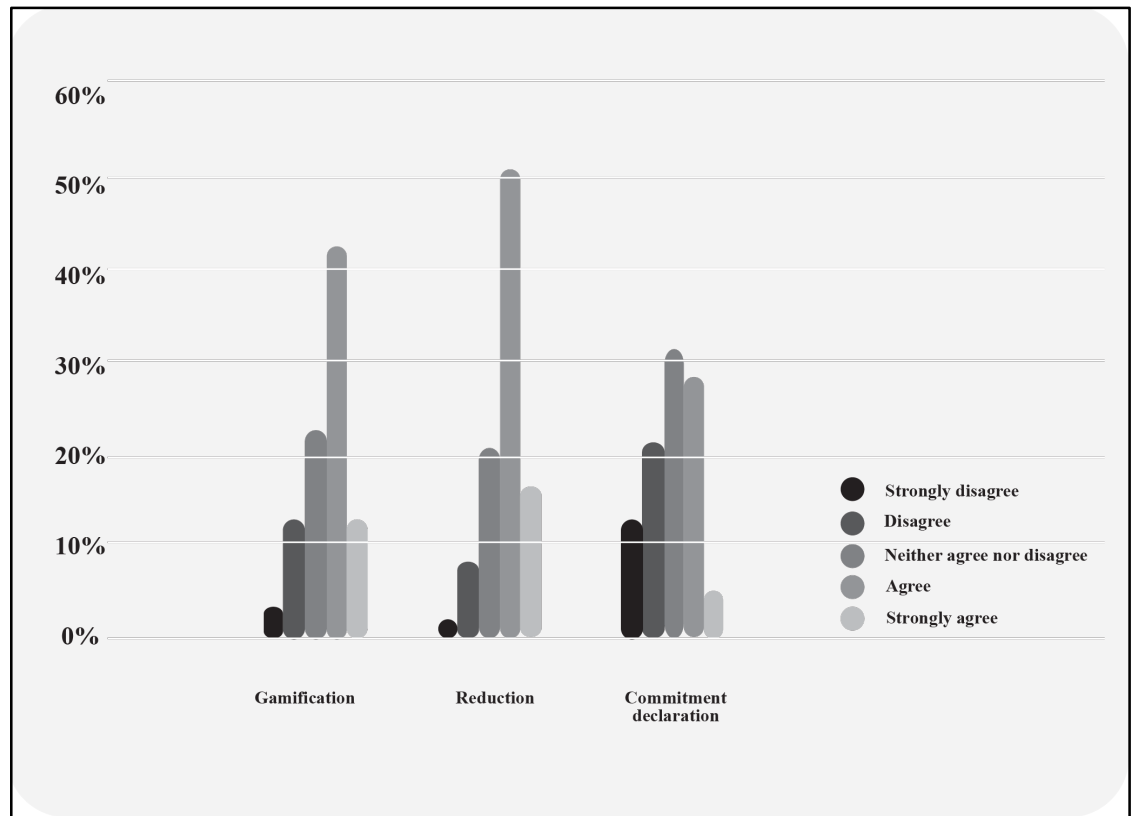


Figure 16: Task Motivation and Engagement Tools

6.5.6 FEATURES OF SNS AND THEIR SUGGESTED COUNTERMEASURES

The features triggering procrastination, the countermeasures and the mapping between the features and countermeasures are results from the qualitative phase, i.e. the exploration and co-design stages and explained in detail in **chapter 4 and 5**. In the **Chapter 4**, five types of SNS features were identified as procrastination triggers: notification, immersive design, surveillance of presence, interaction, and identity. Figure 17 shows the level of agreement of

the survey participants around the features of social networking sites acting as triggers for procrastination.

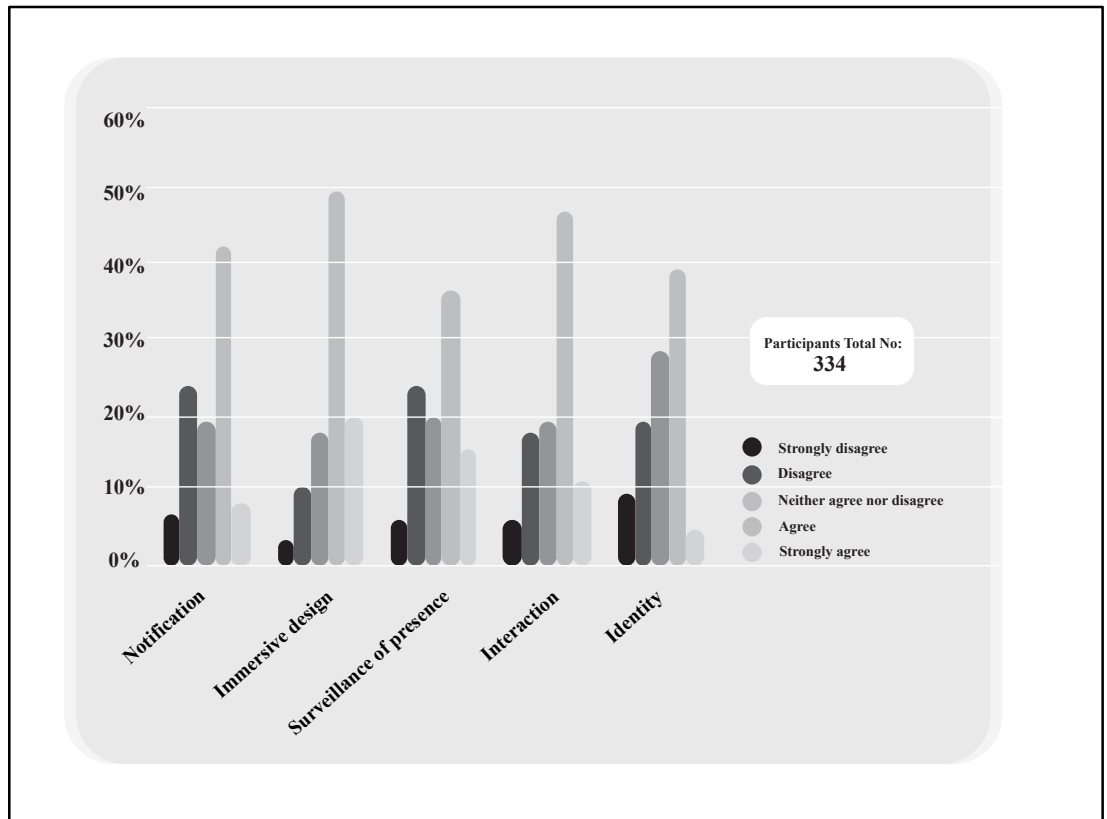


Figure 17: Features of SNS As Procrastination Facilitators

In chapter 5, in the co-design sessions, suitable countermeasures for the procrastination resulted from each feature of the SNS were revealed and suggested. The countermeasures were divided into three types: technical countermeasures, socio-technical countermeasures, and task engagement tools. The participants discussed how some countermeasures could be more effective than others in different contexts. For example, the suggestion to mute notification when receiving many of them would be a better countermeasure than the use of usage reminder or time and frequency restriction. Figure 18

contains the mapping between procrastination triggers, i.e. SNS features, and their suggested countermeasures.

Incorrect choice and implementation of the countermeasures can hurt the user's experience and might introduce some side effects, such as increasing user stress and relapse(Alblwi et al. 2019a). Therefore, the mapping is meant to guide users in the best having a side effect from choosing an incorrect countermeasure.

The descriptive analysis concerned the survey data and meant to show the participants' agreement on the mapping as well as their experience with each type of procrastination. Figure 19 shows the percentage of the survey participants who chose each suggested countermeasure for each of the features seen as procrastination trigger.

The following subsections are organised around each of the features considered to trigger procrastination. The content of the subsections will discuss the feature, its suggested

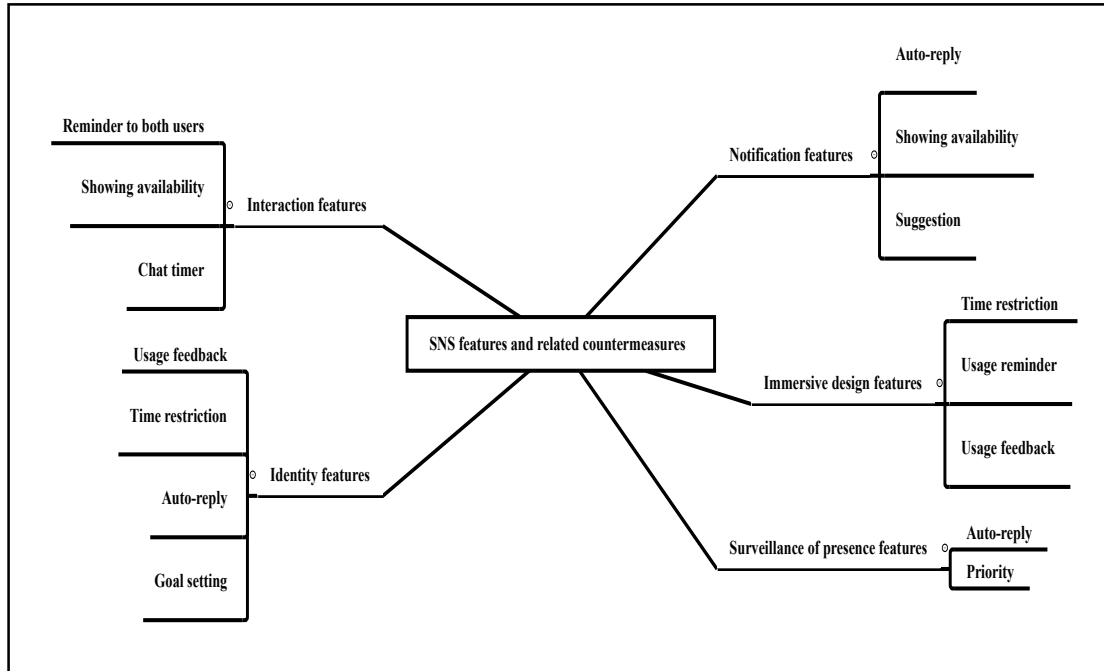


Figure 18: Mapping Between SNS Features and their Countermeasures

countermeasures and the extent to which survey participants chose each of the countermeasures.

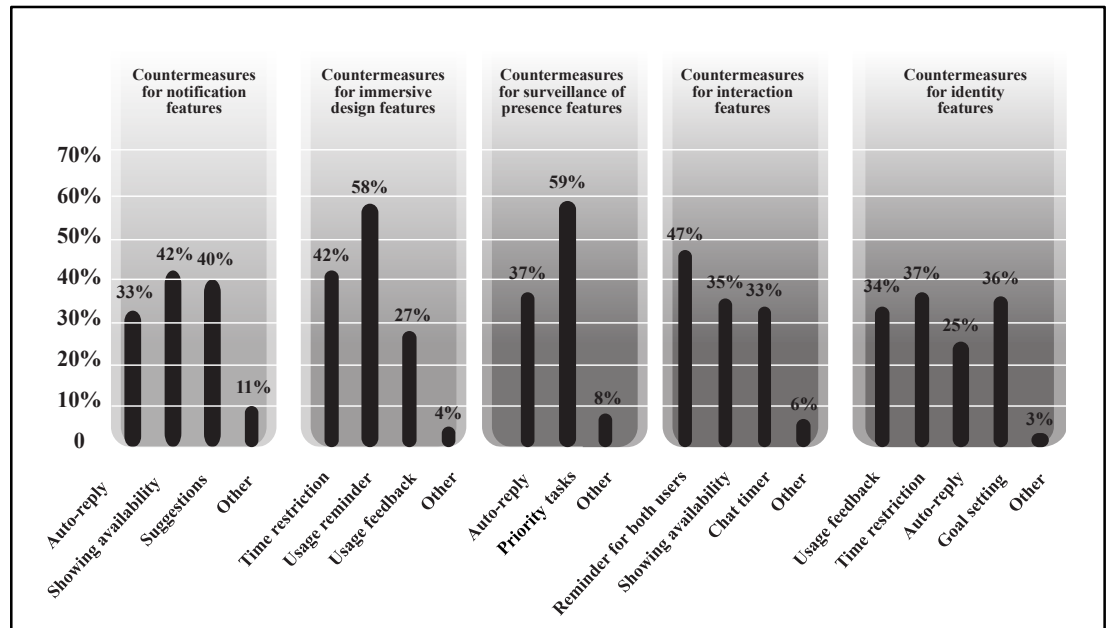


Figure 19: Suggested Countermeasures for Procrastination Resulted from SNS Features

6.5.6.1 NOTIFICATION FEATURES AND ITS COUNTERMEASURES

Notification features were seen as the first trigger that promotes procrastination among users. Notifications can come in different forms, such as sound alerts, vibrations, or a brief text message. Thus, when the user engages with these notifications, they might have several effects on the user's emotions and their task performance (Alrobai et al. 2016). However, the results of the survey indicated that 167 (50%) of the respondents agreed that notification features trigger their procrastination, whereas 102 (30%) of the respondents disagreed with this assumption (see Figure 17). The content of the notification can also affect the user's emotions, e.g. increasing the temptation to check, which might then leave to negative emotion when checked, e.g. regret, and increase procrastination (Wortman and Brehm 1975; Alutaybi et al. 2019a). Therefore, to reduce the possibility of procrastination, it has been suggested that notifications should be scheduled at breakpoints because this would have a significant effect on the users' ability to concentrate on their tasks (Alutaybi et al. 2018).

In the design sessions, the participants proposed countermeasures to combat procrastination that occurs because of the notification features. These countermeasures are showing user's availability, receiving suggestions, and the autoreply. Showing the user's availability can help to manage others' expectations, which might reduce the pressure to check and reply that users may feel when they receive a notification. Furthermore, receiving a suggestion at the same time as the notification can guide the user on how to avoid procrastination, e.g. such as muting them. In addition, the autoreply can help manage others' expectations by confirming the availability time of the user and the expected time to get a response. Hence, the autoreply can help both users to set up a different time for the interaction based on the availability of both users, hence, reducing the likelihood of procrastination.

The results from the survey showed that 243 (73%) of the respondents chose at least one of the suggested techniques to combat procrastination resulted from notification. 53 (16%) of the respondents chose two countermeasures, and 20 (6%) chose three countermeasures. Only 13 (4%) of the respondents did not select any of the suggested countermeasures indicating that they did not see any of them as useful.

Showing availability was the most popular option, selected by 141 (42%). Suggestion techniques were also chosen by 135 (40%) of the respondents: i.e. users wanting to receive suggestions about how to avoid procrastination. This indicates that some users struggle to find suitable strategies to manage procrastination. Furthermore, the auto-reply technique was chosen by 110 (33%) of the respondents, whereby users prefer to confirm to others their availability via automated messages (see Figure 19).

Further countermeasures were suggested by the survey respondents including notification deactivation, rewards, simulation, and social ranks. However, these countermeasures were not new to us and they had been revealed and discussed in the qualitative phase through the co-design sessions and were excluded as it was noted that applying these countermeasures separately from each other might be detrimental to the user

experience and could result in negative side-effects. For example, deactivating user notifications can exacerbate their curiosity to regularly check for new messages. In contrast, using more than one countermeasure at the same time might have a positive impact in terms of reducing the possibility of procrastinating where users can use auto-reply to tell others about their availability and also deactivate their notifications. Hence, other people's expectations can be managed better and they know when to expect a reply, which reduces any pressure that users feel to respond immediately. The combination of countermeasures was not the focus of this study and will be explored in future work.

6.5.6.2 IMMERSIVE DESIGN FEATURES AND ITS COUNTERMEASURES

Immersive design features of SNSs are meant to allow and lead the users to interact with the content on SNSs at full scale. In certain cases, such immersion can make users interact in an unconscious manner and be less aware of how time is passing especially when interacting with customised and interesting content, generated by exploiting their previous interaction with the SNS and what is known about them by the algorithm (Paolillo, 2008). For example, when a user views a video on YouTube, additional suggested content appears and users might view them in an uncontrolled manner, which might negatively impact on the user's commitment to their other tasks (de Oliveira, Pentoney, & Pritchard-Berman, 2018). A total of 228 (68%) of the survey respondents agreed that immersive designs trigger their procrastination. This agreement percentage was higher than that for the other features. Only 46 (13%) of the respondents of the respondents disagreed with that assumption and felt that other features of SNS trigger their procrastination more than the immersive design (see Figure 17).

Participants in the co-design sessions suggested that usage feedback, usage reminder, and time restrictions techniques can help to combat the procrastination resulted from the immersive design features. Monitoring the user's usage can help to send reminders and feedback to procrastinators. The reminder countermeasures can be customised based on user preferences, such as the time of receiving the reminder or the way of delivering it, whether

vibration or alert. Furthermore, users can receive feedback about their procrastination, which might help them to recognise their usage style and reduce the likelihood of procrastination. Some users might face difficulty in controlling their usage even after receiving such reminders, which raises the need for introducing stronger countermeasures, such as time restriction. Time restriction can either allow users to use SNS for a limited time or restrict their usage based on a specific scheduled, e.g. imported from their online calendar site or app.

The survey results show that 230 (69%) of the respondents chose at least one of the suggested countermeasures. Two countermeasures were chosen by around 63 (19%) and three countermeasures were chosen by 23 (7%). Only 5 (1.7%) of the respondents did not select any of the suggested countermeasures meaning that they saw little or no value in them to combat procrastination or that this kind of procrastination did not apply to them. As demonstrated in Figure 19, the usage reminder was chosen by 193 (58%), which indicates that the respondents want to be reminded about the time they spend on SNSs so that the immersion caused by their SNS design is mitigated.

The time restriction countermeasure was chosen by 140 (42%) of the respondents; they wanted to be restricted from browsing SNSs after exceeding a certain period or frequency selected by the users themselves. It has been demonstrated that users who have low self-control might struggle to stop procrastinating and they cannot manage their usage and would need intervention and help (Wilson et al. 2010; Lee-Won et al. 2015). The usage feedback countermeasure was chosen by 91 (27%) of the respondents, who prefer to use their usage feedback in more detail to help them make an informed decision and possible action to better manage their procrastination.

Further countermeasures were suggested by the survey participants and this included **comparisons** with peers' usage and **expected time** for viewing relevant content. However, the comparison of usage was already discussed in the exploration and design sessions stages and it was considered counterproductive as it can trigger competition to be more responsive

and also create meaningless comparisons as the use of SNS can be for different purposes and some may use it for work, e.g. Facebook groups for discussing assignments and coursework for students. However, showing users the expected time for a certain content to be viewed can be difficult to compute if the different cognitive and learning styles of users are considered, but they can be interesting countermeasures to investigate in future work.

6.5.6.3 SURVEILLANCE OF PRESENCE FEATURES AND ITS COUNTERMEASURES

Surveillance of presence features in SNSs enables users to monitor the current status of their peers regarding whether they are active and their latest activities on the SNS (Lundh 2004). These features were highlighted in the exploration stages as being among the features that trigger procrastination. For example, seeing the visibility of being online might give an indicator that a user is free to chat, which puts more pressure on them to respond when they receive a message and this can distract them from their current task. However, the results of the questionnaire showed that 170 (50%) of the respondents agreed that presence features trigger procrastination on SNSs, whereas 97 (29%) of the respondents disagreed (see Figure 17).

Participants of the design sessions proposed some techniques to combat procrastination resulting from the surveillance of presence features. Firstly, the user can receive an **auto-reply** to confirm their availability and when they can respond to another's request. This technique can manage others' expectations, as they will less likely to expect a quick reply, something which might lead them to go back to their task. Secondly, users can be reminded about their **tasks' priorities** so they can decide whether to keep procrastinating or go back to their original tasks.

The results from the survey showed that 295 (88%) of the respondents chose one of the above countermeasures and 26 (7%) chose two countermeasures. However, 21 (6%) did not select any of the suggested countermeasures.

As demonstrated in Figure 19, the majority of the respondents 197 (59%) chose to show the list of priority tasks as a useful countermeasure for procrastination. Moreover, 124 (37%) of the respondents preferred to use auto-reply which can be used to manage the expectations of others regarding when to expect to receive a reply, which can reduce the pressure that users experience to respond and spend time procrastinating.

Further countermeasures were suggested by the survey participants. The notification was suggested to inform senders when a message is received and read and help them to avoid spending too much time checking SNSs to see their messages status. However, the sender might still procrastinate to see whether the receiver is online and ignoring their messages, as had been discussed in the exploration and design session stages. Therefore, the participants suggested that combining the receipt notifications using auto-reply and task priorities by the sender, which may work better to manage the sender's expectations regarding when they expect to receive a response.

6.5.6.4 SOCIAL INTERACTION FEATURES AND ITS COUNTERMEASURES

Interaction features enable users to interact with each other, such as chatting and instant messaging features and the wall timeline features allowing group interactions (Kietzmann et al. 2011). The qualitative phase of this research demonstrated that such features facilitate procrastination due to the pressure that users may experience to continue the interaction and conversation. The results of the survey in the quantitative phase (Figure 17) showed that 192 (57%) of the respondents agreed that interaction features trigger their procrastination, whereas 77 (23%) disagreed. These features were the second most chosen features to trigger procrastination, after immersive design features. Therefore, procrastination might occur to empathy and to satisfy others expectation even if to do so is detrimental to the main task and the user's productivity.

The countermeasures suggested in the qualitative phase included a **reminder** for both users, using a **timer** for the interaction, and **showing user availability** based on their online

calendar. Participants claimed that reminding only the user who procrastinates can create friction between the need to stop procrastination and the need to show empathy to the other interacting peers. Reminding both parties can help to eliminate that friction. Furthermore, a chat timer can be visible to both parties and can be integrated with the user's calendar to suggest a specific time regarding when users should stop the interaction. In addition, showing the user's availability can be helpful to manage others' expectations regarding whether the user is more likely to interact.

As demonstrated in Figure 19, the respondents to the survey who selected the reminder countermeasure for both users amounted to 157 (47%). Meanwhile, 118 (35%) preferred the show availability countermeasure and 111 (33%) of the respondents preferred the chatting timer. The results showed that one of the suggested countermeasures was selected by 253 (75%) of the respondents and two countermeasures were selected by 50 (14%). Only 16 (4%) of the respondents selected three countermeasures. However, only 13 (3%) of the respondents did not choose any of the suggested countermeasures.

The survey respondents suggested a number of additional techniques, including the use of a **free slot**, **showing a list to do**, and **turning the phone off**. These countermeasures had previously been suggested and discussed during the exploration stages and design sessions. It would appear that some of the respondents thought they cannot stop procrastinating when they have their smartphone at hand and they consider their smartphone to be a cause of procrastination. In other words, to stop procrastinating they must turn their smartphones off. However, the majority of the respondents believed that smartphones and SNSs can be useful when users browse with them in a healthy way rather than taking an extreme route to switch them off.

6.5.6.5 IDENTITY FEATURES AND ITS COUNTERMEASURES

Identity features enable users to represent themselves with certain information, such as their names, date of birth and profile photos (Kietzmann et al. 2011). The exploration stage of the

study suggested that users may procrastinate in an attempt to build a positive self-image, increase their popularity, or maintain good relationships with their followers. The quantitative stage examined the extent to which the respondents agreed that identity features trigger their procrastination. The results show that 145 (43%) agreed that identity features can trigger procrastination, whereas 93 (28%) disagreed (see Figure 17).

Users who procrastinate on SNSs to build a positive self-image or seek popularity for their accounts might manage their procrastination better by using some countermeasures as suggested by the participants through the co-design sessions. This includes **usage feedback**, **auto-reply**, **goal setting**, and **time restriction**. Usage feedback can help raise a user's awareness about how much they use the SNS and compare that to their scheduled tasks and other sources such as to-do-lists. Auto-reply can help users to still build a positive self-image when they declare the time when they will be able to respond to any request on the SNS. Thus, declaring to others when they can get a response will manage their expectations better and can build a positive self-image when others get responses at the time the user states. Furthermore, goal setting can help users to manage their time better when deciding which time they want to be on SNS and the times to be working on other tasks. Thereby, users can receive reminders and suggestions to motivate them to follow established goals. Based on these goals, users also can decide on the time that they would like to be restricted from using the SNS, either using a time frame or a time limit.

As demonstrated in Figure 19, 125 (37%) of the survey respondents selected the **time restriction** countermeasure, thereby indicating that they want to be restricted in their use when they exceed an agreed time limit. This suggests that some procrastinators cannot manage their procrastination by themselves and need a third party to force them to stop procrastinating. Meanwhile, 120 (36%) of the respondents chose **goal setting**, whereby they can see their list of tasks to do, something which helps them to reassess their priorities and pay more attention to their outstanding tasks. Furthermore, 113 (33%) chose **usage feedback**, thereby indicating that they want to review their usage on a regular basis, which might help them to recognise

how much time they spend procrastinating and try to manage their time better. Moreover, 84 (25%) chose the **auto-reply** countermeasure to manage other expectations about when they may receive a reply and reduce the pressure they feel to procrastinate.

The survey results showed that 223 (66%) of the respondents selected one of the suggested techniques. Meanwhile, 76 (22%) of the respondents chose two countermeasures and just 12 (3%) selected three countermeasures. Only 10 (2%) of the respondents chose four countermeasures. However, 6 (1%) of the respondents did not choose any of the suggested countermeasures.

New techniques were suggested by the respondents of the survey and they fell into two categories. Firstly, **universal blockage** whereby users are prevented from accessing SNSs while working on their tasks. Secondly, **recovery countermeasures**, whereby users can get a reward to access SNSs in order to recover from intensive work, which helps to prepare them to continue with upcoming tasks. However, a universal blockage can negatively affect users and might increase their stress level when it happens in one stage. Therefore, the user may follow a gradual approach before reaching this stage. Furthermore, the recovery countermeasures are meant to allow users to still have small breaks during the main tasks which can help them to refresh their mood and return to their tasks at an appropriate time.

Table 11: Summary of The Respondents' New Suggested Countermeasures

Family of features	Suggested countermeasures
Notification features	Deactivated notification
	Rewards
	Simulations
	Social ranks

Immersive design features	Usage comparison with peers
	Expected time for relevant content
Surveillance of presence features	Notification to show when received and read
Identity features	Universal blockage
	Recovery
Interaction features	Free slot
	Show to do list
	Turn phone off

6.5.7 CORRELATIONS BETWEEN FEATURES OF SNS AND PROCRASTINATION TYPES

The research utilised a correlation test to examine the relationship between the different types of procrastination and the features of SNSs that may facilitate procrastination. The results show that there is a significant positive correlation between the mood modification and notification features ($r = 0.648$, $p = 0.009$). There is also a positive correlation between mood modification and the surveillance of presence ($r = 0.531$, $p = 0.042$). This means that participants who reported a high level of mood modification types also reported a high level for the notification and surveillance of presence features. However, the research does not indicate any significant correlation between other types of procrastination and the features of SNSs.

The research identifies a significant positive correlation between escapism and avoidance types ($r = 0.619$, $p = 0.014$). Escapism also had a significant positive correlation with emergence type ($r = 0.721$, $p = 0.002$). This means that the participants who reported a

high level of escapism type also reported a high level of avoidance and emergence types. There was a significant positive correlation between the following features of SNSs: significant correlation between interaction features and notification ($r = 0.756$, $p = 0.001$), surveillance of presence ($r = 0.711$, $p = 0.003$), and identity ($r = 0.552$, $p = 0.003$). This means that participants who reported a high level of interaction features also reported a high level of notification features, surveillance of presence features, and identity features.

There was also a positive correlation between immersive design and identity features ($r = 0.523$, $p = 0.045$). Table 12 shows all the correlations that were identified between the various types of procrastination and features of SNSs, between the different types of procrastination, and between the features of SNSs that facilitate procrastination.

Table 12: Correlation Between Procrastination Types and SNS Features

Type of procrastination	Features of SNS	Pearson correlation
Escapism and avoidance		0.619
Mood modification	Notification features	0.648
Mood modification	Surveillance of presence features	0.531
Escapism and emergence		0.721
	Interaction and notification	0.756
	Interaction and surveillance of presence	0.711
	Interaction and identity	0.552
	Immersive design and identity	0.523

6.6 DISCUSSION

The suggested countermeasures, discussed in the previous section, are meant to utilize and augment the SNS design to help users gain greater control over their procrastination. However, implementing these countermeasures is a challenging task as it can introduce side-effects that might be detrimental to the user's experience and also their digital wellbeing. Cultural differences are an example of the factors that must be considered when implementing these countermeasures. Power distance is higher in certain cultures and this can introduce the risk of increasing users' stress when a chat timer or an autoreply are used when interacting with someone who they perceive to be higher in the position. Power distance is one of the five dimensions developed by (Hofstede 2011) and it refers to how people accept a higher degree of unequally distributed power. Another example of a challenge relates to showing availability status as a countermeasure for procrastination as it might help to manage the expectations of others and reduce the pressure on users to procrastinate. Despite the benefits, it can introduce the risk of preoccupation where users might fear being excluded from participating in an important event or communication during the time when they are unavailable. It has been argued that certain design features of social networks can trigger such a fear of missing out (FoMO) and one of them is that people may interpret unavailability online as lack of interest (Alutaybi et al. 2018; Alutaybi et al. 2019a). This introduces the need to consider more holistic solutions than the proposed countermeasures; solutions which require digital literacy and the utilization of social norms and situational awareness.

Users' personality is also a factor and can affect the type of countermeasures. For example, some users might procrastinate and refuse to acknowledge their procrastination despite objective measures, e.g. usage feedback, due to denial and low level of agreeableness. The denial strategy refers to the defence mechanism that some people use to protect themselves from the illness resulting from negative behaviour such as the feeling of guilt

(Roth and Cohen 1986). Therefore, providing users with feedback about their procrastination might introduce the risk of users avoiding the tools introduced to help them. Moreover, some users might use SNSs as a coping strategy to relieve stress and modify their mood. Those users have reasons to procrastinate and are conscious of their procrastination. Reminder and suggestion countermeasures can increase their stress level and prove detrimental to their experience with the SNS as a mood modification medium. These challenges are to be considered when designing the software and it is argued here that besides the usual software-related testing such as the functional and user testing, a psychological test of their efficiency and potential harm to wellbeing is much needed. The modality of application can differ, and this can increase or decrease the risks, e.g. it matters whether the users or the software apply the countermeasures. Involving the users in a semi-automated style to set countermeasures can increase the likelihood of acceptance and reduce side-effects. At the same time, applying heuristics may be beneficial to users in order to assess whether any of the recurrent risks are likely to apply to them.

Procrastination can occur due to internal or external factors. Internal factors are when users procrastinate due to low self-control, low self-esteem, and low self-efficacy (Tice et al. 2001; Nielsen et al. 2002; Klassen et al. 2008). In contrast, external factors are where users procrastinate due to social pressure, to satisfy others' expectations or to gain an external reward. Social pressure and the need to agree on what others suggest can be triggers for procrastination (Chen et al. 2016a; Eckert et al. 2016). However, the suggested countermeasures can be divided into two subcategories based on the preferences of the user. Firstly, **proactive countermeasures** enable users to plan and prepare to avoid procrastination in advance, e.g., showing availability and the auto-reply. Using proactive countermeasures can reduce the effect of the external factors that may trigger procrastination, e.g. social pressure. Furthermore, proactive countermeasures can reduce the possibility of silent procrastination where users keep thinking about whether they have been contacted while they are offline. Secondly, **reactive countermeasures** enable users to combat the internal factors

of procrastination and to take immediate reaction when the procrastination takes place. The reactive countermeasures, such as reminders and suggestions, can raise users' awareness and help them gain greater control over their procrastination.

GDW tools are meant to help users to have healthier smartphone usage and a balance between technology and life. The features of GDW were evaluated to discover the extent to which their features support the suggested countermeasures. The results are shown in Table 13. The features of GDW are meant to help users to use smartphones healthier. An example of these features is usage feedback so they can manage their usage time and style better to avoid distraction. Overall, the suggested countermeasures were either partially suggested or partially supported in GDW. This could be due to the fact that operating systems, such as Google Android, are not expected to interfere with the management of interaction with users through the social networking applications they host. However, given the lack of facilities which enable third-party developers to access usage data of applications and digital device on behalf of their users, the implementation of the countermeasures, at the moment, can only be done by the operating system or the SNS designers who have sole access to such data and mechanics. It is advocated that such openness from the operating systems and the SNS is critically needed not only for third-party applications but also to implement countermeasures which are cross-application, e.g. an autoreply which spans across multiple SNSs.

Auto-reply, time restrictions, and usage reminder countermeasures are supported partially in GDW program. To maximise the suggested countermeasures, it is suggested that the countermeasures, with proper consent from the users, are integrated with their calendars so that processes are automated and user experience is enhanced. In contrast, in GDW features, users must set up their preference manually. The automated processes enable users to be less distracted when setting the limits and scheduling the allowed times for the usage, which may itself trigger further procrastination. Furthermore, GDW features do not support other advanced countermeasures, such as **showing users' availability, suggestion, priority, reminder for both users, chat timer, or goal setting**. This is currently left entirely for SNS

designers, and it is reiterated that some countermeasures are better set to be universal across all applications of the device and this requires a role of the operating system as well. For example, suggestion around muting notification and limiting chat times would apply to the use of the device as a whole and it will be tedious for the users to set that individually for each application.

Table 13: Assessing Google Digital Wellbeing Against the Suggested Countermeasures

<div> <div>Fully supported ✓</div> <div>Partially supported ○</div> <div>Not Supported at all ✕</div> </div>		
Countermeasures	Level of support	GDW support of the countermeasure and suggestions for improvement
Showing users availability	✕	This countermeasure is not supported and left to the individual SNS to implement. A universal availability status administered at the level of the operating system, and GDW is still missing.
Suggestion	✕	This is either left to the individual SNS or integrated with some Google programs, e.g. YouTube. Suggestion countermeasures towards the device usage or collective usage of a set of SNS are still missing.
Auto-reply	○	This countermeasure is partially supported by Google applications, e.g. Gmail as an emailing system, i.e. Gmail's out-of-office. Universal auto-reply, spanning across the SNS applications on the device and multiple devices, and an auto-reply which is automatically or semi-automatically generate, e.g. based on the context and the online calendar, are still missing.
Time restriction	○	This countermeasure is partially supported by GDW where the user can set the time limit that they wish to spend online. They are reminded when approaching

		the limit and then restricted from using the application or the device when they exceed the limit. Again, intelligence in setting these limits can benefit from the context and online calendar and to-do-list of the person and this requires further tools to collect such data from the users, explicitly or implicitly, with their consent.
Usage reminder	○	This countermeasure is partially supported by DGW and mostly correlated with the time restriction and has the same limitations as to time restriction and suggestions.
Usage feedback	○	The usage feedback in GDW is mainly centred on the time of using the phone and applications. Usage feedback could provide more details about actual procrastination time over the day through accessing and intelligently processing context and tasks data, collected automatically or through self-report. Feedback can also relate to the usage sentiments and not only time, e.g. through natural languages processing of the posts and through smartwatch data to infer sentiments.
Priority tasks	✖	This countermeasure is not supported and left for applications dedicated for time and work management.
Reminder for interacting users	✖	This countermeasure is not supported and left to SNS designers. A universal countermeasure supported by the operating system would enhance users experience and reduce effort through being embedded as a service to add to each social interaction application.
Chat timer	✖	This countermeasure is not supported and can be supported in a way similar to the Reminders to interacting users.

Goal setting	○	This countermeasure is partially supported in GDW through techniques like “Do not disturb” and Mute Notification allowing the user to focus on their goals and tasks. However, an explicit setup of them is not yet supported. This can enhance situational awareness and empathy if explained to the other interacting parties on SNS and reduce the worry about misinterpretation.
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6.7 CHAPTER SUMMARY

The paper proposed countermeasures to combat procrastination resulted from a set of typical SNS features. A mapping between the features and the countermeasures was presented and the implications of implementing and applying these countermeasures on user experience and digital wellbeing, both positively and negatively, was discussed. This chapter also showed that countermeasures could be implemented to be universal across all SNS on one or even more device. This requires an increase in the openness culture of operating systems and SNS companies; an openness to each other and also to third-part applications to which a user gives a consent to manage their digital usage. There is a need for the process of engineering such tools to be multi-disciplinary involving fields like software engineering, data analytics, sociology and psychology. This is due to the delicate nature of the mechanics for behaviour change and their associated risks such as reactance and relapse (Wortman and Brehm 1975; Alrobai et al. 2016).

7 Chapter 7: Combating Procrastination on Social Networking Sites Method (D-Crastinate)

Based on the finding of the previous chapters, D-Crastinate method was developed to help users to gain more control over their procrastination on SNS. D-Crastinate method has sixth stages which include education, self-diagnosis, planning and preparation, action, self-assessment, and error identification. In the first section of this chapter, the background about the concepts and theories that contributed to the method stages was provided. In the second section, explanation about D-Crastinate method and its content for each stage was supplied. The guidance to help users in applying this method in order help them control their procrastination better was offered.

7.1 D-CRASTINATE METHOD'S BACKGROUND

In this section, the theories and concepts were discussed that were considered while designing the stages of D-Crastinate method. These theories and concepts include health belief model, relapse prevention, digital resilience, positive thinking, relatedness to others, acceptance of non-perfect, emotional intelligence, social norms, poor expectation management, impulsive control, poor time management, habitual checking, and think aloud strategy.

7.1.1 HEALTH BELIEF MODEL

The health belief model (HBM) focuses on the relationship between beliefs and health. HBM suggested that preventive health behaviour consists of personal beliefs (Janz and Becker 1984). There are six components for HBM which include perceived severity, perceived barriers, perceived susceptibility, self-efficacy, perceived benefits, and cues of action(Janz and Becker 1984). The way that people relate themselves to these components is predictive whether they are engaged or not engage in particular action or behaviours. For example, users who perceived benefit of procrastination and how this could change their mood to have better feeling they are more likely to procrastinate whereas others who perceived susceptibility of

procrastination and how it could impact their wellbeing, they are more likely to have more control over their procrastination. However, the materials which will be provided to users can increase their awareness which can change the way of the users thinking about procrastination. These materials also illustrate how users can overcome the barriers and ensure that users get prepared for the procrastination. These materials consider the HBM in order to change users' beliefs about procrastination which can positively affect the behaviour of the users toward the procrastination on SNS. For example, peer pressure is one of the barriers that may lead users to procrastinate in order to meet their peer's expectation. That barrier can be addressed by using the show availability countermeasures which help user to manage their peers' expectation regarding the time that can peers expect the replies. This can reduce the pressure that user feels to responded immediately.

7.1.2 RELAPSE PREVENTION

Relapse refers to the failure in individuals' attempt to change or moderate a targeted behaviour. Relapse prevention refers to the strategy that can be used to ensure that the person will keep a greater control on their changing process and not to back to the addictive behaviour again (Marlatt and Gordon 1985). The relapse can occur in multiple stages which include emotional relapse, mental relapse, and physical relapse (Larimer and Marlatt 2004). Emotion relapse can occur on the earlier stage where individuals start to think about the addictive behaviour and how it could help them to cope with their situation, i.e. smoking. The emotion relapse also occurs when the individual remember their last relapse and they do not want to repeat it, and their emotions and thought can driver them for previous behaviour which that had improved for a period of time (Larimer and Marlatt 2004). The second stage of the relapse is the mental stage where is a war inside individual mind, part of them want to back to the addictive behaviour but the other part does not. Finally is the physical relapse when the person back to the addictive behaviour and perform it as before or might be more (Larimer and Marlatt 2004).

It is hard to prevent relapse from happening in the case of motivating users to avoid procrastination on SNS because of the availability and the ease of the accessibility to the smartphones most of the time. Moreover, the personalised content which based on user interest and the temporary content such as Snapchat stories, these features increase the possibility of the relapse where users back to procrastinate again. Moreover, the relapse might happen when users procrastinate to change their mood and or cope with the associated task's stress. The instantaneous euphoria or the instant reward that SNS design provides for users such as *likes* or *positive comments* trigger the relapse and could significantly affected their control over the procrastination. However, the suggested countermeasures are meant to consider these design triggers to decrease the possibility of having relapse. In the proposed method, further steps were also taken in order to educate users how relapse occurs and provide users with guidelines for relapse prevention. The guidelines focus on motivating users to finish the process and insure that users would not deviate from their goals. In order to achieve this, users are required to identify their gaols and motivation for using this method. Then, different reminders and suggestion will be sent to the user during the method stages. Reminding users about their gaols and their motivations can help to keep users motivated to achieve their gaols and increase the chance of preventing relapse from happening.

There some strategies that could help users for the relapse prevention such as peer supporting, learning from setbacks, and having a positive self-libelling. Using these strategies can increase user's self-esteems and self-efficacy to moderate and reduce the possibility of the relapse, eventually having greater control over procrastination time.

7.1.3 DIGITAL RESILIENCE

Resilience in general refers to the ability that individual might have to deal effectively with changes, threats and the ability to recover quickly from challenges and difficulties. Digital resilience describes to what extent the online data should freely accessible, interchangeable, operational, of high quality, and up-to-date (Wright 2016). Building digital resilience will

enable users to have the resources that help them to deal with online issues such as procrastination. These resources could include that understanding when the user is at risk, knowing how to seek help, and guidelines to help in recovering quickly from issues' side effect. The digital resilience could offer users timely feedback which help them to understand their current situation about procrastination. This feedback can also provide more suggestions for users on how to control procrastination. Furthermore, building digital resilience could help users to build defence's skills where users can combat the trigger of procrastination and eventually controlling procrastination better. Digital resilience can be built for users by illustrates how procrastination happens on SNS and the features that facilities it. D-Crastinate method and its supported materials can help to educate users on how to recover from procrastination side effects which to help users to gain greater control over their procrastination.

The following are some strategies are included in D-Crastinate method which provides alternatives options to increase user's ability and build their resilience to combat procrastination.

7.1.4 POSITIVE THINKING

To power success (I will finish my task even its tough). Using the positive thinking strategy can positively increasing users self-efficacy which reduce the possibility of procrastination (Scheier and Carver 1993). The suggested countermeasures provide users with feedback focussing their improvement in controlling their procrastination which can trigger user's positive thinking and keep users motivated. Also, the framing of the content for the suggestion countermeasures could play an important role to ensure that users stay motivated and encourage the positive thinking.

7.1.5 RELATEDNESS AND CONNECTED TO OTHERS

Relatedness is a component of the self-determination theory and one of the three needs that people should have to be motivated. For example, to increase user's motivation they could

apply the procrastination countermeasures with their relatedness and friends. Applying the procrastination countermeasures with friends and colleagues can help users to motivate each other and also reduce the possibility of procrastination when users' procrastinate to build positive self-image to keep greater relationship with their friends and relatives.

7.1.6 ACCEPTANCE OF NON-PERFECT

Procrastination has a strong relationship with perfectionism where people procrastinate because of desire to complete the task perfectly or even to reply the requests on SNS instantly to maintain positive self-image (Shafran and Mansell 2001). The perfectionism model explained the six dimensions which include personal standards, parental expectations, parental criticism, concern about mistakes, doubts about actions, and organisation (Frost et al. 1990). When people try to satisfy these dimensions can lead them to procrastinate and make tasks hard to achieve. However, the acceptance of non-perfectionism can reduce the feeling of being criticised or evaluated by others and positively lead users to learn from previous mistakes without pressuring themselves (Lundh 2004). The findings in chapter 4 also suggested that people might procrastinate in order to reply messages instantly in order to maintain positive relationship with others and to build positive self-image. This could add more pressure in the users to procrastinate on SNS in order to meet their friends' expectations all the time.

7.1.7 EMOTIONAL INTELLIGENCE

Emotional intelligence refers to the ability to recognise the meaning of the emotion and their relationship, and capacity to perceive emotion, feeling, understand the information behind these emotions, and manage them (Mayer et al. 1999). Procrastination has associated relationship with emotion where people tend to procrastinate to regulate negative emotions and have a better feeling (Tice and Bratslavsky 2000; Sirois and Pychyl 2013). Furthermore, people who procrastinate do not report unhappy feeling in the short term because the tendency of procrastination might be used to avoid dealing with unpleasant tasks and engage in

relatively enjoyable activities (Pychyl et al. 2000; König and Kleinmann 2004). The design of SNS provides its users with considerable number of options to express their emotion such as happy or unhappy emoji. However, the absence of the body languages can trigger procrastination on SNS where people may understand the meaning of these emoji differently which can lead to the silence procrastination where people keep thinking about others' emotions and what it could mean.

7.1.8 SOCIAL NORMS

Social norms refer to typical rates which most people tend to behave or hold a certain attitude. The literature of social norms considers two type of social norms which include descriptive norms and injunctive norms. The descriptive norms refer to the observable behaviour in which people engage or action whereas the injunctive norms refer to the level of attitude held toward particular behaviour (Borsari and Carey 2001, 2003). For example, the associated descriptive norms may be that some people do not access their SNS during lecture time, whilst the injunctive norms might be that most people believe that SNS should not be accessed during the lecture time. social norms research also indicated that individual believe that others tend to behave in more negative way than they do themselves, and others also hold more negative attitude toward a negative behaviour than they do themselves. For example, the social norms around alcohol consumption indicated that individual belief others drink larger quantities more than what they report, and others hold more positive attitude toward drinking alcohol than they report holding (Borsari and Carey 2001; Perkins 2002).

Concerning procrastination on SNS, users might find an excuse for procrastinating when they think others do the same or even procrastinate more. This type of thinking might prevent users to seek some solution to control their procrastination. However, applying social norms approach either the descriptive or the injunctive norms can promote healthier messages and encourage help-seeking where users can realise the issue of procrastination on SNS

(Crocker et al. 2009; Stok et al. 2012). Hence, users can be influenced by their peers having greater control over their procrastination.

7.1.9 POOR EXPECTATION MANAGEMENT

The findings of the studies demonstrated that procrastination on SNS might occur due to the pressure that users might have to meet their contact's expectation in order to build positive self-image (Alblwi et al. 2019b, 2019a; Alblwi et al. 2019a). Therefore, managing others expectation can play a significant role to reduce that pressure, eventually reduce the possibility of procrastination. Setting others expectation can be achieved by enabling some information regarding user's availability or the tasks that users currently perform more transparent to user's contacts. Therefore, confirming the availability time can also reduce the FOMO where users fear of being ignored or excluded (Alutaybi et al. 2018; Alutaybi et al. 2019a). Although, being transparent can inspire and create trust between users and provide an excuse to avoid interacting with others during the unavailability time. On another hand, the transparency of users availability could also introduce some risks around the privacy of users and the security (Van Dyke et al. 2007; Hoadley et al. 2010). However, this issue can be considered in the modality of the application to allow user to be transparent to some level as they wish.

7.1.10 IMPULSIVE CONTROL

Impulsivity refers to the unplanned reaction to external or internal stimuli without regard to the negative result of these reactions to the impulsive individual or to others (Van Dyke et al. 2007). People who are keenly oriented towards the present result of the actions do not consider the long-term consequences and how it can turn to harmful for them. Barratt and their colleagues were developed the most widely used model of impulsivity behaviour (Barratt 1959, 1970). The model the model considered impulsivity as a unidimensional factor for orthogonal to anxiety (Barratt 1970). However, later Barrett developed the impulsiveness scale (BIS). The BIS scale has eleven items, such as "*I plan trips well ahead of time*" and "*I am more interested in the present more than the future*". UPPS is another scale for the

impulsive behaviour which has 20-items to evaluate five facet of impulsivity (Billieux et al. 2012). These facets of impulsivity include Positive urgency (e.g., “When I am really excited I tend to no think before acting”, Negative urgency (e.g., “When I am upset I often act without thinking”), perseverance (e.g., “I finish what I start”), premeditation (e.g., “I usually think carefully before doing anything”), and sensation seeking (e.g., “I quite enjoy taking risks”).

Procrastination has associated relationship with impulsivity behaviour (Steel 2007; Gustavson et al. 2014). In the impulsiveness behaviour, people might act without thinking and they might take risks for seeking immediate pleasure. Neuromas studies demonstrated the importance of considering emotion as trigger of procrastination, e.g., (Sirois and Pychyl 2013; Eckert et al. 2016). Concerning the immersive design of SNS features were the content are personalised based on the users interest and preference which has significant impact in increasing the procrastination time and fulfil the user gratification (Tice et al. 2001; De Paola and Scoppa 2015). There is a need to educate users how to increase the control among their impulse behaviour. Numerous strategies can be used to increase user’s awareness about the impulsivity and to help user to think before act. For example, teaching users mindfulness strategies. Therefore, some of the suggested countermeasures meant to increase user’s awareness about their impulse control by providing feedback about the procrastination time or provide suggestions for the user which can help user to rethink whether to complete their procrastination and control it better. This could help users to reassess their behaviour and at least being aware of it. However, advances countermeasures such as universal blockage are also aiming to control the impulsivity by restricting users from continues procrastination when the users wish to use them.

7.1.11 POOR TIME MANAGEMENT

Time management refers to the process of determining needs, setting goals to accomplish these needs, prioritising tasks required to accomplish these goals (Lakein and Leake 1973). Time management also refers to the technique for effective time use (Slaven and Totterdell

1993), or the planning and allocating time for each task to be achieved (Francis-Smythe and Robertson 1999). Procrastination can be reduced using time management tools, and these tools also have positive impact to reduce the stress associated with procrastination (Van Eerde 2015a). However, the design features of SNS also focuses on the time where some features have temporarily content to be viewed in limited time which seen as trigger of procrastination. Another trigger is that once the users views the temporary data the others related or personalised data suggested which can trigger users interest, eventually the user lose their control and ending up procrastinating. However, the suggested countermeasures are meant to pay particular attention to help users to manage their time better. Different tools were suggested such as usage feedback, which meant to monitor users' usage and provide specific information about their procrastination such as the time, location, and the apps that were used. This could help users to have a greater control over their usage. The countermeasures also help to guide users on how to set their goals and the time they wish to spend on SNS. The countermeasures also considered the side effect of procrastination such as stress from multiple reminders in short time. The modality of the application enables users to decide the time that they wish to receive reminders and the quantities of those reminders.

7.1.12 HABITUAL CHECKING

Habitual checking refers to the automaticity access and use of SNS that developed as individuals repeatedly and routinely access because of the gratification that users received from such action (LaRose 2010). Over time, the behaviour becomes action-scripts that users perform without conscious reflection about the consequences of their behaviour (LaRose and Eastin 2004; LaRose 2010). Some researchers conceptualised the habit as type of gratification (Kaye 1998; Ferguson and Perse 2000). However, the gratification seeking on SNS is a predictor for the compulsive and excessive usage which over the time leads users for the habitual checking where the use of SNS becomes in uncontrolled manner (Chou and Hsiao 2000; Song et al. 2004). Diversion and relationships building are factors for gratification sought that can leads to the habitual checking where users access SNS to seek pleasure and

entertainment (Chen and Kim 2013). Self-presentation is also seen as triggers for gratification (Boyle and Johnson 2010). Self-presentation refers to the information management in which users chose to represent themselves for public. SNS features play an important role to increase the gratifications seeks such as the identity features and the immersive design features. these features fulfil users' needs which increase the urge for the gratification seek that could leads users for accessing SNS in unconscious moods and leads to the habitual checking.

7.1.13 THINK ALOUD STRATEGY

Think aloud strategy is widely used in usability design which helps designers and researchers to gather data that help to test and improve a product design (Nielsen et al. 2002). In phycology think-aloud techniques refer to the verbalisation of the thoughts while performing a specified task (Ericsson and Simon 1984). The participants are required to report everything that goes to their minds while performing the task without interprets or analyses their thinking. However, applying these techniques can help the users to identify their motivation for procrastination in the first place and write them down. Later, users can search for some strategies to overcome these motivations for procrastination.

7.2 STAGES OF D-CRASTINATE METHOD

Table 14 presents the stages of the D-Crastinate method and its expected outcomes. D-Crastinate stages include education, self-diagnosis, planning and preparation, action, self-assessment, and error identification. Moreover, in Table 15, the guidance was provided which users must follow to improve control over their procrastination.

Table 14: Stages of D-Crastinate Method and their Expected Outcomes

Method stages	Stages' name	Expected outcomes
		<ul style="list-style-type: none"> • Increase users' awareness about procrastination and how it happens in general

First stage	Education	<ul style="list-style-type: none"> • Build digital resilience when users understand the motivation for procrastination and how to combat it • Users get knowledge about relapse prevention
Second stage	Self-diagnosis	<ul style="list-style-type: none"> • Users can identify their procrastination types
		<ul style="list-style-type: none"> • Users can identify the features of SNS that trigger their procrastination
Third stage	planning and preparation	<ul style="list-style-type: none"> • Users can identify the tools that increase their engagement for particular task
		<ul style="list-style-type: none"> • Users can identify the suitable technical and socio-technical countermeasures to combat procrastination
Fourth stage	Action	<ul style="list-style-type: none"> • User can use the customised countermeasures for one. • Alternative countermeasures will be made available should the suggested countermeasures not work well enough for the user
Fifth stage	Self-assessment	<ul style="list-style-type: none"> • Users will assess the usefulness of the suggested method and whether it helps to combat procrastination
Sixth stage	Error identification	<ul style="list-style-type: none"> • This stage helps users to identify the features of SNS and the countermeasures more spastically should the previous stages does not work from the first time

Table 15: Guidance for Applying D-Crastinate Method

Stages' name	Guidance
Education	In the education stage, users can read and familiarise themselves with the key ideas and habits that may lead people to procrastinating more on SNS.

Self-diagnosis	Firstly, in this stage the users are expected to figure out what type of procrastinator they are. This can be achieved by selecting the types of procrastinating that relate to the user in Table 17.
	Secondly, after that users can determine for themselves what they think the main features of social networking sites are that facilitates them to procrastination more in Table 18. However, if they feel like they procrastinate due to other things that are not currently listed they may write them down before moving on to the third stage.
planning and preparation	Firstly, if the users believe that they may procrastinate due to a lack of motivation to complete tasks; they can consider using tasks engagement tools which is provided for users in Table 19.
	Secondly, in Table 20, a list of customised countermeasures was provided that can help users to gain more control over how much they procrastinate on a day-to-day basis. The countermeasures have been customised specifically based on the features that lead them to procrastinate.
Action	In this stage, users are required to apply the selected tools of task's engagement which is presented in (Table 19) and the countermeasures (Table 20) for one week.
Self-assessment	After the action stage is completed, users are expected to decide how useful they found the previous stages by answering the question in Table 21. However, users can move on to the next stage if they do not find the previous stages useful in helping them to gain more control over their procrastination.
Error identification	In this stage, users are expected to answer the provided questions in Table 22 to help them analyse what went wrong in the previous stages. Once users have identified their own personal challenges they can then return to the second stage to apply the method process again.

In the following sub sections, more explanation was provided about each stage of the D-Crastinate method. It will also provide the instructions on how users can use D-Crastinate method to gain greater control over their procrastination.

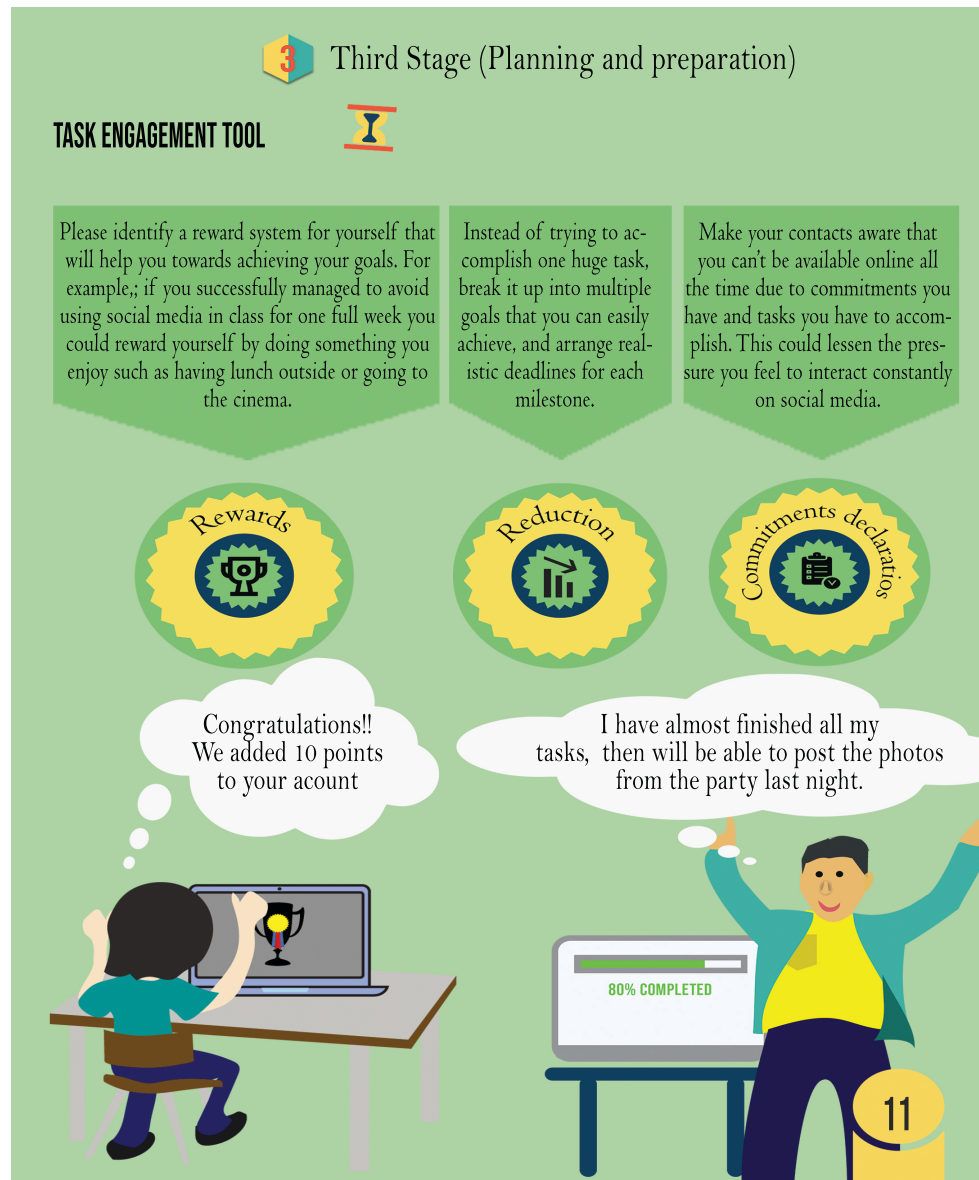


Figure 20: An example from D-Crastinate Method

7.2.1 FIRST STAGE: EDUCATION

The first stage is the education stage where users can be educated about the phenomena of procrastination, associated side effect, and the negative result of it. This stage can help to increase users' awareness about procrastination and also helps to build digital resilience where

users' can easily found the information on how procrastination happens, user's motivation for procrastination, the features that facilitate procrastination on SNS, and the suggested countermeasures to combat it. Furthermore, users can get guidelines on how to use the proposed methods and information about each stage. Therefore, they fully understand the used concepts and what their meaning such as the countermeasures, procrastination types, and the SNS features that could trigger procrastination. Moreover, in this stage, users will be provided with an explanation about the relapse and how it can prevent them from completing the process of the interventions. The relapse can occur in any stage and at any time. Therefore, users must prepare for it in order to have successfully completed the use of the proposed method. Preventing the relapse can also help to ensure that the users stay motivated to complete the use of the suggested countermeasures and increase the possibility of reducing the procrastination time.

In education stage, the participants will be also provided with additional countermeasures which sought to provide alternative strategies that could help to combat procrastination on SNS. The used language was moderated to ensure that users can easily understand it. In the first part, explanation was provided about the concepts that could lead users to procrastination such as poor expectation management, impulsiveness and lack of self-control, poor time management, and social norms. However, in the second part, some of the suggested techniques were offered that could help to combat procrastination such as digital resilience, acceptance of non-perfect, express you to others, goal / limit settings, positive thinking and relapse prevention.

7.2.1.1 EDUCATION STAGE: PROCRASTINATION TRIGGERS

In this part, it is explained how procrastination usually happens, and some examples have been given for each trigger.

- **Poor Expectation Management:** considerable number of people end up spending large amounts of time procrastinating on social media. Sometimes this can be due to social

pressure, usually from friends, who might be very active on social media platforms. In order to maintain a positive self-image some people might try to avoid disappointing their friends by replying to messages and notifications immediately.

- **Impulsiveness and lack of self-control:** people who have a low amount of self-control might react impulsively to their social media notifications. When they see a new notification, they might want to respond to it straight away and interact with others. But this might cause them to prioritise social media over tasks they have to do and responsibilities they have to carry out, which will affect how well they work and how they manage themselves in a work environment.
- **Poor Time Management:** people who have low skills in time-management are more likely to spend a lot of time procrastinating. They might tend to forget themselves and get easily distracted when accessing social media instead of prioritising more important tasks, which could lead to them wasting valuable time. Those people need to practice managing their time more effectively so they have a healthy balance between carrying tasks / doing homework and spending time on social media (in their free time).
- **Habitual checking:** the impulse to frequently check social media might lead some people to developing a habit to check their notifications without meaning to, leading to them spending more time than necessary on social media. Habits like this are usually difficult to control as it has become normalised to be constantly using phones and other devices.
- **Social norms:** some people underestimate their levels of procrastination and might think that their habits are acceptable and normal when they see that others procrastinate also. For example; ‘I knew I was going to be late for the lunch event, but everyone was taking a selfie at the venue so I thought it would be okay for me to do the same.’

7.2.1.2 EDUCATION STAGE: SOLUTIONS FOR PROCRASTINATION

In this part, some techniques were provided that could help users to control their level of procrastination better. These techniques include digital resilience, accept of non-perfect, express yourself to others, goal / limit setting, positive thinking, and relapse prevention.

- **Digital resilience:** when users wanted to have a better control over their level of procrastination there are some tools and information available which can help users to build digital resilience. To build digital resilience, users can find out how procrastination happens, what the negative results of procrastination are, and how to prevent those negative consequences.

Digital resilience means the following:

- Do not get overly affected emotionally by what you see online.
- Users could understand that a large percentage of what they see online is not necessarily a reflection of the real world.
- Users could understand how information on social media is filtered to cater to your interests.
- **Acceptance of non-perfect:** people who seek to be ‘perfect’ might feel the need to instantly respond to every single message they receive in order to meet other people’s expectations and please them as much as possible. But the pressure many people feel to always be available online might prevent individuals from dealing with their own day-to-day tasks. Being able to accept that users can’t please everyone could help users to better manage how much time they spend engaging with people online, and therefore decrease how much time users spend procrastinating on social media.
- **Express yourself to others:** users can manage their friend’s expectations by telling them when the user is free to interact with others on social media, and when the user is busy. Doing this could reduce the pressure that user feel to be active on social media too often. Users could also apply this procrastination countermeasure with their friends so that can both motivate each other to spend less time on their devices.
- **Goal / limit settings:** applying goal / limit settings to users’ life could help them avoid receiving distracting notifications too often. This should eliminate a lot of temptation users might feel to frequently check on their social media accounts, and in

turn should lead to reducing how much time users spend procrastinating on social media. For example; users could select daily updates instead of hourly ones, or simply mute notifications. This will help users to develop new, healthy habits and encourage users to engage more with their tasks rather than their devices.

- **Positive thinking:** maintaining positive self-talk could help users to curb how much time they spend on social media. For example, if a user had sent a message to someone and found that they had read their message but hadn't yet replied, instead of obsessing over it the user could choose to think more positively about the situation; they might have been busy at the time and needed more time to reply. Methods like this also help users to develop more understanding and empathy towards others, and help users distance themselves from situations that might otherwise cause anxiety.
- **Relapse prevention:** once users decide to take control back into your own hands and spend less time procrastinating on social media, users must prepare for there to be a relapse. It can help to understand what the signs are, how it happens and what strategies users can implement into their life to help in either avoid it or tackle it. The relapse occurs when the user use the suggested techniques to help in control their procrastination levels and ultimately the user return to your previous habits of spending too much time on social media.

The relapse occurs in three stages:

- Emotional relapse when users think about how spending time on social media could help them to feel better and improve their mood.
- Mental relapse when users struggle to train themselves into spending less time on social media.
- Physical relapse when users return back to procrastinating like they did before.

In order to prevent relapse, users could do the following:

- The user can list things that will help to motivate them to beat procrastination.
- The user can list the negative results of procrastination that they want to avoid.

7.2.2 SECOND STAGE: SELF-DIAGNOSIS

The self-diagnosis stage has two parts to perform. The first part is the Types of procrastination and the second part is SNS features that facilitate procrastination.

Self-diagnosis: Types of procrastination

In this part, the users will identify their motivation for procrastination. This part can help to understand the user's motivation for procrastination which includes avoidance, emergency, mood modification, and escapism. Identifying the specific motivation for procrastination can play a significant role in increasing users' awareness and build digital resilience so the users can be more prepared to avoid procrastination once they understand their motivation for the procrastination. In this stage, the participants will be provided with Table 16 which contains some questions to help in identifying the procrastination types. Once the users finish this part, they will move on to the second part which is the SNS features that facilitate procrastination.

The techniques that can be used in the self-diagnosis stage:

- Brainstorming: this technique can help users to delve and apply deep thinking to identify their motivation to procrastinate and the features that usually trigger their procrastination.
- Think sheet: this technique also can be used to help the users to reflect on how they usually procrastinate. The think sheet will have a template that has some questions to encourage users to identify the features that trigger procrastination and their motivation to procrastinate.

Table 16: Self-Diagnosis: Procrastination Types

Questions	Procrastination types
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I often procrastinate to avoid working on unpleasant or difficult tasks	Avoidance
I often procrastinate to change my mood and feel better	Mood modification
I often procrastinate to distance myself from real-life issues	Escapism
When I receive a notification, I check it and spend time on that despite having other tasks to perform	Emergence

Self-diagnosis: SNS features that facilitates procrastination

In this part, the users will identify the features of SNS that may facilitate their procrastination. Table 17 can help users to identify the features of SNS that trigger procrastination. Once the users successfully identified the features of SNS that triggers their procrastination they can move to the next stage of the **planning and preparation**.

Table 17: Self-Diagnosis: SNS Features

Features explanation	Features name
I often delay working on my tasks because I am busy checking notifications on social media	Notification
On social media, I spend time more than I initially intended due to seeing relevant content suggested to me automatically	Immersive design
When I send a message to someone, I keep checking whether or not they received, read or replied my message	Surveillance of presence
I procrastinate on social media to maintain positive interaction with people and respond to them on a timely fashion	Identity

When I am involved in chatting, I find it hard to stop procrastinating and complete my tasks	Interaction
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7.2.3 THIRD STAGE: PLANNING AND PREPARATION

This stage has two phases which include **tasks engagements tools phase** and **countermeasures phase**. Firstly, users can select some tool to motivate them to keep focusing on their tasks. These tools sought to bring the joy that users might have in SNS to the tasks environment (see Table 18). Hence users stay motivated while performing their tasks which can reduce the possibility of the procrastination. At the same time, users will be provided with customised and personalised countermeasures to combat procrastination. The customisation process will be based on the selected features that trigger procrastination which has already been identified on the previous stage. The same background colours were used to match the features that lead to procrastination with their customised countermeasures (see Table 19). Therefore, each feature might have different countermeasures which sought to combat the procrastination that happened due to the identified features. However, users have the ability to select different countermeasures if they wish. To achieve this stage, the users will be provided with Table 19, and Table 20, which contains some questions to help in identifying the tasks motivation tools and the preferred countermeasures to combat procrastination on SNS. The countermeasure could be an either technical or socio-technical countermeasure. Once the users identified the preferred countermeasures to use and the tasks motivation tools they can move to the action stage.

Table 18: Planning and Preparation Stage: Task Engagement Tools

Engagement tools explanation	Tools
I am more motivated to work on tasks that have rewards such as virtual points for each accomplished level and performance quality.	Rewards

I would like to specify different milestones for my big tasks and have a deadline for each milestone.	Reduction
Declaring my work commitments to my contacts on social media would help me to commit more to fulfil them and reduce the peer pressure to engage in unnecessary conversations.	Tasks commitments

Table 19: Planning and Preparation Stage: Procrastination Countermeasures

SNS triggers	Guidance	Suggested Countermeasures	Guidance
Notification features	When you feel you are likely to procrastinate due to checking your notifications and engaging with their content, which of these software techniques would help you to control your procrastination?	Auto-reply	Set up auto-reply so that your contacts are automatically informed about your availability when they message you
		Showing availability	Set a status to show your contacts when you are not available so they do not expect you to interact immediately.
		Suggestions	Seek advice and suggestions if are not sure how to do various technical things such as muting notifications or setting a timer. For example, in iOS you could use Siri to get more suggestion.
Immersive design features	When you spend more time on social media than you initially intended, which of these software techniques would best help you to combat that?	Time restriction	Set a reasonable time limit that you wish to not exceed on social media. For example, using screen apps limit or down time in iOS. To do so, go to the setting in iOS >> screen times >> app limits or down time.
		Usage reminder	Decide on an amount of time that you wish to spend on social media. For example, if you wish to spend one hour per day on social media you could set up a timer for one hour so that you would receive a reminder when the timer is up.

		Usage feedback	Please, utilise your usage feedback that you have spent on social media during your working hours. For example, in iOS, go to setting>>screen time>>usage feedback.
Surveillance of presence features	When you send a message to someone and you find yourself constantly checking to see if they are active online, which of these software techniques would help you to combat that procrastination?	Auto-reply	Set up auto-reply to respond automatically to your contacts in order to let them know about your availability time. For example, set up an auto-reply for your email account.
		Task Priority	Prioritise your tasks based their importance to you. For example, list tasks that you need to carry out this week, ranking them in order of urgency, and then prioritising them over other things.
Identity features	When you procrastinate by replying to your contacts as soon as they message you, mainly to build a positive self-image and maintain a good profile, which of these software techniques would help you to tackle that procrastination?	Usage feedback	Please, utilise your usage feedback that you have spent on social media during your working hours. For example, in iOS, go to setting>>screen time>>usage feedback.
		Time restriction	Decide on a time limit that you wish to not exceed on social media. For example, using screen apps limit or down time in iOS. To do so, go to settings in iOS>> screen times>>app limits or down time.
		Auto-reply	Set up auto-reply to respond automatically to your contacts in order to let them know about your availability time. For example, set up an auto-reply for your email account so you don't feel the need to reply to everyone immediately.
		Goal setting	Set personal goals that you wish to achieve. For example, if you wished to study for one hour per day, you could set up a timer for one hour each time you study so as to organise your time more effectively.
	When you prioritise chatting to your	Reminder to both users	Set up the time you wish to spend messaging your contacts on social

Interaction features	friends on social media instead of focusing on your tasks, which of these software techniques would help you to combat that problem?		media and let them know about the suggested time. For example, if you wish to chat for ten minutes you could set up a timer for ten minutes when the conversation starts with each of your contacts.
		Showing availability	Please set a status to show your contacts when you are not available so they do not expect you to interact with them at certain times when you are busy.
		Chatting timer	Decide on the amount of time that you wish to spend engaging with other online. For example, if you wished to chat for ten minutes you could set up a timer for ten minutes when the conversation is starts.

7.2.4 FOURTH STAGE: ACTION

In this stage, users are required to apply the suggested countermeasures for one week to examine the usefulness of these countermeasures. The users will monitor their control over procrastination while using the proposed countermeasures. As soon as the action stage is finished the users will move to the self-assessment stage.

7.2.5 FIFTH STAGE: SELF-ASSESSMENT

In this stage, users will be asked about their feedback about the used countermeasures and whether it helps them to gain more control over their procrastination (see Table 20). In the case, the users fail to get more control on their procrastination or they do not notice any improvement, they are advised to move to the next stage (error identification) which can help users to pinpoint what was went wrong in the previous stages. However, if users gain more control over their procrastination and acknowledge the usefulness of the suggested countermeasures the process of this method will stop here.

Table 20: Self-Assessment

Questions	Yes	No
Do the suggested countermeasures help you to gain more control over your procrastination?		

7.2.6 SIXTH STAGE: ERROR IDENTIFICATION

In this stage, the users are expected to answer some questions should the previous stages did not work to reduce the procrastination time (see Table 21). These questions meant to help users to identify their types of procrastination and the features that may facilitate users' procrastination more specifically. Once the user answered the previous questions they will be able to select more specific countermeasures to help control their procrastination. Also, if they find themselves end up procrastinating because of other people (peer pressure), the **socio-technical countermeasures** would perhaps be more helpful than the technical countermeasure to aid in controlling how much they procrastinate. However, if they feel they procrastinate because of low self-control skills or poor time management they might instead consider the **technical countermeasures**.

Table 21: Error Identification Questions

Where did you procrastinate? (In which application)
When did you procrastinate? (What time)
What did you miss? (Tasks that you missed)
Why did you procrastinate? (Your reasons for procrastinating)
How did you procrastinate? (Other activities you did while procrastinating)
Who did you procrastinate with? (Other people who were involved and who were perhaps affected by your procrastination)

7.3 CHAPTER SUMMARY

The literature contains some approaches to guide users in how to control their procrastination in general. Some examples of these approaches are discussed in (Schouwenburg 2004; van Eerde 2015b; Grunschel et al. 2018). These approaches viewed procrastination mainly for the personality and self-control perspective and did not notice the power of the design of SNS feature in facilitating procrastination. However, the focus was increased to explore how the features of SNS design could have an important role in facilitating users' procrastination. The novelty of the D-Crastinate method can be summarised in two points. Firstly, it helps to raise users' awareness about procrastination types and the features that could lead users to procrastinate. Secondly, D-Crastinate method offers its users with customised and personalised countermeasures specifically for each feature.

8 CHAPTER 8: EVALUATION OF THE D-CRASTINATE METHOD

In a follow up to the previous chapter where the combating procrastination on social networking sites method (D-Crastinate) method was proposed, this chapter sought to evaluate the D-Crastinate method. The D-Crastinate method was designed in attractive way to help users gain more control over their procrastination (see Appendix 7). In the evaluation, the researcher aims to examine the extent to which the participants believe that D-Crastinate works effectively to improve users' control over their procrastination. The evaluation study has two phases, including a focus group and a diary study. In the evaluation study, a mixed methods approach was used for data collection that comprised a focus group (qualitative) and a survey (quantitative). The following sections discuss in detail the aims and data collection methods of the evaluation study as well as its results.

8.1 AIM OF THE EVALUATION STUDY

This study aims to examine the validity of the D-Crastinate method to help users gain more control over their procrastination. The evaluation study sought to evaluate the D-Crastinate method and its supporting materials across the following aspects:

- **Clarity:** the evaluation study assessed the clarity with which the D-Crastinate method and its supporting materials can be used to identify the types of procrastination; features that may facilitate procrastination; countermeasures that could be used to minimise the time spent procrastinating. This will ensure that the D-Crastinate method is not difficult to understand or use, thereby increasing the likelihood of encouraging users to utilise it to gain more control over their procrastination on SNS.
- **Coverage:** the evaluation study focused on the level of coverage and the self-explanation of the D-Crastinate method and its supporting materials. Examining the

coverage of the method help to assess to which extent D-Crastinate and its supported materials provide sufficient information to achieve the method's aims.

- **Procrastination awareness:** The evaluation study assessed to what extent users benefit from increased awareness about procrastination through the D-Crastinate method and its supporting materials, thereby improving users' control over their procrastination.
- **Acceptance:** this study examined the acceptance of the D-Crastinate method and its supporting materials, which can help to predict the attitude of the participants toward using this method in future. This can be achieved by measuring how users perceive the D-Crastinate method and its supporting materials to combat procrastination on SNS. For this purpose, the e-therapy and attitude and process questionnaire (e-TAP) will be used (see Appendix 10). Measuring users' acceptance will help to generate recommendations for relevant industry companies to implement this intervention into the future design of SNS features to help users gain more control over their procrastination.

The study also aims to assess user acceptance by measuring participants' engagement with the materials provided during the diary study. This will be achieved by using a treatment questionnaire concerning programme participation (TQCPP) (see Appendix 11). The questionnaire explores the reasons for participants' continuing engagement with the procrastination management programme. In other words, the study explored whether people continued in participation because of autonomous regulation (intrinsic motivation) or controlled regulation (extrinsic motivation).

- **Effectiveness:** in this aspect, particular attention was paid to examining the extent to which the D-Crastinate method and its supporting materials can help users to gain more control over their procrastination. Specifically, it assesses how the materials

provided enhanced users' ability to identify their particular type of procrastination; the features that trigger their procrastination; the suitable countermeasures that could help them gain greater control over their procrastination. This can be achieved by comparing the results of the self-reporting questionnaire **before** and **after** using D-Crastinate method.

Table 22 mapped between the aims of the evaluation study and the survey questions used.

8.2 EVALUATION PROTOCOL

The evaluation study adopted a mixed methods approach in which the researcher used the qualitative measures of focus group and diary study, together with the quantitative measure of a survey. The combination of qualitative and quantitative data could offer the study more insight, better understanding and the ability to consolidate its outcomes (Seaman 1999; Runeson and Höst 2009). The inclusion criteria involved people who are aged over 18 years, have an active account on SNS and self-declared frequent procrastination on SNS. The evaluation process was conducted in three stages as follows:

Stage 1

In the first stage, the researcher collected the participants' demographic information. Then, the participants were provided with generic details about procrastination on SNS and the strategies and tools that have been used in previous literature to combat procrastination. The participants were encouraged to share their stories about procrastination and how it affects both their well-being and their academic performance. Sharing stories about procrastination can be used as a warm-up activity, helping to ensure that all of the participants are engaged in the session, as well as providing deeper insight into how the design of SNS may facilitate procrastination (Kankainen et al. 2012). Therefore, the participants can become immersed in the research problem, which encourages them to seek more information about how to control

their procrastination. At the end of this stage, the participants were asked to apply their own strategies to control procrastination for three days.

Stage 2

The first part of the second stage involved inviting the participants to discuss both the usefulness and limitations of their own strategies and explain whether or not these strategies had helped them to better control their procrastination. Next, the participants were encouraged to fill in the self-reporting questionnaire, which helped to identify their types of procrastination and the features of SNS that may facilitate this procrastination (see Appendix 8). After that, the researcher provided a more detailed presentation about the previous findings, including the types of procrastination; the features that trigger procrastination; the suggested countermeasures to combat procrastination on SNS. Subsequently, the researcher explained the D-Crastinate method and its stages, which are designed to help users gain greater control over their procrastination. Finally, the participants were asked to use the D-Crastinate method and its materials for one week. The treatment questionnaire concerning continued programme participation was also handed to the participants and they were asked to fill it in for three days from the day they began to use D-Crastinate.

Stage 3

This session saw the participants being handed back the materials that were provided to them in previous sessions with their comments included. This enabled the participants to discuss the usefulness of the D-Crastinate method and consider whether it had helped them to control their procrastination better than the personal strategies that they had chosen to apply in the first sessions. At the end of the sessions, the participants not only filled in the **e-TAP scale** regarding their intention to apply the D-Crastinate method in future but they were also asked to fill in the self-reporting questionnaire, which helps to identify their types of procrastination and the features of SNS that may facilitate their procrastination (see Appendix 9 and 10).

Table 22: Mapping Between the Aims of The Evaluation Study and The Survey Questions

Evaluation goal	Question examples
Clarity	<p>Generally speaking, the D-Crastinate method was not difficult to understand (i.e. it was explained clearly)</p> <p>Overall, the D-Crastinate method was not difficult to use</p> <p>Did you encounter issues or difficulties when using the D-Crastinate method? If yes, please explain</p>
Coverage	<p>I got sufficient information about how to use the D-Crastinate method</p> <p>I got sufficient information in the D-Crastinate method about the types of procrastination</p> <p>I got sufficient information in the D-Crastinate method about the features of social networking sites that facilitate procrastination</p> <p>I got sufficient information in the D-Crastinate method about task engagement tools</p> <p>I got sufficient information in the D-Crastinate method about the countermeasures for combating procrastination</p>
Procrastination awareness	<p>Do you know how procrastination on social networking sites happens?</p> <p>Are you aware of the features that may facilitate procrastination on social networking sites?</p> <p>How do you rate your awareness of how to control your procrastination on social networking sites?</p>
Acceptance	<p>The following scales were used to measure the participants' acceptance and their intention to use the D-Crastinate method in the future:</p> <p>Treatment Questionnaire Concerning Continued Programme Participation</p> <p>E-Therapy Attitudes and Process Questionnaire (eTAP)</p>

Effectiveness	<p>The following questions were asked before and after using the D-Crastinate method. Then, the results were compared to measure the effectiveness of the D-Crastinate method:</p> <p>Q1/ I often procrastinate to avoid working on unpleasant or difficult tasks</p> <p>Q2/ I often procrastinate to change my mood and feel better</p> <p>Q3/ I often procrastinate to distance myself from real-life issues</p> <p>Q4/ When I receive a notification, I check it and spend time on that despite having other tasks to perform</p> <p>Q5/ I often get distracted by notifications that encourage me to access my social networking sites and I then delay working on my tasks</p> <p>Q6/ When I send a message to someone, I keep checking whether or not they are active online.</p> <p>Q7/ I respond to my contacts on social media almost instantly in order to build a positive self-image and maintain a good profile.</p> <p>Q8/ I find it hard to pull myself away from online conversations in order to complete my tasks.</p> <p>Q9/ While on social media, I often see suggested content that is relevant to me and I end up spending more time than I intended to on those sites.</p>
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8.3 ANALYSIS

The collected diary data and the participants' comments on the questionnaire were transcribed and 'cleaned up'. A qualitative analysis was applied to the qualitative data that were written either in the diary or on the survey. A descriptive and inferential analysis was applied in the quantitative part of the survey, with the paired sample t-test method being used to determine the effectiveness and usefulness of the proposed method. Paired sample t-tests were used to determine the statistical significance of the changes after the treatment time. In this study, the paired sample was conducted to compare the mean and to determine the significance of the change in the data that was collected **before** and **after** applying the treatment.

8.4 FINDINGS

In the following sub-sections, the findings of the evaluation study are presented and discussed. The findings are instructed according to the aims of the study. A total of 30 participants took part in the evaluation study; 13 (43%) male and 17 (57%) female. The participants' ages ranged between 19 and 41 (mean: 25.63 and Standard Deviation: 5.58).

8.4.1 CLARITY OF D-CRASTINATE

“Generally speaking, the D-Crastinate method was not difficult to understand”

Concerning the questions' clarity and to what extent the participants found the D-Crastinate method and its materials easy to understand, 27 (90%) of the participants either agreed or strongly agreed with the assumption that the D-Crastinate method was not difficult to understand (see Figure 21). However, three (10%) of the participants selected the neutral option. Some participants reported that some of the colours used in the booklet made the text a little hard to read and they suggested making the text background brighter. An example of these comments is, *“Colours could be brighter, especially the purple one”*. In general, the comments about the structure were positive and highlighted the benefit of using shapes and colours to match the content; this made the D-Crastinate method easy to follow and understand.

The following are examples of comments about the structure and presentation of the D-Crastinate content:

- *“Nicely organised and clear guidance”*
- *“Good use of coordinated colours to make it fun”*
- *“Good use of diagrams to avoid it being too text-heavy”*
- *“It helped me understand how and why we procrastinate. This information was very clear and engaging”*

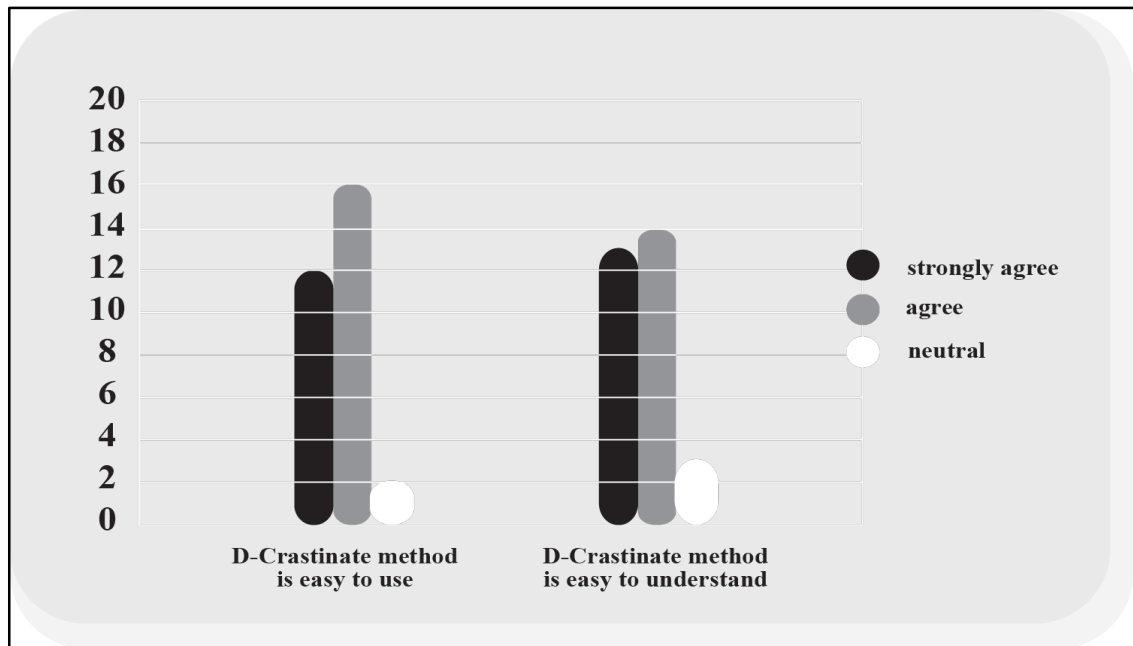


Figure 21: Clarity Level of D-Crastinate Method

“Overall, the D-Crastinate method was not difficult to use”

In response to the question about whether the D-Crastinate method was not difficult to use, 28 (93%) of the participants chose either ‘strongly agree’ or ‘agree’. Twelve (40%) of respondents chose ‘strongly agree’; 16 (53%) participants chose ‘agree’; two of the participants chose the neutral option (see Figure 22). The participants reported that the D-Crastinate was very easy to apply and the guidance did not need any explanation. For example, one participant said, *“Very well explained, I didn't need to question anything throughout the week”*. However, another participant reported that the time that was given to apply the D-Crastinate was short as they said, *“No difficulties; however, the intervention duration was quite short to able to explore other aspects of it”*. Meanwhile, another respondent said, *“The countermeasures were very good and easy to use; the use of D-Crastinate just made me a lot more aware of what I could do to combat procrastination”*.

8.4.2 COVERAGE OF D-CRASTINATE

The following subsections will discuss the result of the evaluation study from the perspective of coverage, including the coverage of D-Crastinate in general; procrastination types; SNS features; task engagement tools; procrastination countermeasures.

8.4.2.1 COVERAGE OF THE D-CRASTINATE METHOD IN GENERAL

“I got sufficient information about how to use the D-Crastinate method”

In response to the question about whether users were provided with sufficient information about the D-Crastinate method, all of the participants either agreed or strongly agreed with this assumption. Twelve (40%) of the participants strongly agreed and 18 (60%) of the participants selected ‘agree’ (see Figure 22).

Overall, the participants reported that the D-Crastinate method and its support materials provided a clear structure and sufficient information about the use of the method. One respondent said, *“The method seemed simple and easy to follow”*. The fact that the D-Crastinate method has a simple structure and content helps to increase user engagement and reduces the threat of users failing to complete the entire process of the method. One participant said, *“It was good that the booklet even gave instructions for how to set auto-reply and other countermeasures”*. Another participant said, *“I followed the steps of how to manage my procrastination and it works”*.

8.4.2.2 COVERAGE INFORMATION ABOUT PROCRASTINATION TYPES

“I got sufficient information from the D-Crastinate method about the types of procrastination”

As demonstrated in Figure 22, all of the respondents either agreed or strongly agreed with this assumption. Eleven (37%) participants selected ‘strongly agree’, while 19 (63%) of the participants chose ‘agree’, which demonstrates that the booklet provided sufficient information about the procrastination types. This helps users to understand their motivation

for procrastination and once they recognise this motivation, they can have a better idea of how to control their procrastination more effectively.

Overall, the participants were fully educated about the different types of procrastination. Having four different types of procrastination in the model helps users to divide the huge issue of procrastination into smaller elements, which allows customised solutions to be provided. This differentiation can help users to choose more specific countermeasures based on their personal type of procrastination, enabling them to gain more control. One of the comments about the information concerning procrastination types was that increasing users' awareness about their motivation for procrastination on SNS plays an important role and can in itself be part of the solution to reducing procrastination. This participant said, *"I didn't know before how many types of procrastination there were and what they were called, so now I know the main reasons why I procrastinate"*.

8.4.2.3 COVERAGE INFORMATION ABOUT SNS FEATURES THAT FACILITATE PROCRASTINATION

"I got sufficient information in the D-Crastinate method about the features of social networking sites that facilitate procrastination"

As shown in Figure 22, respondents were generally in agreement about whether they received sufficient information about the features of SNS that lead to their procrastination. Most respondents (28; 93%) either strongly agreed or agreed with this assumption, while two (7%) selected neutral. This indicated that the participants had started to recognise that procrastination is encouraged as part of the design of SNS. Therefore, each participant could successfully pinpoint the features that usually lead them to procrastinate. One participant said, *"It helped me to understand how and why we procrastinate. This information was very clear and engaging"*. Another participant said, *"Now that I'm more aware of these features, I'm able to notice which ones trigger me to procrastinate more and try to avoid that happening"*.

8.4.2.4 COVERAGE INFORMATION ABOUT THE TASK ENGAGEMENT TOOLS

“I got sufficient information in the D-Crastinate method about task engagement tools”

As demonstrated in Figure 22, 28 (93%) of the respondents either agreed or strongly agreed that they had received sufficient information about the tools that could increase their motivation to keep focusing on their tasks and minimise the risks of procrastinating on SNS. Meanwhile, 2 (6%) of the respondents were selected to the neutral option. The task's engagement tools are designed to prevent procrastination from happening by bringing the joy that users experience when using SNS to the task environment. Examples of task engagement tools are rewards and reduction, which may provide extrinsic motivation for users and thereby increase commitment to the task. A participant said, *“It was very clear in explaining the engagement tools which helped me to focus on my own work”*.

8.4.2.5 COVERAGE INFORMATION ABOUT PROCRASTINATION COUNTERMEASURES

“I got sufficient information in D-Crastinate method about countermeasures for combating procrastination”

Figure 22 illustrates to what extent the respondents agree with the assumption that the D-Crastinate method provides enough information about countermeasures that may help to prevent procrastination from happening, with 28 (93%) indicating that they strongly agree or agree with this assumption; 15 (50%) of the respondents chose ‘strongly agree’ and 13 (43%) chose ‘agree’. The researcher customised the countermeasures based on the features of SNS that facilitate or encourage procrastination, so each feature has its own countermeasures. This helps to avoid information overload by users choosing all of the countermeasures. The D-Crastinate method used the same colours and shapes to match the features of SNS and their countermeasures. This helps the participants to determine the related countermeasure even before reading the text. One user said: *“Well explained countermeasures, having different shapes and colours made it easy to follow”*.

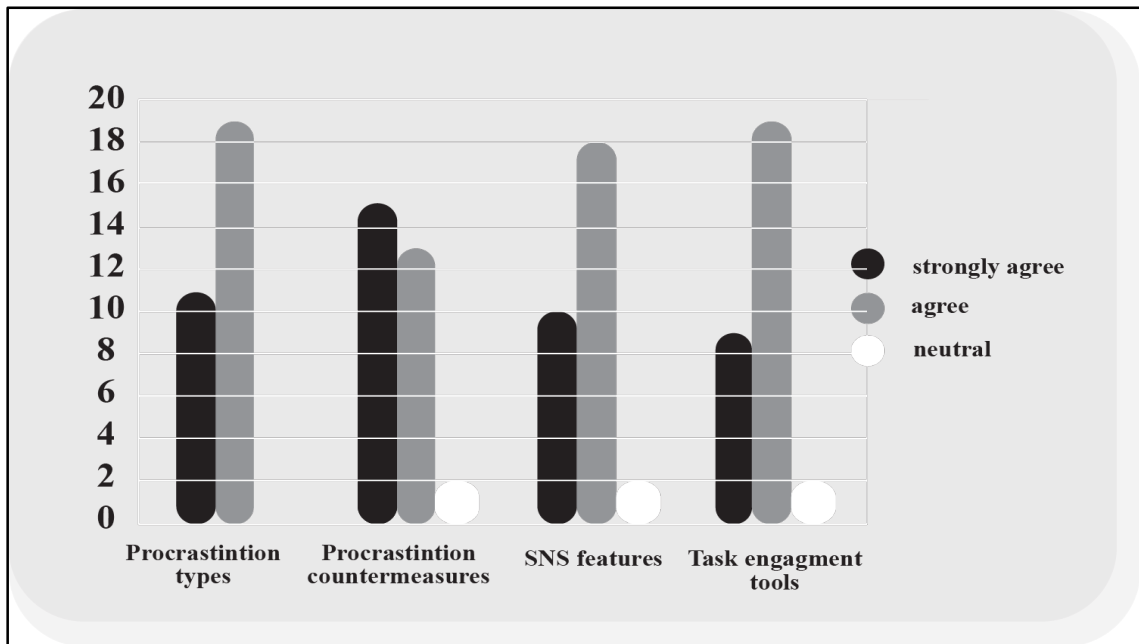


Figure 22: Participants' Responses Regarding the Coverage of D-Crastinate Method

8.4.3 PROCRASTINATION AWARENESS

To evaluate the improvement of the awareness of procrastination on SNS, the researcher compared the participants' answers before and after applying the D-Crastinate method. The following questions were provided to the participants before and after using the D-Crastinate method:

- Do you know how procrastination on social networking sites happens?
- Are you aware of the features that may facilitate procrastination on social networking sites?
- How do you rate your awareness of how to control your procrastination on social networking sites?

The participants self-reported their level of awareness about how procrastination happens on SNS, as well as rating their awareness of how to control procrastination before and after applying the D-Crastinate method. Table 23 demonstrates the improvement in

procrastination awareness. Comparing the answers to the question about participants' awareness of how procrastination on SNS happens; the results show that only 10 (33%) of the respondents selected 'Yes'. In contrast, 13 (43%) of respondents selected 'Not Sure' and seven (23%) were not aware of how procrastination happens or how the design of SNS could lead them to procrastinate. After using the D-Crastinate method, 29 (96%) of the respondents became aware of how the design of SNS could trigger their procrastination and they began to realise how to prevent procrastination from happening.

Specifically, the participants were asked whether they were aware of the exact features of SNS that facilitate their procrastination and Table 23 shows the comparison of this awareness before and after applying the D-Crastinate method. It can be noted that 29 (96%) became very aware of the features that trigger procrastination on SNS. This means that the D-Crastinate achieved one of its aims, which is to increase users' awareness about procrastination and help them to reduce their tendency to procrastinate in the future.

Concerning how the participants rated their awareness about how to control procrastination on SNS, Table 24 compares the results before and after using D-Crastinate. It can be noted that only six (20 %) respondents were moderately aware of how to control procrastination before using D-Crastinate method; however, this number significantly increased to 26 (86%) after using the D-Crastinate. This demonstrates that the D-Crastinate method helped to increase users' awareness about how to better control their procrastination.

Table 23: Comparison of The Participants' Awareness Level Before and After Using D-Crastinate Method

Questions		Yes	No	Not sure
Do you know how procrastination on	Before	33.3%	23.3%	43.3%

social networking sites happens?	After	96.7%		0%	3.3%	
Questions		Extremely aware	Moderately aware	Somewhat aware	Slightly aware	Not at all
Are you aware of the features that may facilitate procrastination on social networking sites?	Before	0%	30%	33.3%	20%	16.7%
	After	40%	53.3%	6.7%	0%	0%
How do you rate your awareness of how to control your procrastination on social networking sites?	Before	0%	20%	46.7%	23.3%	10%
	After	40%	46.7%	13.3%	0%	0%

Additionally, to determine the significance of the change regarding procrastination awareness, a series of paired sample t-tests were conducted to compare the responses before and after applying the D-Crastinate method. A Bonferroni correction was applied to the analysis to accommodate the multiple comparisons that were made. The result shows a significant change in procrastination awareness.

8.4.4 EFFECTIVENESS

To measure the effectiveness of the D-Crastinate method, the experience of procrastination was compared before and after the method was used (see Table 24). This was achieved by conducting a paired sample t-test for the responses before and after using D-Crastinate

method. The paired sample t-test was conducted for each type of procrastination and each feature of SNS that leads to procrastination. The t-test provides an estimation of whether any change from baseline to follow-up is statistically significant and brought about by the D-Crastinate method, rather than just a natural fluctuation in the data. The following subsections present the results of the paired sample t-test for each type and feature.

8.4.4.1 AVOIDANCE TYPE

This type of procrastination is when people procrastinate to avoid working on unpleasant tasks. Comparing the responses of the participants before and after applying the D-Crastinate method, the result of the paired sample t-test demonstrated a significant change to users' experience of this type of procrastination. Before applying the D-Crastinate method the result was ($M=4$, $SD=9.47$) and after ($M=2.8$, $SD=8.3$) using D-Crastinate method; conditions: $t(29)=7.6$, $p=.000$.

8.4.4.2 MOOD MODIFICATION TYPE

Concerning the mood modification type of procrastination, where people procrastinate to change their mood and to feel better; the result of the paired sample t-test demonstrated a significant change before (mean= 3.43, $SD=1.19$) and after using the D-Crastinate method (mean= 2.13, $SD=0.91$); conditions: $t(29)=6.1$, $p=.000$.

8.4.4.3 ESCAPISM TYPE

This type sees people procrastinating to distance themselves from real-life issues. The result of the paired sample t-test demonstrated a significant change before (mean= 2.83, $SD=1.34$) and after (mean= 1.83, $SD=0.91$) using the D-Crastinate method; conditions: $t(29)=4.25$, $p=.000$.

8.4.4.4 EMERGENCE TYPE

In the emergence type, people procrastinate on SNS due to the distracting nature of notifications and the result demonstrated a significant change in reducing the procrastination

time. The result of the paired sample t-test before using the D-Crastinate method (mean= 3.70, SD= 0.91) and after using the D-Crastinate method (mean= 2.27, SD= 0.86); conditions: $t(29) = 6.01, p = .000$.

Table 24: Procrastination Types Before and After Using D-Crastinate Method

Procrastination types		Never	Rarely	Sometimes	Often	Always
Avoidance	Before	0%	10%	13.3%	43.3	33.3%
	After	0%	36.7%	50%	6.7%	6.7%
Mood modification	Before	3.3%	20%	33.3%	16.7%	26.7%
	After	20%	53.3%	20%	6.7%	0%
Escapism	Before	23.3%	16.7%	23.3%	26.7%	10%
	After	46.7%	26.7%	23.3%	3.3%	0%
Emergence	Before	3.3%	3.3%	30%	46.7%	16.7%
	After	20%	40%	33.3%	6.7%	0%

In the second part, paired sample t-tests were conducted to examine the changes in respondents' awareness and agreement about the features of SNS that may lead them to procrastinate. The features that may facilitate procrastination include notifications; surveillance of presence; identity; interaction; immersive design features. Table 25 presented the results of the features that lead to procrastination before and after using D-Crastinate method. Furthermore, the result of the paired sample t-test is presented for each feature in the following subsections.

8.4.4.5 NOTIFICATIONS

People procrastinate because of the distraction created by notifications while working on their tasks. The results show a significant change before (mean= 3.37, SD= 0.99) and after using the D-Crastinate method (mean= 2.17, SD=0.87); conditions: $t(29) = 6.00$, $p = .000$.

8.4.4.6 SURVEILLANCE OF PRESENCE FEATURES

Here, people procrastinate because of the surveillance of presence features of SNS where they can check whether others are online and active and wonder why they have not yet replied to their requests. The result show a significant change between before (mean= 2.63, SD= 1.18) and after using the D-Crastinate method (mean= 1.57, SD=0.67); conditions: $t(29) = 5.57$, $p = .000$.

8.4.4.7 IDENTITY FEATURES

The identity features of SNS usage see people procrastinating to maintain or build positive self-image. The result shows a significant change before (mean= 2.43, SD= 1.10) and after using the D-Crastinate method (mean= 1.53, SD=0.62); conditions: $t(29) = 4.79$, $p = .000$.

8.4.4.8 INTERACTION FEATURES

The interaction features of SNS usage mean that many people have difficulties pulling themselves away from online conversations to concentrate on their main tasks. The result shows a significant change before (mean= 3.03, SD= 0.96) and after (mean= 2.17, SD=0.69) using the D-Crastinate method; conditions: $t(29) = 4.41$, $p = .000$.

8.4.4.9 IMMERSIVE DESIGN FEATURE

Immersive design features mean that people procrastinate as a result of the suggested content that is pushed to SNS users. The result shows a significant change before (mean= 3.47, SD= 1.00) and after using the D-Crastinate method (mean= 2.17, SD=0.95); conditions: $t(29) = 4.93$, $p = .000$.

Table 25: The Respondents Regarding SNS Features Before and After Using D-Crastinate Method

SNS features		Never	Rarely	Sometimes	Often	Always
Notification	Before	3.3%	13.3%	40%	30%	13.3%
	After	16.7%	60%	16.7%	3.3%	3.3%
Surveillance of presence	Before	13.3%	43.3%	20%	13.3%	10%
	After	53.3%	36.7%	10	0%	0%
Identity	Before	16.7%	46.7%	20%	10%	6.7%
	After	53.3%	40%	6.7%	0%	0%
Interaction	Before	3.3%	26.7%	40%	23.3%	6.7%
	After	13.3%	60%	23.3%	3.3%	0%
Immersive design	Before	0%	20%	30%	33.3%	16.7%
	After	26.7%	36.7%	33.3%	0%	3.3%

8.4.5 ACCEPTANCE OF THE D-CRASTINATE METHOD

To measure the acceptance of the D-Crastinate method and the extent to which the participants agreed to use this method in the future, two questionnaires were conducted. First, during the diary study, the participants were required to fill in “Treatment Questionnaire Concerning Continued Programme Participation” which sought to examine the true reasons behind completing the diary study; in other words, whether the participants would keep using the D-Crastinate method because of autonomous or controlled regulation. Second, after the diary study was completed, the participants filled in “The e-Therapy Attitudes and Process

Questionnaire”. This questionnaire was built based on planned behaviour theory and sought to measure its four components, which are behaviour intention; attitude toward behaviour; subjective norm; perceived behaviour control (Ajzen 1991). Planned theory helps to predict the possibility of using the D-Crastinate method in the future.

8.4.5.1 TREATMENT QUESTIONNAIRE CONCERNING CONTINUED PROGRAMME PARTICIPATION (TQCCPP)

The treatment questionnaire concerning continued programme participation (TQCCPP) enabled an assessment of the reasons that motivated people not to withdraw from the study and whether this motivation was autonomous or controlled regulation. According to (Ryan and Deci 2000), the three components of self-determination theory are amotivation, controlled regulation and motivation. In autonomous regulation, people choose to stay in the programme because of the pleasure they derive from it. In contrast, controlled regulation sees people not withdrawing from the programme for reasons such as acting to gain external reward; acting to avoid punishment; to avoid feelings of guilt (Ryan and Deci 2000). In this evaluation study, the participants were asked to fill in the treatment questionnaire to explore the main motivation for continuing involvement in the programme, i.e. the diary study. Measuring autonomous and controlled regulation is widely used to predict behavioural change; while examples of studies that measure these two components to predict future behaviour include (Williams et al. 1996; Mata et al. 2011; Hagger et al. 2014).

Table 26 shows the distribution of means and standard deviations for autonomous and controlled regulation. The possible range of the scores for autonomous regulation was 5-35; however, the actual mean for autonomous regulation was 25.7 (SD= 4.3). The mean score was close to the high score, which indicates that a large majority of the participants agreed that they were engaged and were continuing with the diary study because of intrinsic motivation such as enjoying using the materials or the desire to control procrastination. According to Gagné (2003), people are more likely to perform an activity for the enjoyment they derive from it when they freely decide to perform that activity.

In contrast, the possible score range for controlled regulation was 8-56 and the actual mean was 26.5. The observed mean was below the medium score, which indicates that the main reason to continue in the diary study was to avoid punishment, feeling guilty or to obtain extrinsic reward.

In summary, the results demonstrated that the main reason to continue with the diary study programme was autonomous control, which suggests that the participants were enjoying using the D-Crastinate method to control their procrastination; this increases the possibility of using the D-Crastinate method in the future.

Table 26: Distribution of Means and Standard Deviations for Autonomous and Controlled Regulation

PBT components	N	Possible range	Variance	Mean	Std. Deviation
Autonomous Regulation	30	5 - 35	18.7	25.7	4.3
Controlled Regulation	30	8 - 56	78.6	26.5	8.8

8.4.5.2 THE E-THERAPY ATTITUDES AND PROCESS QUESTIONNAIRE (ETAP)

The e-therapy attitudes questionnaire was developed to examine whether people were going to use a programme that was designed to influence mental health change (Clough et al. 2019). This scale was built based on planned behaviour theory to examine its four components, behaviour intention; attitude toward behaviour; subjective norm; perceived behaviour control (Ajzen 1991). However, the present study used this scale to investigate participants' acceptance and the extent to which they intended to use the D-Crastinate in future to manage their procrastination on SNS.

Table 27 presents the distribution of means and standard deviations for behaviour intention; attitude toward behaviour; subjective norm; perceived control of behaviour. The possible score range for the four subscales was 4 – 35; while the actual mean score for

behaviour intention was 22.1 (SD = 3.1), which indicates that the participants had high intention to use D-Crastinate in the future. The participants had a high favourable attitude toward using the D-Crastinate method in future, as evidenced by their mean score of 23.3 (SD = 2.8). For the subjective norm and perceived behavioural control subscales, the participants' mean scores were 21.1 (SD = 4.0) and 23.4 (SD = 3.0) respectively. This indicates the significant influence of others' opinions about using the D-Crastinate method. Participants' perceived control about the confidence of using the D-Crastinate method has a positive influence toward using the method in future.

As mentioned previously, (Ajzen 1991) states that the four components of planned behaviour theory are behaviour intention; attitude toward behaviour; subject norms; perceived behaviour control. The combination of these components can predict the possibility of carrying out such behaviour; in this case, for using the D-Crastinate method in future. Therefore, the previous results demonstrated that the participants have positive attitudes toward using the D-Crastinate method in future, which means that the participants have a positive perception of D-Crastinate. Planned behaviour theory is widely used to predict and measure people's intention toward behavioural change; examples of studies that use planned behaviour theory scales are (Armitage 2005; Stolte et al. 2017; Judge et al. 2019).

Table 27: Distribution of Means and Standard Deviations for Planned Behaviour Theory Four Components

PBT components	N	Possible range	Variance	Mean	Std. Deviation
Behaviour intention	30	4 - 35	10.1	22.1	3.1
Attitude toward behaviour	30	4 - 35	7.8	23.3	2.8
Subjective norm	30	4 - 35	16.6	21.1	4.0

Perceived behaviour control	30	4 - 35	9.2	23.4	3.0
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8.5 DISCUSSION AND GENERAL OBSERVATION

Concerning the types of procrastination, the findings showed that seven respondents (23%) selected just one type of procrastination but the majority of participants (18; 60%) selected two types. Meanwhile, one participant selected three types of procrastination and four (13%) participants selected all the procrastination types. It should be noted that none of the participants suggested a new type of procrastination, from which it can be inferred that the four procrastination types are comprehensive and represented most people's needs. Table 28 shows the number of the participants and their selected procrastination types; the most commonly selected type was 'avoidance', with 23 (76%) participants choosing this; 'mood modification' was chosen by 17 (56%); 'emergence' by 13 (43%) and 'escapism' by seven (23%). The participants reported that simply identifying the types of procrastination that they used was helpful in increasing their awareness, thereby reducing the possibility of procrastination. Before using the D-Crastinate method, the participants viewed procrastination as one large issue that seems overwhelming, preventing them from dealing with it. To overcome this issue, the D-Crastinate method educates people about procrastination and its types, which eases the process when individuals work on controlling their procrastination from a different perspective. One participant said, *"Now I understand why I usually procrastinate and this was very helpful to control my procrastination better"*.

Regarding the SNS features that may facilitate procrastination, 20 (67%) of the participants selected two features; seven (23%) selected one feature; one participant selected three features and two (7%) selected four features. The majority of the participants (18; 60%) selected 'notifications'; 'interaction' was selected by 13 (43%); 11 (37%) chose 'immersive design'; 'surveillance of presence' was selected by six (20%) and two (75%) selected 'identity

features' (see Table 28). Increasing users' awareness about the features that may lead them to procrastinate can play an important role in reducing procrastination time, while it also helped to select the appropriate countermeasures for each feature. The D-Crastinate method provided sufficient information about how SNS features could trigger procrastination. One participant said, *"The examples provided for each feature helped me a great deal to better understand how the features trigger my procrastination"*.

Concerning task engagement tools, 21 (70%) of the participants selected reduction tools and 20 (67%) selected reward, while 10 (33%) of the participants selected the task commitments tool (see Table 28). During the focus group session, most of the participants agreed that the main motivation for their procrastination was lack of motivation, combined with huge tasks that require a long time to be achieved. This explained why the majority of participants tended to choose reward and reduction techniques. Task engagement tools were designed to increase people's motivation and prevent procrastination from happening, helping people to prepare for procrastination, which can have a significant impact in reducing the likelihood of procrastination. One participant said, *"Breaking a huge task into smaller tasks has really helped me to achieve them"*.

Concerning the procrastination countermeasures, 'time restriction' was most chosen by the most people (13; 43%); 10 (33%) selected 'suggestion'; 'chat timer' was selected by 8 (26%); eight (26%) chose 'showing availability'; 6 (20%) chose 'task priority', 'usage reminder' and 'auto-reply'; two participants selected 'usage feedback'; 'goal setting' and 'reminder for both users' were selected one time each (see Table 28). The majority (26; 87%) of the participants reported that the selected countermeasures had worked for them from the first time of use, which infers that the D-Crastinate method provided sufficient information and a good level of the clarity. However, four (13%) participants reported that the countermeasures did not work well enough from the first time of use. Considering those people who might struggle in selecting the appropriate countermeasures, the D-Crastinate method overcomes this by adding an error identification stage to guide those people toward

the appropriate selection. For example, one participant said, *“It was interesting to see that one way worked and the other did not when I used another countermeasure”*.

Table 28: Participants' Selection for Procrastination Types, Triggers, Countermeasures and Task Engagement Tools

Procrastination types				
Avoidance	Mood modification	Emergence	Escapism	
23	17	13	7	
SNS features that may facilitate procrastination				
Notifications	Immersive design	Interaction	Identity	Surveillance of presence
18	11	13	2	6
Procrastination countermeasures				
Time restriction	Suggestion	Task priority	Usage reminder	Chat timer
13	10	6	6	8
Usage feedback	Goal setting	Auto reply	Showing availability	Reminder for both users
2	1	6	7	1
Task engagement tools				
Reduction		Reward	Tasks commitment	
21		20	10	

Since some of the countermeasures do not yet exist, two participants chose only ‘reminder for both users’ and ‘goal setting’. To overcome this issue, the evaluation study

provided alternative countermeasures that relate closely to the countermeasures that are still under development. This helps to increase the coverage of the D-Crastinate method and thus its acceptance. Moreover, some participants were concerned that only a short time was given to evaluate the effectiveness of the countermeasures, feeling that they needed more time to live and feel the countermeasures. However, the aim of the evaluation was to examine whether the D-Crastinate method could improve the participants' control over their procrastination.

8.6 UPDATES AND AMENDMENTS

This section discussed the main updates on the D-Crastinate method and its supporting materials after the evaluation study had been conducted. The main update can be summarised in the following points:

- The name of the developed method was changed from CPoSNS to **D-Crastinate** since one of the participants commented that the name of the method was difficult to remember and does not have a clear meaning; the new acronym addresses this issue.
- Some participants mentioned that in some contexts, the background colour could be confusing and they suggested using brighter colours to make the text easier to read. The new version has therefore taken these comments into account and features brighter colours (see appendix 7).

8.7 THREATS TO VALIDITY

In the course of a research project, several factors might affect the validity of the study. One of the most useful ways of accessing these threats to validity is by grouping them into internal and external threats. Internal threats to validity refer to the study actually carried out with the participants, and whether it was carried out in a way that makes the results accurate, whereas external threats to validity refer to the extent to which that the results of the study can be

generalised (Onwuegbuzie and Leech 2007). This section attempts to isolate possible factors in this study, both external and internal, that might affect the validity of results obtained.

The internal threats to validity in this study include the time allowed for testing, the subjectivity of participants and the countermeasures tested. With regards to the time taken for testing, tests were carried out over a two-week period. This period might not, however, be sufficient to determine significant changes in social media usage and procrastination. To determine significant change, participants would ideally be subjected to test conditions for at least six months. Thus, this research was only able to test whether participants benefited and if they felt there had been improvements.

Furthermore, the subjectivity of participants may be a major threat to validity in a study of this nature. For instance, the perception of procrastination could differ depending on the period of the year. Thus, what students perceive as procrastination during exam periods might not be perceived as such during the summer. Therefore, testing for improvements might not be as straightforward as expected, as seasonal changes might affect participants' perception of procrastination. This subjectivity of participants can also extend to how they perceive and interpret their actions as improvements, which affects the overall research findings.

Another crucial internal threat to validity is the countermeasures tested in the course of this study. Some proposed countermeasures have not yet been implemented in SNS and thus cannot be currently tested. These countermeasures include suggestions and chat timers. To overcome this threat, a number of alternative techniques were proposed by the researcher to help participants simulate how these countermeasures could control procrastination on SNS in the future.

The external threats to validation in this study mainly come from the sample population utilised and the non-specificity of social media networks analysed. With regard to the sample population, the study participants were mainly university students. While this is not an issue in itself, as students face similar procrastination issues as other members of society, it could be argued that this sample population is a user group that is educated and

tech-savvy. Thus, the generalisation of the findings to less educated or tech-savvy groups might be problematic. In addition, as the sample population is mainly from the KSA and the UK, cultural factors could influence generalisability. Peer pressures and social norms differ across cultures, and these are the main reasons that influence the urge to respond quickly, be online, and eventually procrastinate. Thus, societies whose cultural norms are substantially different from those in the KSA and the UK might have different levels of responses to applied tests.

Furthermore, the study did not focus on a specific SNS platform, and it might be the case that procrastination and countermeasures are platform-specific. For instance, the procrastination pattern on Snapchat and its countermeasures might be different from those of WhatsApp. Snapchat users might procrastinate due to the fear of missing temporary content, as uploaded media are only available for 24 hours. Snapchat users might therefore need more specific countermeasures, such as suggestions. In contrast, WhatsApp users might procrastinate due to the pressure to respond instantly when they receive a message, especially when they are visible online. Thus, showing availability countermeasures could be used in this case to reduce such pressure and eventually avoid procrastination. Therefore, as the results in this study are not platform-specific, it might be difficult to generalise them to specific platforms with unique procrastination patterns.

8.8 CHAPTER SUMMARY

This chapter discussed the evaluation process of the proposed D-Crastinate method for combating procrastination on SNS. The evaluation study used mixed methods, which included focus group (qualitative) and survey (quantitative) to examine to what extent the participants believed that the D-Crastinate method is useful and effective in helping them to gain greater control over their procrastination. The result demonstrated the usefulness of the D-Crastinate in reducing the tendency for procrastination.

9 CHAPTER 9: CONCLUSION AND FUTURE WORK

In this thesis, procrastination on SNS has been defined as the voluntary delay of tasks that can lead to negative consequences such as anxiety and work-related stress. Despite procrastination having certain benefits, helping people to release stress and change their mood, this behaviour can quickly become harmful when people lose the ability to manage it (Kim and Seo 2015). Numerous studies have found a direct association between procrastination and both low academic performance and work-related stress (Steel 2007; Metin et al. 2016; Prem et al. 2018). Literature in the procrastination field generally studies the phenomenon of procrastination from a psychological perspective, focusing on its influence on a person's personality, self-control and self-efficacy. However, the literature provides limited information to pinpoint the main role that the design of SNS features has in facilitating procrastination.

As a result, this thesis advocated the need for a novel method to help users identify their procrastination triggers and proposes countermeasures that can be used to combat procrastination on SNS. Utilising a participatory design approach where users are part of the research and considering their requirements can have a significant impact on increasing the likelihood of the method becoming accepted. To achieve this, this thesis conducted a mixed method approach that utilised numerous studies to identify and confirm the findings that were used to build the stages of the D-Crastinate method.

The studies in this thesis demonstrated that the design of SNS features plays an important role in facilitating procrastination on SNS (Alblwi et al. 2019b, 2019a; Alblwi et al. 2020). This thesis not only identified a set of features that are seen as procrastination facilitators but also determined the types of procrastination on SNS. These findings were achieved through the exploration stage, where the researcher conducted multiple studies, including focus group, diary study and follow-up interviews; the findings are discussed in **Chapter 4**. Based on the findings of the exploration stage, this thesis proposed different

countermeasures to combat procrastination and there was a discussion about which modality should be used to implement these countermeasures in the future design of SNS or in third-party applications. To achieve these findings, co-design sessions were conducted with users and the findings are discussed in **Chapter 5**. As a result of these studies, this thesis has proposed the D-Crastinate method, which is designed to help users gain more control over their procrastination.

The D-Crastinate method has six stages that users need to follow to enable their procrastination to be better controlled, the first of which is user education about how procrastination happens on SNS, which helps to raise their awareness, thereby minimising the possibility of procrastination. The second stage is self-diagnosis, where users can identify their types of procrastination as well as the features that trigger it, while the third stage involves planning and preparation, providing users with customised countermeasures to combat procrastination based on their chosen features. The customisation process helps users to select the countermeasures most appropriate to their needs and prevents them from having to browse unrelated countermeasures, which aims to ease the process for the user. In the fourth stage, the user is expected to apply the suggested countermeasures for a period of time and the fifth stage asks users to examine the effectiveness of the countermeasures and whether they help to reduce the procrastination time. In the event that the suggested countermeasures do not have a positive impact on the user, they continue to the final stage, error identification. The error identification stage guides users to select more specific features that trigger their procrastination and makes alternative countermeasures available for the user. The D-Crastinate method and its stages are discussed in detail in **Chapter 7**.

The researcher evaluated the D-Crastinate method through a mixed-method approach that utilised focus group, diary study and survey. The evaluation study recruited 30 participants in order to evaluate the D-Crastinate method against five aspects: clarity, coverage, procrastination awareness, acceptance and effectiveness. The results of the evaluation study demonstrated the positive impact and improvement in helping users to have

greater control over their procrastination. The results of the evaluation study are presented in **Chapter 8**.

The D-Crastinate method was developed to help individuals to adopt healthier styles of usage of SNS. However, it can also be used by other parties, such as companies, to reduce procrastination and increase employee productivity. Most companies now rely on technology, and the Internet is necessary for people to perform their roles. This introduces the new challenge of helping employees to avoid procrastinating and using the web for personal reasons. Some employers might restrict access to social networking sites during working hours, which could lead to silent procrastination, whereby employees become preoccupied thinking about SNS. For example, people might think about what they could tweet or post after finishing work. Therefore, applying the D-Crastinate method could help to increase work engagement by reducing the pressure on employees to interact with SNS during working hours.

9.1 RESEARCH QUESTIONS AND REVISED OBJECTIVES

This section discusses the thesis objectives and revises them according to the findings of the thesis.

9.1.1 OBJECTIVE 1: TO CONDUCT A LITERATURE REVIEW ON PROCRASTINATION AND RELATED PSYCHOLOGY THEORIES

To address this objective, the literature was reviewed to establish the main focus of the research and build knowledge about the research problem. This facilitated a better understanding of related topics in this area, including digital addiction, cyber slacking, behavioural change theories, self-concept theories and persuasive technology techniques. Exploring the related topics in this literature helped to determine what is already known about the topic. In addition, the psychological theories search helped the researcher in the design

solution stage to successfully guide the process on how to help users gain more control over their procrastination.

9.1.2 OBJECTIVE 2: TO EXPLORE THE RELATIONSHIP BETWEEN PROCRASTINATION AND SNS DESIGN FEATURES

To achieve this objective, an exploration study was conducted to identify the five types of SNS features that facilitate users' procrastination; these features include notifications, immersive design, surveillance of presence, interaction and identity features. Furthermore, four types of procrastination were identified, which means the reasons why users procrastinate and how SNSs encourage users to procrastinate when they should be working on other tasks. Moreover, the study explored how people perceive procrastination and what they might expect to see in future software in order to help them gain more control over their procrastination. Finally, this thesis named the most wanted techniques that participants suggested they would like to see in the future design of SNS. The results of this objective were discussed in **Chapter 4**. To confirm the findings of this objective, an online survey of 334 participants was conducted and the results can be seen in **Chapter 6**.

9.1.3 OBJECTIVE 3: TO PROPOSE DIFFERENT COUNTERMEASURES TO COMBAT PROCRASTINATION ON SNS

To achieve this objective, co-design sessions were conducted, with the aim of identifying the procrastination countermeasures and how best to apply them. In addition, the expected side-effects of the suggested countermeasures were investigated and suggestions were provided about how the side-effects could be avoided when the countermeasures were implemented. Moreover, the researcher classified the countermeasures based on the users' level of control, so these were divided into users who have high, medium or low self-control; the results of this objective were discussed in **Chapter 5**. The findings of this objective were refined and confirmed through an online survey that involved 334 participants of different nationalities. The results of the survey are presented in **Chapter 6**.

9.1.4 OBJECTIVE 4: TO PROPOSE AND EVALUATE A NOVEL METHOD TO COMBAT PROCRASTINATION ON SNS

To achieve this objective, the findings of the previous Objectives 1, 2, and 3 were used and the D-Crastinate method was proposed, which aimed to allow users to better control their procrastination. This method educates users about how procrastination happens and the general techniques that can be used to gain better control. Second, it guides users to determine their procrastination types and the features that specifically lead them to procrastinate. Third, it allows users to implement the suggested countermeasures, which are specifically customised for each feature in order to help them to gain more control over their procrastination. The suggested method is supported by some persuasive techniques, such as reminders, suggestions and self-monitoring. The findings of this objective are presented in **Chapter 7**.

To enable this objective to be evaluated, an evaluation study was conducted in two phases; the qualitative phase, which comprised a focus group and diary study and the quantitative phase, which used a survey. The evaluation of the method sought to evaluate the D-Crastinate across four aspects: clarity, coverage, procrastination awareness and effectiveness. The results of this objective are presented in **Chapter 8**.

9.2 CONTRIBUTING TO KNOWLEDGE

This thesis has not only contributed to knowledge in this field but has also filled the literature gap regarding how the design features of SNS play an important role in facilitating users' procrastination on SNS; previous literature was limited to identifying the main features of SNS that encourage procrastination. This study has contributed suggested techniques that could help to reduce procrastination times, particularly as these techniques were suggested by users, which increases the likelihood of the acceptance of countermeasures in the future. The following points explain the main contributions of this thesis:

First contribution: identifying the types of procrastination on SNS

This contribution was achieved by exploring the role that design features play in facilitating procrastination on SNS, as well as the procrastination types. The results demonstrated four types of procrastination: avoidance, mood modification, escapism and emergence. A discussion about the types of procrastination is presented in **Chapter 4**.

Second contribution: identifying the features of SNS that facilitate procrastination

This contribution was enabled by the exploration stage and the features of SNS that may facilitate procrastination were named, including notifications; immersive design; surveillance of presence; identity and interaction. The results of this contribution are discussed in **Chapter 4**.

Third contribution: proposing different countermeasures to combat procrastination

The co-design features enabled this contribution to be achieved; the countermeasures were categorised into three sub-categories: technical countermeasures; socio-technical countermeasures; task motivation and engagement tools. These countermeasures are discussed in detail in **Chapter 5**; they are designed to help users to gain more control over their procrastination and include goal setting, chat timer and time restrictions.

Fourth Contribution: mapping between the suggested countermeasures and SNS features

The co-design sessions also facilitated this contribution, which mapped between the procrastination countermeasures and the features of SNS, enabling each feature to have different countermeasures. The customisation of the countermeasures for each feature helps to suggest the measures that are most relevant to individual users, enabling users to choose the most appropriate. The results of the mapping are discussed in detail in **Chapter 5**.

Fifth Contribution: developing the D-Crastinate method to combat procrastination on SNS

This thesis' main contribution is the development of the D-Crastinate method, as this educates and raises user awareness about how procrastination happens on SNS. The method also guides users to identify their types of procrastination and the features that may facilitate their procrastination. The D-Crastinate method also provides users with customised countermeasures to help them gain more control over their procrastination. The D-Crastinate method and its evaluation are discussed in **Chapters 7 and 8**.

9.3 RECOMMENDATIONS FOR FUTURE WORK

The findings of this thesis have a significant impact as they provide a novel method to help people gain more control over their procrastination. However, more research is needed to examine the relationship between personality traits, nationalities and the thesis findings, including types of procrastination, SNS features that facilitate procrastination, and the suggested countermeasures. Moreover, the relationship between gender and the countermeasures could also be examined to determine more personalised countermeasures for each gender.

The findings of this thesis also pave the way for a design engineer to use these findings to create a third-party application that can be used for procrastination management. This app could be also used to collect feedback from users, enabling the suggested procrastination countermeasures to be further developed and refined. This thesis confirmed and evaluated the D-Crastinate method with 30 participants but implementing the method within an app would facilitate access to a larger sample in real-time, which could have a significant impact on producing a new version of the D-Crastinate method.

This thesis demonstrated that online interaction among users facilitates procrastination. However, much research is needed to provide additional information to help

individuals regarding how best to set up an online communication protocol. This can be achieved through various modalities such as a collective interaction protocol or reciprocal interaction protocol. For example, in the collective interaction protocol a group may collectively agree on an interaction protocol in which they do not interact in a specified time. This can reduce the pressure that users may feel to meet the group's expectations by interacting every time. In addition, there is a need to develop a scale that predicts the level of procrastination. This would help to develop further countermeasures to mitigate procrastination in its early stages.

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Appendix 1: Exploration study (focus group)

First scenario

It's Monday morning and Sam has a lecture in mathematics. This lecture is really important to him because it is a revision lecture before the final exam and he arrived early for it. After the first hour, Sam started to feel bored. He decided to check his Instagram to see how many likes he got for his last post and whether anyone commented on it. Then he reassesses his priorities, realises this is an important lecture that he needs to focus on but still thinks that 10 seconds to refresh my mood would not hurt my focus. Finally, he opens his Instagram and finds that his best friend is commenting on the photo and starts to chat with him. After 15 minutes, he notices that he has missed the most important part on the lecture.

Please answer the following questions:

What do you think is the main reason why Sam spent 15 minutes on Instagram?

Do you feel that Instagram encourages Sam to stay online for 15 minutes?

What are the different features in Instagram that might facilitate Sam to procrastinate?

How can Sam be helped to avoid this situation again?

Would you like to add any feedback?

Second scenario

Laura is an undergraduate student in the first year and she has her final exam tomorrow. She is studying hard to get a good result and while studying she faced a difficult task that needed further explanation to understand the concept. She was thinking of finding a video on YouTube to help her. She started looking and found a video that explained the same task. Later, from the 'recommended list' she found some related topics and started browsing them. After one hour, she found herself wasting time and not doing what she was supposed to be doing. Her stress level had increased and she began to worry about her studies. As a result, she spent more time studying that night instead of sleeping.

Please answer the following questions:

What do you think were the main reasons that Laura spent one hour on YouTube?

What are the different features in YouTube that might facilitate Laura to procrastinate?

How can Laura be helped to avoid this situation again?

Would you like to add any feedback?

Third scenario

Tom has an interview for a job and he woke up early to ensure that he would arrive 10 minutes before the meeting. He arrived at the bus stop, checked the bus timetable and found that a bus would arrive in 3 minutes. He opened his phone to check his friend's account on Twitter but suddenly he found breaking news about his favourite team that had signed a contract with a new player. Tom started looking for some information about that player while he was waiting for the bus. After 5 minutes, he noticed that he had missed the bus and the next one was not due for another 30 minutes. As a result, he feels angry and stressed and calls a taxi to drop him at the company which costs £25.

Please answer the following questions:

What do you think was the main reason that led Tom to spend 5 minutes on Twitter?

Do you feel that procrastination is associated with SNS features?

What made Tom change his aim from checking his friend's profile to suddenly seek information about the player?

What are the different features in Twitter that might facilitate Tom to procrastinate?

How can Tom be helped to avoid this situation arising again?

Would you like to add any feedback?

Please answer the following questions:

Can you give an example of different SNSs features that may facilities users to procrastination?

Which scenarios might happen for people most often?

Can you think of different situations that lead people to spend time online procrastinating?

How would you feel if somebody else procrastinates to avoid a task that is given by you?

Would you like to use some of these techniques in order to help reducing your procrastination?

Would you like to add any feedback?

Listed some techniques that might help users to avoid procrastination:

	Techniques for behaviour change	Description
1	Monitoring	Record specified behaviour (person has access to recorded data of behavioural performance e.g. from diary)
2	Rewards	System should provide virtual rewards for users in order to give credit for performing the target behaviour.
3	Social comparison	System should provide means for comparing performance with the performance of other users.
4	Punishment	Contingent aversive consequence, i.e. if and only if behaviour is not performed
5	Rehearsal	A system providing means with which to rehearse behaviour can enable people to change their attitudes or behaviour in the real world.
6	Reminders	If a system reminds users of their target behaviour, the users will more likely achieve their goals
7	Suggestion	System should suggest that users carry out behaviours during the system use process.

8	Self- monitoring	System should provide means for users to track their performance or status
9	Competition	System should provide means for competing with other users.

Appendix 2: Inclusion criteria

Answer the following questions:

Your age

☐ 18 to 24 ☐ 25 to 30 ☐ 30- 45 ☐ 45 and above

Your gender

☐ Male ☐ female ☐ prefer not to say

Where are you from?

I have social network account in:

☐ Twitter ☐ Instagram ☐ YouTube ☐ others

How often did you get distracted by Social networking sites which might have affected you to delay your Task?

☐ usually ☐ often ☐ rarely ☐ never

Participants information of the focus group

	Gender		Age			Total
	Male	Female	18-24	25-30	31-40	
Group 1	5	4	4	3	2	9
Group 2	4	3	2	2	3	7

Appendix 3: Diary study template

Did you become distracted by social network sites when you were focusing in your work?

Can you explain how?

Today I procrastinated within (1) (write below which social networking sites you tend to use? for example, Instagram, YouTube, Twitter, etc.). I was working on or I avoided starting my urgent task (2) (What was your urgent task? For example, preparing for an exam or attending a class, etc.) When I received or I felt (3) (describe your trigger to social network sites. For example, you receive a notification or feel bored). I was doing (6) (Describe your activities on social networks. For example, chatting with your friend or seeking information) after some time I recognised that I had to go back to the urgent task and avoid procrastination.

Which of these techniques could help you to reduce your procrastination?

- **Reminder** (time reminder, priority reminder, other) I would like to receive a (message, email, change in screen colour, other) to help me to control my procrastination (please write it down)
- **Suggestion** (positive affirmations, other) an example of positive affirmation is that “I know I can accomplish anything I set my mind to” and how would you like to receive the suggestion (text, email, which time is better for you?)
- **Self-monitoring** (give daily feedback, suggest a forthcoming activity, other) (please write it down)
- **Time restriction** (for example, you cannot browse SNSs at certain times like between 9 am and 11 am or you can browse SNSs for 3 minutes and then the app will sign you out)
- **Goal setting** (to set your goal once you open SNSs) the app allows you to set your goal. For example, chat’s topic is our exam tomorrow). How would you like to set your goal?

- **Punishment** (positive punishment, negative punishment) How would like to use the punishment?

Example of positive punishment (the user should answer some questions when signing in to SNS again)

Example of negative punishment (the user cannot access SNS for 10 minutes)

- Other

Answers

- 1- -----

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- 2- -----

- 3- -----

- 4- -----

- 5- -----

- 6- -----

Write the techniques that you have chosen to control your procrastination

Appendix 4: co-design sessions materials

Study title

Implementing different techniques to combat procrastination on SNSs

Study purpose

This study is designed to identify the countermeasure techniques that can be used in future designs of SNSs in order to combat procrastination and provide details of how best to apply them. Based on the findings of the previous study, the research identified various families of SNS features that facilitate users to procrastinate. It is expected that the findings of the current study will illustrate different families of countermeasures that will help to combat procrastination. Moreover, the study will explore the side effects for each technique and the modality of the application that can best help to minimise these side effects. In addition, the study will explore whether allowing participants to map between families of SNS triggers and countermeasure families helps users to identify which are the most suitable techniques to combat procrastination.

Study questions

- What are the different techniques that can be embedded into future designs of SNS in order to combat procrastination?
- What are the expected side effects of applying these countermeasures?
- How can the countermeasure techniques be seamlessly embedded in SNS without affecting user experience?

First scenario (notification features)

Sam has a lecture in mathematics that requires his full attention. While Sam was focussing on his studies, he received a notification from his friend and thought that replying to the message would not do any harm because it would take less than a minute. However, when he replied he continued chatting for 10 minutes and did not realise he was procrastinating. He tried to deactivate notifications but this caused him to open WhatsApp frequently to see if he had received any messages.

Answer the following questions:

What countermeasure could be used to help Sam avoid procrastinating the next time this happens?

Are there any side effects when applying these techniques?

How can the countermeasures be set?

Are there any additional techniques that can be used to avoid this situation arising again?

Second scenario (interaction feature)

Sara has graduated from the department of management and she has an interview for her first job after two days. Sara thought that she could practice the interview with a friend; both decide to meet at a local restaurant in one hour. While she was waiting for the bus she felt bored so she decided to chat with her sister to pass the time. The conversation really caught her interest so she kept chatting for a long time without noticing that time was passing quickly. While she was chatting, her sister also sent a link for a post on Instagram; she saw the post and commented on it. Eventually she realised that the bus has gone which led her to wait another 30 minutes for the second bus.

Answer the following questions:

What countermeasure could be used to help Sam avoid procrastinating the next time this happens?

Are there any side effects when applying these techniques?

How can the countermeasure be set?

Are there any additional techniques that can be used to avoid this situation arising again?

Third scenario (identity feature)

Mark is a student in the final year in the department of Information Technology. He heard that one of his friends was able to earn £2,000 by advertising products on Instagram. He liked the idea and started to think about doing the same. Mark signed up on Twitter and started trying to increase his number of followers by tweeting with different hashtags. Mark spent most of his time on Twitter, even during his classes and each day his number of followers grew. Mark subscribes to a different group and in order increase his relatedness he was trying to reply and comment on each tweet to improve his identity and build a positive self-image. Mark started to become worried about his procrastination because the exams were looming.

Answer the following questions:

What countermeasure could be used to help Mark avoid procrastinating the next time this happens?

Are there any side effects when applying these techniques?

How can the countermeasure be set?

Are there any additional techniques that can be used to avoid this situation arising again?

Fourth scenario (immersive design)

Clara is in the second year in the department of law. Clara usually spends most of her time on YouTube, especially before going to sleep. One day she had an exam and before the exam she prepared very well so she felt confident of getting a high mark. As usual, before going to sleep that night she browsed YouTube. She watched a funny video about cats and then the recommended list suggested more videos about cats. She was enjoying watching these videos and the time passed quickly; she did not realise how long she had been viewing YouTube. Finally, she realised that she had not slept yet and the time was 4:30am. She slept for two hours and woke up early to revise but she found it very hard to focus due to a lack of sleep.

Answer the following questions:

What countermeasure could be used to help Clara avoid procrastinating the next time this happens?

Are there any side effects when applying these techniques?

How can the countermeasure be set?

Are there any additional techniques that can be used to avoid this situation arising again?

Fifth scenario (surveillance of presence)

Sophia is a lecturer. She sent a message using WhatsApp to her colleague to ask him for a meeting after the lecture. The lecture had started and she had not yet received a reply. During the lecture, she kept checking her WhatsApp frequently to see whether her colleague was online. Also, Sophia checked other SNSs to see whether her colleague had been online or posted anything new. She started to become worried because she thought that he might have seen her message and chosen to ignore her.

Answer the following questions:

What countermeasure could be used to help Sophia avoid procrastinating the next time this happens?

Are there any side effects when applying these techniques?

How can the countermeasure be set?

Are there any additional techniques that can be used to avoid this situation arising again?

Appendix 5: questionnaire advertisements

Do you procrastinate on Social Media?

If Yes, please complete this Survey



The survey is expected to take around 5 minutes. There will be a prize draw on **10 Amazon vouchers, £25 each**. Also, there will be an additional draw on **3 more Amazon vouchers, £25 each**; will be for those who provide **useful comments in the surveys**, i.e. elaborate on their choices.

Appendix 6: questionnaire design

I often get distracted by social media while I am working on something else.

☐ Yes ☐ No [Please note if you select this option will end the survey here]

Please respond to each of the following questions:

Q1/ what is your age?

.....

Q2/ what is your main country?

.....

Q3/ what gender do you identify with?

☐ Male ☐ Female ☐ I prefer not to say

Q4/ How do you feel about your procrastination on social media?

- Happy with it
- Somewhat happy with it
- Somewhat unhappy with it
- Unhappy with it

Q5/ on average, how many hours do you procrastinate on social media per day?

.....

Q6/ on average, how many hours do you think other people (with similar age and gender to yours) procrastinate on their social media accounts per day?

.....

**Q7/ as percentages, how much of your procrastination time is spent on the following?
(Please note that the total should be 100%)**

Social Networks: Facebook, Twitter, LinkedIn. : _____

Media Sharing Networks: Instagram, Snapchat, YouTube. : _____

Instant messaging: WhatsApp, Skype. : _____

Other (please specify). : _____

Total : _____

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. is reserved					
2. is generally trusting					
3. tends to be lazy					
4. is relaxed, handles stress well					
5. has few artistic interests					
6. is outgoing, sociable					
7. tends to find fault with others					
8. does a thorough job					

9. gets nervous easily					
10. has an active imagination					

Q8/ on average, how many hours do you think your friends procrastinate on social media?

.....

Q9/ how well do the following statements describe your personality?

I see myself as someone who...

Q10/ using the 1 to 5 scale below, please indicate how much each of the following statements reflects how you typically are:

	Not at all (1)	(2)	(3)	(4)	Very much (5)
1. I am good at resisting temptation					
2. I have a hard time breaking bad habits					
3. I am lazy					
4. I say inappropriate things					

5. I do certain things that are bad for me, if they are fun					
6. I refuse things that are bad for me					
7. I wish I had more self-discipline					
8. People would say that I have iron self-discipline					
9. Pleasure and fun sometimes keep me from getting work done					
10. I have trouble concentrating					
11. I am able to work effectively toward long-term goals					
12. Sometimes I can't stop myself from doing something, even if I know it is wrong					
13. I often act without thinking through all the alternatives					

Q11/ Please tick the box that most closely represents your experience of procrastination on social media?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I often procrastinate to avoid working on unpleasant or difficult tasks					
I often procrastinate to change my mood and feel better					
I often procrastinate to distance myself from real-life issues					
When I receive a notification, I check it and spend time on that despite having other tasks to perform					

Q12/ To what extent do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
often delay working on my tasks because I am busy					

checking notifications on social media					
When I send a message to someone, I keep checking whether or not they received, read or replied my message					
I procrastinate on social media to maintain positive interaction with people and respond to them on a timely fashion					
When I am involved in chatting, I find it hard to stop procrastinating and complete my tasks					
On social media, I spend time more than I initially intended due to seeing relevant content suggested to me automatically					

Q13/ For tasks you are supposed to complete on time and to avoid procrastination on them, e.g. completing an assignment on an e-learning site, to what extent do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am more motivated to work on tasks that have rewards such as virtual points for					

each accomplished level and performance quality					
I would like to specify different milestones for my big tasks and have a deadline for each milestone					
Declaring my work commitments to my contacts on social media would help me to commit more to fulfil them and reduce the peer pressure to engage in unnecessary conversations					

Here are some techniques that could help you to combat procrastination. Please select one or more of the following techniques that you think are more effective for each scenario:

Q14/ when you likely to procrastinate because of checking your notifications and engaging with their content, which of these software techniques would help you to combat procrastination? (You can choose more than one)

- Auto-reply; e.g. sending an auto-reply that contains some information such as I received your message, I will read and reply later when finishing my current work.
- Showing availability; e.g. when you receive notification, your contacts will be automatically informed that you are unavailable or busy.
- Suggestions; e.g. at the same time as the notification you receive a message suggesting how to avoid procrastination, e.g. showing how to mute notification and how to declare a Busy status.
- Other (please specify)

Q15/ when you spend more time on social media than you initially intended because of the relevant content that social media suggests to you, which of these software techniques would best help you to combat that? (You can choose more than one)

- Time restriction; e.g. restricting you from using social media beyond a maximum time or during certain hours of the day that you sat for yourself.
- Usage reminder; e.g. when you decide to spend 30 minutes on social media, you receive a reminder about the time that you have spent once you approach or exceed that limit.
- Usage feedback; e.g. at the end of the day, you can see statistics regarding the time you spent on social media and when such a usage conflicted with your other tasks listed in your online calendar.
- Other (please specify)

Q16/ when you send a message to someone and you keep spending time checking to see if they received, read or replied, which of these software techniques would help you to combat that procrastination? (You can choose more than one)

- Auto-reply; e.g. receiving an automated message from your contacts containing information such as I am currently busy and will try to read and reply when I am free around 5:00pm today.
- Priority; e.g. showing to you your priority tasks and to-do list so that you focus on them and avoid unnecessary checking.
- Other (please specify)

Q17/ when you procrastinate and reply to your contacts' requests in a timely fashion, mainly to maintain good relations or positive interaction, which of these software techniques would help you to combat that procrastination? (You can choose more than one)

- Usage feedback; e.g. at the end of the day, you can see statistics regarding the time you spent on social media and when such a usage conflicted with other tasks listed in your online calendar.
- Time restriction; e.g. restricting you from using social media beyond a maximum time or during certain hours of the day that you sat for yourself.
- Auto-reply; e.g. sending an automated message to your contacts containing information such as: I am currently busy and will try to read and reply when I am free around 5:00pm today.
- (3)
- Goal setting; e.g. enabling you to set your career or life-related goals, and help you to track your progress toward achieving these goals.
- Other (please specify)
.....

Q18/ when you procrastinate because you are chatting with your friends, which of these software techniques would help you to combat that problem? (You can choose more than one)

- Reminder to both users; e.g. while chatting, both of you receive a reminder telling that one or both of you may have other work to do as your online calendar suggests.

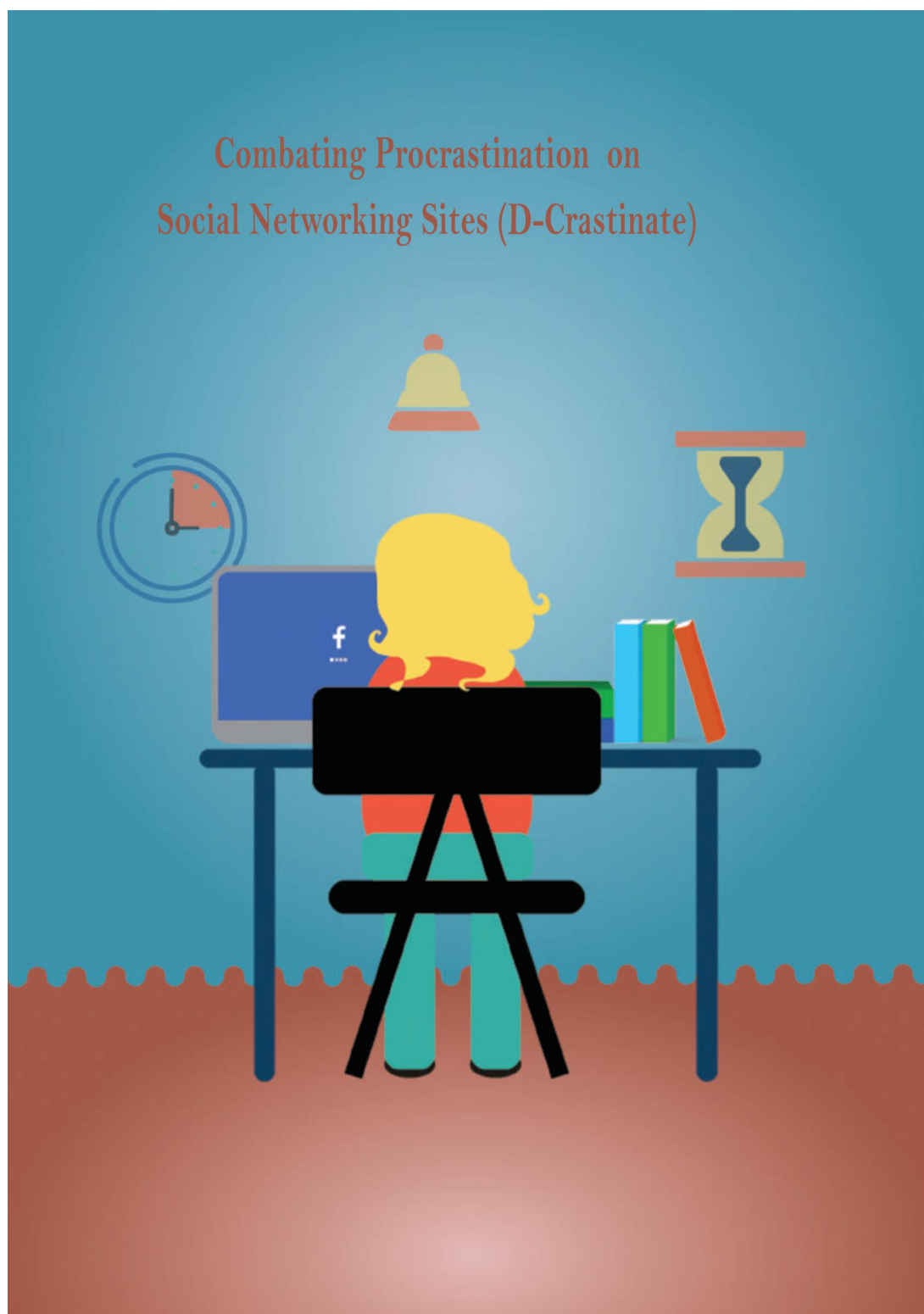
- Showing availability; e.g. your status will automatically change and declare that you have now become busy with other tasks so your friends would not expect you to continue chatting.
- Chatting timer; e.g. a time bar showing both users the time limit for the chat and the time spent already.
- Other (please specify)
.....

If you like to be entered to our prize draw for the Amazon vouchers, please provide your email. Email will be only used for communicating with winners of the prize.

- Yes, here is my email address
- No, I do not want to be entered to the prize draw

End of the survey

Appendix 7: D-Crastinate method materials



CONTENT PAGE

- 1 WHAT IS PROCRASTINATION?
- 2 D-Crastinate STAGES
- 3 GUIDANCE FOR USING THE D-Crastinate METHOD
- 4 FIRST STAGE: EDUCATION
- 5-6 HOW DOES PROCRASTINATION ON SOCIAL NETWORKING SITES HAPPEN?
- 7-8 SOLUTIONS FOR PROCRASTINATION
- 9 SECOND STAGE: SELF-DIAGNOSIS
- 10 SECOND STAGE: SELF-DIAGNOSIS
- 11 THIRD STAGE: PLANNING AND PREPARATION
- 12-14 THIRD STAGE: PLANNING AND PREPARATION
- 15 FOURTH STAGE: ACTION
- 16 FIFTH STAGE: SELF-ASSESSMENT
- 17 SIXTH STAGE: ERROR IDENTIFICATION

What is procrastination?

Procrastination is a voluntary delay, a way of avoiding tasks that need to be accomplished but which someone doesn't perhaps want to do.



When someone procrastinates too much it can lead to negative consequences.

Consequences



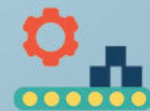
Low academic
performance



Anxiety



Work-related
stress










Low
productivity

1

D-Crastinate Stages

The following table summarises the D-Crastinate method and its stages:

METHOD STAGE NAME						
FIRST STAGE Education 	SECOND STAGE Self-diagnosis 	THIRD STAGE Planning and preparation 	FOURTH STAGE Action 	FIFTH STAGE Self-assessment 	SIXTH STAGE Error identification 	
EXPECTED OUTCOMES	<ul style="list-style-type: none">• Increase your awareness about procrastination and how it happens in general.• Help you to understand why you procrastinate.• Help you to become more digitally resilient so you can better control your procrastination.• Help you to gain more knowledge about what the relapse phase is, and how to prevent it. <ul style="list-style-type: none">• Help you find out your procrastination types.• Aid you in finding useful tools that will help you to engage with particular tasks more.• You will use your own personal countermeasures for a certain length of time.• Alternative countermeasures will be made available should the suggested countermeasures not work well enough for you.• You will assess the usefulness of the CPOSNS method and whether it helps you to combat procrastination.• You will be more able to pinpoint the key features of SNS that trigger procrastination and the best countermeasures for you to use.					

Guidance for using the D-Crastinate method



FIRST STAGE (EDUCATION):



The first stage is to read and familiarise yourself with the key ideas and habits that may lead people to procrastinating more on social networking sites.



SECOND STAGE (SELF-DIAGNOSIS):



In this stage you are expected to figure out what kind of procrastinator you are by selecting the types of procrastinating that relate to you specifically. After that you can determine for yourself what you think the main features of social networking sites are that lead you to procrastinate more. However, if you feel like you procrastinate due to other things that are not currently listed you may write them down before moving on to the third stage.



THIRD STAGE (PLANNING AND PREPARATION):



This stage has two phases which include tasks engagement tools and procrastination countermeasures. Firstly, if you believe you may procrastinate due to a lack of motivation to complete tasks, please consider using tasks engagement tools. Secondly, you have been given a list of customised countermeasures that can help you to gain more control over how much you procrastinate on a day-to-day basis. They have been customised specifically for you based on the features that lead you to procrastinate.



FOURTH STAGE (ACTION):



In this stage you are required to apply the suggested task's engagement tools and the countermeasures for one week.



FIFTH STAGE (SELF-ASSESSMENT):



After the action stage is completed, you will be expected to decide how useful you found the previous stages. Move on to the next stage if you do not find the previous stages useful in helping you gain more control over your procrastination.



SIXTH STAGE (ERROR IDENTIFICATION):



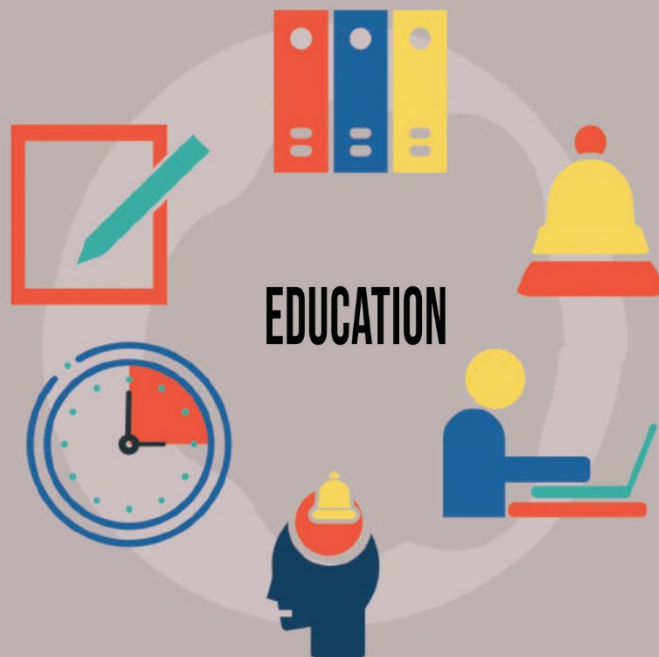
In this stage you will be expected to answer the provided questions to help you analyse what went wrong in the previous stages. Once you have identified your own personal challenges you can then return to the second stage to apply the method process again.



First stage (Education)



In this stage you are expected to get more knowledge about how procrastination usually occurs on social networking sites. This includes general guidance and methods that can help users gain more control over their procrastination.



4

How does procrastination on social networking sites happen?



POOR EXPECTATION MANAGEMENT

"My friends often expect me to reply almost instantly when they send me a message, no matter what time."

Many people end up spending large amounts of time procrastinating on social media. Sometimes this can be due to social pressure, usually from friends, who might be very active on social media platforms. In order to maintain a positive self-image some people might try to avoid disappointing their friends by replying to messages and notifications immediately.



IMPULSIVENESS AND LACK OF SELF-CONTROL

"I lose my control when I see a notification."

People who have a low amount of self-control might react impulsively to their social media notifications. When they see a new notification they might want to respond to it straight away and interact with others. But this might cause them to prioritise social media over tasks they have to do and responsibilities they have to carry out, which will affect how well they work and how they manage themselves in a work environment.



POOR TIME MANAGEMENT

"I have low skills when it comes to managing my time wisely."

People who have low skills in time-management are more likely to spend a lot of time procrastinating. They might tend to forget themselves and get easily distracted when accessing social media instead of prioritising more important tasks, which could lead to them wasting valuable time. These people need to practice managing their time more effectively so they have a healthy balance between carrying tasks / doing homework and spending time on social media (in their free time).



HABITUAL CHECKING

"I check my phone excessively without meaning to do so."

Do you find yourself accessing social media without even intending to do so? The impulse to frequently check social media might lead some people to developing a habit to check their notifications without meaning to, leading to them spending more time than necessary on social media. Habits like this are usually difficult to control as it has become normalised in our society to be constantly using our phones and other devices.



SOCIAL NORMS

"Everyone else is also on their smartphones and end up procrastinating like me."

Some people underestimate their levels of procrastination and might think that their habits are acceptable and normal when they see that others procrastinate also. For example; 'I knew I was going to be late for the lunch event, but everyone was taking a selfie at the venue so I thought it would be okay for me to do the same.'



Solutions for procrastination

To help control your level of procrastination better, you could work to improve your skills in these different areas as follows:



DIGITAL RESILIENCE

If you want to better control your level of procrastination there are tools and information available that can help you. You can find out how procrastination happens, what the negative results of procrastination are, and how to prevent those negative consequences.

Digital resilience means the following:

- You do not get overly affected emotionally by what you see online.
- You understand that a large percentage of what you see online is not necessarily a reflection of the real world.
- You understand how information on social media is filtered to cater to your interests.



ACCEPTANCE OF NON-PERFECT

People who seek to be 'perfect' might feel the need to instantly respond to every single message they receive in order to meet other people's expectations and please them as much as possible. But the pressure many people feel to always be available online might prevent individuals from dealing with their own day-to-day tasks. Being able to accept that you can't please everyone could help you to better manage how much time you spend engaging with people online, and therefore decrease how much time you spend procrastinating on social media.



EXPRESS YOURSELF TO OTHERS

You can manage your friend's expectations by telling them when you are free to interact with them on social media, and when you are busy. Doing this could reduce the pressure you feel to be active on social media too often. You could also apply this procrastination countermeasure with your friends so that you can both motivate each other to spend less time on your devices.



GOAL / LIMIT SETTINGS

Applying goal / limit settings to your life could help you avoid receiving distracting notifications too often. This should eliminate a lot of temptation you may feel to frequently check your social media accounts, and in turn should lead to reducing how much time you spend procrastinating on social media. For example; you could select daily updates instead of hourly ones, or simply mute your notifications. This will help you to develop new, healthy habits and encourage you to engage more with your tasks rather than your devices.



POSITIVE THINKING

Maintaining positive self-talk could help you to curb how much time you spend on social media. E.G; if you had sent a message to someone and found that they had read your message but hadn't yet replied, instead of obsessing over it you could choose to think more positively about the situation; they might have been busy at the time and needed more time to reply. Methods like this also help you develop more understanding and empathy towards others, and help you distance yourself from situations that might otherwise cause you anxiety.



RELAPSE PREVENTION

Once you decide to take control back into your own hands and spend less time procrastinating on social media, you must prepare for there to be a relapse. It can help to understand what the signs are, how it happens and what strategies you can implement into your life to help you either avoid it or tackle it. The relapse occurs when you fail to use the suggested techniques to help you control your procrastination levels, and you ultimately return to your previous habits of spending too much time on social media.

THE RELAPSE OCCURS IN THREE STAGES:

- Emotional relapse when you think about how spending time on social media could help you feel better and improve your mood.
- Mental relapse when you struggle to train yourself into spending less time on social media.
- Physical relapse when you return back to procrastinating like you did before.

In order to prevent or help this relapse it might help you to:

- List things that will help motivate you to beat procrastination.
- List the negative results of procrastination that you want to avoid.

2 Second stage (Self-Diagnosis)

TYPES OF PROCRASTINATION



I often procrastinate to avoid working on unpleasant or difficult tasks.

I often procrastinate to change my mood and to feel better.

I often procrastinate to distance myself from real-life issues.

When I receive a notification I check it automatically and spend time on that, despite having other tasks to perform.

Avoidance



Mood modification



Escapism



Emergence



I should have started working on my assignment an hour ago, but first I am going to check how many likes I got on my recent post.

NOTE: People might also procrastinate due to peer pressure, to increase their popularity on social networking sites, and to help them stay up-to-date with what's happening on social media. Describe your own reasons for procrastination if you feel the suggested types do not apply to you:



9



Second stage (Self-Diagnosis)

THE FEATURES OF SOCIAL NETWORKING SITES THAT MAY INCREASE PROCRASTINATION



I often get distracted by notifications which lead me to accessing my social media and then delaying working on my tasks.



When I send a message to someone, I keep checking whether or not they are active online.



I respond to my contacts on social media almost instantly in order to build a positive self-image and maintain a good profile.



I find it hard to pull myself away from online conversations in order to complete my tasks.



While on social media I often see suggested content that is relevant to me, and I end up spending more time than I intended to spend on those sites.



NOTE: If you feel the above suggested features of SNS do not lead you to procrastinate, list below some other features you can think of that do apply to you:

10



Third Stage (Planning and preparation)

TASK ENGAGEMENT TOOL



Please identify a reward system for yourself that will help you towards achieving your goals. For example, if you successfully managed to avoid using social media in class for one full week you could reward yourself by doing something you enjoy such as having lunch outside or going to the cinema.

Instead of trying to accomplish one huge task, break it up into multiple goals that you can easily achieve, and arrange realistic deadlines for each milestone.

Make your contacts aware that you can't be available online all the time due to commitments you have and tasks you have to accomplish. This could lessen the pressure you feel to interact constantly on social media.



Congratulations!!
We added 10 points
to your account

I have almost finished all my
tasks, then will be able to post the photos
from the party last night.



11



Third Stage (Planning and preparation)

TECHNICAL COUNTERMEASURES AND SOCIO-TECHNICAL COUNTERMEASURES PHASE



When you feel you are likely to procrastinate due to checking your notifications and engaging with their content, which of these software techniques would help you to control your procrastination? (You can choose more than one.)

Set up auto-reply so that your contacts are automatically informed about your availability when they message you.



Set a status to show your contacts when you are not available so they do not expect you to interact immediately.



Seek advice and suggestions if are not sure how to do various technical things such as muting notifications or setting a timer. For example, in iOS you could use Siri to get more suggestion.



When you spend more time on social media than you initially intended, which of these software techniques would best help you to combat that?

Set a reasonable time limit that you wish to not exceed on social media. For example, using screen apps limit or down time in iOS. To do so, go to the setting in iOS >> screen times >> app limits or down time.



Decide on an amount of time that you wish to spend on social media. For example, if you wish to spend one hour per day on social media you could set up a timer for one hour so that you would receive a reminder when the timer is up



Please, utilise your usage feedback that you have spent on social media during your working hours. For example in iOS, go to setting >> screen time >> usage feedback.





Third Stage (Planning and preparation)

TECHNICAL COUNTERMEASURES AND SOCIO-TECHNICAL COUNTERMEASURES PHASE



When you send a message to someone and you find yourself constantly checking to see if they are active online, which of these software techniques would help you to combat that procrastination?

Set up auto-reply to respond automatically to your contacts in order to let them know about your availability time. For example, set up an auto-reply for your email account.

Prioritise your tasks based their importance to you. For example, list tasks that you need to carry out this week, ranking them in order of urgency, and then prioritising them over other things.



When you procrastinate by replying to your contacts as soon as they message you, mainly to build a positive self-image and maintain a good profile, which of these software techniques would help you to tackle that procrastination?

Please, utilise your usage feedback that you have spent on social media during your working hours. For example in iOS, go to setting>>screen time>> usage feedback.

Decide on a time limit that you wish to not exceed on social media. For example, using screen apps limit or down time in iOS. To do so, go to settings in iOS>>screen times>>app limits or down time.

Set up auto-reply to respond automatically to your contacts in order to let them know about your availability time. For example, set up an auto-reply for your email account so you don't feel the need to reply to everyone immediately

Set personal goals that you wish to achieve. For example, if you wished to study for one hour per day, you could set up a timer for one hour each time you study so as to organise your time more effectively.





Third Stage (Planning and preparation)

TECHNICAL COUNTERMEASURES AND SOCIO-TECHNICAL COUNTERMEASURES PHASE



When you prioritise chatting to your friends on social media instead of focusing on your tasks, which of these software techniques would help you to combat that problem?

Set up the time you wish to spend messaging your contacts on social media and let them know about the suggested time. For example, if you wish to chat for ten minutes you could set up a timer for ten minutes when the conversation starts with each of your contacts.

Please set a status to show your contacts when you are not available so they do not expect you to interact with them at certain times when you are busy.

Decide on the amount of time that you wish to spend engaging with other online. For example, if you wished to chat for ten minutes you could set up a timer for ten minutes when the conversation is starts.





Fourth Stage (Action)



Please apply the selected countermeasures for one week.



Alternative countermeasures will be made available should the suggested countermeasures not work well enough for you.



15



Fifth stage (Self-assessment)

Answer the question:



Do the suggested countermeasures help you to gain more control over your procrastination?





Sixth stage (Error identification)



On a separate sheet please answer the following questions to the best of your ability:

Where did you procrastinate? (In which application)

When did you procrastinate? (What time)

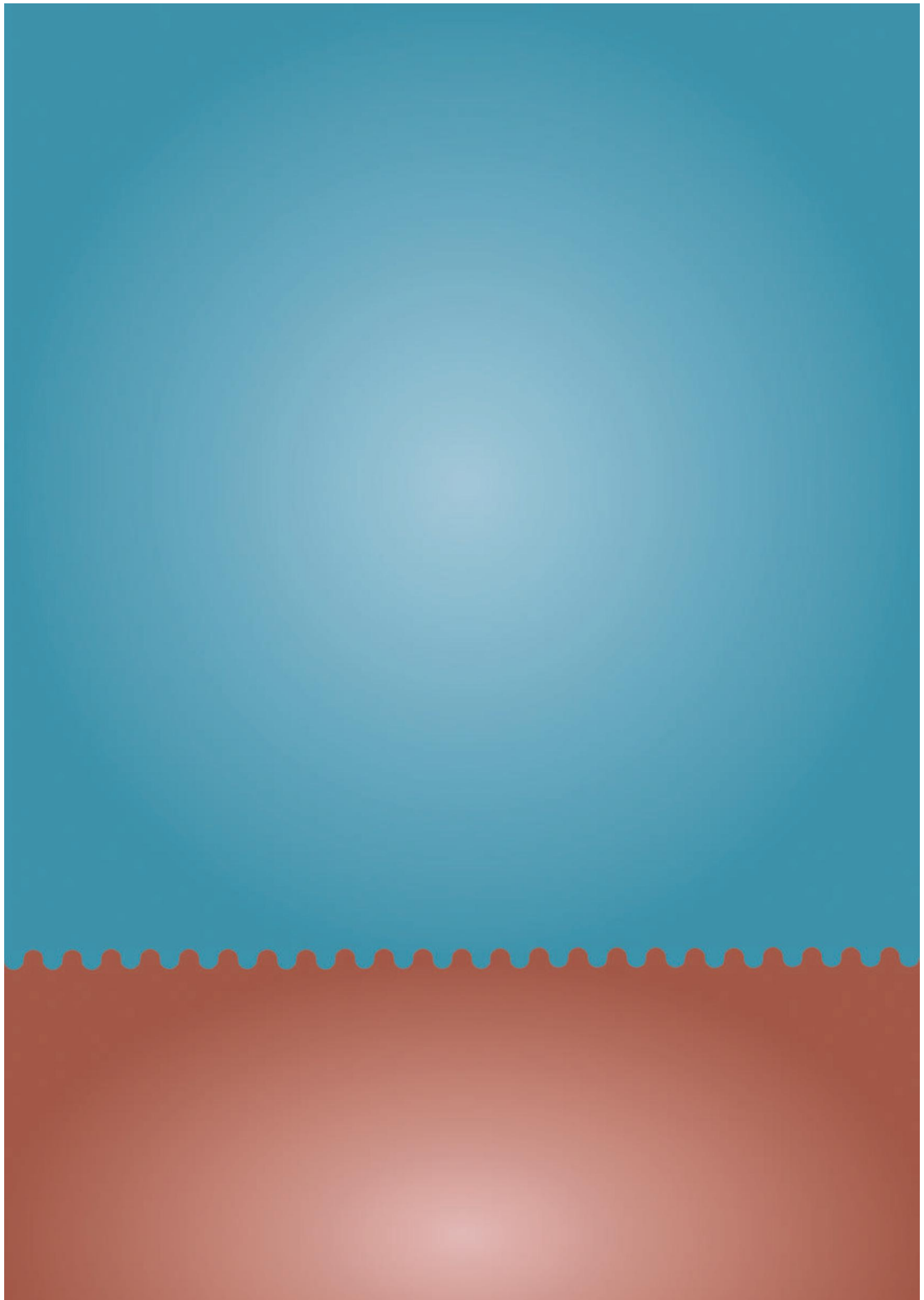
What did you procrastinate? (Tasks that you missed)






















Why did you procrastinate? (Your reasons for procrastinating)

How did you procrastinate? (Other activities you did while procrastinating)

Who did you procrastinate with? (Other people who were involved and who were perhaps affected by your procrastination)

NOTE: Once you have answered the previous questions you will be able to select more specific countermeasures to help control your procrastination. Also, if you find you end up procrastinating because of other people (peer pressure), the socio-technical countermeasures would perhaps be more helpful than the technical countermeasure to aid you in controlling how much you procrastinate. However, if you feel you procrastinate because of low self-control skills or poor time management you might instead consider the technical countermeasures.



My procrastination type(s) are :			SELF - MONITORING SHEET
Social media feature(s) that lead me to procrastination are : 	To increase my task's engagement, I will use the following tools: 	To gain better control over my procrastination I will use the following countermeasure(s): 	Do the suggested countermeasures help you to gain more control over your procrastination? :
	 	 	
	 	 	
	 	 	

Appendix 8: Evaluation questionnaire before using the D-Crastinate method

Participant's number is (You will be given this number at the beginning of the first session)

Q1/ I often procrastinate on social networking sites instead of working on my tasks

☐ Yes ☐ No (if your answer is no, please stop the survey here)

Q2/ What is your age?

.....

Q3/ What gender do you identify with?

☐ Male ☐ Female ☐ I prefer not to say

Q4/ Do you know how procrastination on social networking sites happens? If yes, please elaborate on your answer

☐ Yes ☐ No ☐ Not sure

.....
.....
.....

Q5/ Are you aware of the features that may facilitate procrastination on social networking sites?

☐Extremely aware ☐Moderately aware ☐Somewhat aware ☐Slightly aware
☐Not at all

Q6/ How do you rate your awareness of how to control your procrastination on social networking sites?

☐Extremely aware ☐Moderately aware ☐Somewhat aware ☐Slightly aware
☐Not at all

Q7/ Please tick the box that most closely represents your experience of procrastination on social networking sites

	Never	Rarely	Sometimes	Often	Always
I often procrastinate to avoid working on unpleasant or difficult tasks					
I often procrastinate to change my mood and feel better					
I often procrastinate to distance myself from real-life issues					
When I receive a notification, I check it and spend time on that, despite having other tasks to perform					

Q8/ Please tick the box that most closely represents your experience of procrastination on social media

	Never	Rarely	Sometimes	Often	Always
I often get distracted by notifications which lead me to access social					

networking sites and then delay working on my tasks					
When I send a message to someone, I keep checking whether or not they are active online					
I respond to my contacts on social media almost instantly in order to build a positive self-image and maintain a good profile					
I find it hard to pull myself away from online conversations in order to complete my tasks					
While on social media, I often see suggested content that is relevant to me and I end up spending more time than I intended to spend on those sites					

Appendix 9: Evaluation questionnaire after using the D-Crastinate method

Participant's number is (This number was given to you during the first session)

Q1/ Do you know how procrastination on social networking sites happens? If yes, please elaborate on your answer

☐ Yes

☐ No

☐ Not sure

Q2/ Are you aware of the features that may facilitate procrastination on social networking sites?

☐ Extremely aware ☐ Moderately aware ☐ Somewhat aware ☐ Slightly aware

☐ Not at all

Q3/ How do you rate your awareness of how to control your procrastination on social networking sites?

☐ Extremely aware ☐ Moderately aware ☐ Somewhat aware ☐ Slightly aware

☐ Not at all

Q4/ Please tick the box that most closely represents your experience of procrastination on social media in the last week

	Never	Rarely	Sometimes	Often	Always
I often procrastinate to avoid working on unpleasant or difficult tasks					
I often procrastinate to change my mood and feel better					

I often procrastinate to distance myself from real-life issues					
When I receive a notification, I check it and spend time on that despite having other tasks to perform					

Q5/ Please tick the box that most closely represents your experience of procrastination on social media in the last week

	Never	Rarely	Sometime s	Often	Alway s
I often get distracted by notifications which lead me to access my social networking sites and then delay working on my tasks					
When I send a message to someone, I keep checking whether or not they are active online.					
I respond to my contacts on social media almost instantly in order to build a positive self-image and maintain a good profile.					
I find it hard to pull myself away from online conversations in order to complete my tasks.					
While on social media, I often see suggested content that is relevant to me and I end up spending more time than I intended to spend on those sites.					

Q6: Sufficient information was provided regarding how to use the CPoSNS method:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Q7: Sufficient information was provided for the CPoSNS method about the types of procrastination:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....

Q7: Sufficient information was provided for the CPoSNS method about the features of social networking sites that lead to procrastination:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....
.....

Q8: Sufficient information was provided for the CPoSNS method about task engagement tools:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....

Q9: Sufficient information was provided for the CPoSNS method about the countermeasures for combating procrastination:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....

Q10: Generally speaking, the CPoSNS method was not difficult to understand (e.g. it was explained in a clear way):

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....

Q11: Overall, the CPoSNS method was not difficult to use:

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please elaborate on your answer (optional):

.....
.....
.....

Q12: Did you encounter issues or difficulties when using the CPoSNS method? If yes, please explain:

.....
.....
.....
.....
.....
.....
.....

Q13: Did you experience any habitual behaviour while you were applying CPoSNS? If yes, please explain:

.....
.....
.....
.....
.....

Appendix 10: The e-Therapy Attitudes and Process Questionnaire (eTAP)

(Table 1): Please circle the number that most closely represents your experience when using the CPoSNS method for procrastination

1. I will use the CPoSNS method to gain better control over my procrastination on SNS in the next week:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
2. I find the CPoSNS method for controlling procrastination on SNS to be:									
Unhelpful					Helpful				
-3	-2	-1	0	+1	+2	+3			
3. Those people who are important to me would approve of me using the CPoSNS method to gain a better control over my procrastination on SNS:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
4. I possess the required knowledge to use the CPoSNS method to gain better control over my procrastination on SNS:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
5. It is likely that I will use the CPoSNS method to gain better control over my procrastination on SNS in the next week:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			

6. Most people who are important to me would approve of me using the CPoSNS method to gain better control over my procrastination on SNS:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
7. I find using the CPoSNS method to gain better control over my procrastination on SNS to be:									
Harmful					Beneficial				
-3	-2	-1	0	+1	+2	+3			
8. It is mostly up to me whether I use the CPoSNS method to gain better control over my procrastination on SNS in the next week:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
9. I intend to use the CPoSNS method to gain better control over my procrastination on SNS in the next week:									
Strongly disagree					Strongly agree				
1	2	3	4	5	6	7			
10. I find using the CPoSNS method to gain better control over my procrastination on SNS to be:									
Unpleasant					Pleasant				
-3	-2	-1	0	+1	+2	+3			
11. Those people who are important to me would support me using the CPoSNS method to gain better control over my procrastination on SNS:									

Strongly disagree						Strongly agree	
1	2	3	4	5	6	7	
12. I intend to ensure that I have access to the required materials to use the CPoSNS method to gain better control over my procrastination on SNS in the next week:							
Strongly disagree						Strongly agree	
1	2	3	4	5	6	7	
13. I have complete control over whether I use the CPoSNS method to gain better control over my procrastination on SNS:							
Strongly disagree						Strongly agree	
1	2	3	4	5	6	7	
14. I find the CPoSNS method to offer better control over my procrastination on SNS to be:							
Not credible						Credible	
-3	-2	-1	0	+1	+2	+3	
15. I am confident using the CPoSNS method to gain better control over my procrastination on SNS:							
Strongly disagree						Strongly agree	
1	2	3	4	5	6	7	
16. Those people who are important to me think that the CPoSNS method for procrastination on SNS is credible:							
Strongly disagree						Strongly agree	
1	2	3	4	5	6	7	

Appendix 11: Treatment Questionnaire Concerning Continued Programme Participation

(Table 2): Please indicate how true each reason is for you:

		1 not at all true	2	3	4 somewhat true	5	6	7 very true
A. I have remained in treatment because:								
1	I would have felt bad about myself if I didn't.							
2	Others would have been angry at me if I didn't.							
3	I would have felt like a failure if I didn't.							
4	I feel like it's the best way to help myself.							
5	People would think I'm a weak person if I didn't.							
6	I have chosen not to leave the programme.							
7	It is a challenge to accomplish my goal.							
8	I have invested so much time in this program.							

		1 not at all true	2	3	4 somewhat true	5	6	7 very true
B. I have been following the procedures of the programme because:								
9	I believe they help me solve my problem.							
10	I have been worried that I would get in trouble with the researcher if I didn't follow all the guidelines							
11	I want the researcher to see that I am really trying to manage my procrastination.							
12	It is important to me that my efforts succeed.							
13	I feel guilty if I don't comply with all the procedures.							

Appendix 12: Information Sheet



The title of the research project:

Exploring procrastination and social network sites

Invitation

You are being invited to take part in this research project conducted by Abdulaziz Alblwi, a postgraduate researcher, in the Department of Computing and Informatics, Faculty of Science & Technology, Bournemouth University, UK. Before you decide, it is important for you to understand why this research is being conducted and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

Procrastination is defined as the act of delaying or postponing an action into the future. Hence, this study is designed to explore common factors in SNSs that may contribute or relate to procrastination. Some possible factors have been identified in the literature and this includes escapism, habitual usage, and fear of missing out. By this study, a particular focus will be paid to the exploration and understanding of the role of software features in facilitating procrastination. Moreover, the study will explore the general perception about procrastination and social media; both view people who procrastinate and people who are affected by procrastination. In addition, the study will explore the initial design of the advanced features that future software could have to manage procrastination.

Why have I been invited to take part?

You have been chosen because of your probable interest in helping the researcher understand procrastination, and Social Network Sites' features that may facilitate users to procrastinate. You will be contributing to this research by utilising the materials that are provided to you, and discussing and giving feedback on them.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. You can withdraw at any time, up to the point where the data are processed and become anonymous, so your identity cannot be determined, without it affecting any benefits that you are entitled to in any way and you do not have to give a reason. Deciding to take part or not will not adversely affect you.

What would taking part involve?

As a participant in this study, there are number of activities to undertake, you may be asked to participate with some or all of them. Firstly, you will be asked to fill a short pre-selection survey to gather your demographic data (e.g. age, gender, profession, etc.) and your experience with technology. If based on the information you provide you are selected for the next stage of the study, you will be invited to a focus group. During the focus group session, you will be given a brief demonstration about procrastination, main concepts related to SNS and a smart phone application that will be used for this study. After that, you will be given different scenarios to discuss with other participants in the groups. After that you will be asked to install a smart phone application and use it for a couple of weeks. During that the researcher may ask you to input your daily experience with the usage of social networks as a diary notes. In particular, the notes you provided will concern the moments that you felt you tend to procrastination.

What is Evernote smart phone app and why may I need to use it?

Evernote is an app for smartphones and computers. It is used to allow people taking electronic notes such as voice, pictures or text and possible sharing with others. You will be asked to download the Evernote app from Apple Store or Play Store depending on the type of your smartphone or through the following link: <https://evernote.com/download/> and keep it active for a certain period of time. You will sign up by your email account. The researcher will use the Evernote to send your questions during the day about research problem and you are expected to answer and send it back as text, picture or voice

What are the possible benefits and risks of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will improve understanding of procrastination to the SNS and how a new technology is designed that can help people managing their procrastination. There are not speculated risks of taking part of this study.

Will my taking part in this study be kept confidential?

All the information that is collected about you during the course of the research will be kept strictly confidential. Your identity will not be identified in any reports or publications. All data relating to this study will be kept for 5 years on a BU password protected secure network.

Will I be recorded, and how will the recorded media be used?

Yes, if you take part in the focus groups. The recording will help me to capture the information that will be sought from you during the study. However, you will be given the right to accept or reject recording the session. No other use will be made of the recording without your written permission, and no one outside the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted once transcribed and anonymised. No other use will be made of them without your written permission, and no one outside the project team will be allowed access to the original recordings. The transcription of the session will not include your name or any identifiable information. Instead, each person will be identified by a participant number (i.e. participant 1, participant 2, participant 3, etc.).

Who should I contact for further information?

If you have any questions or require more information about this study, please contact me using the following contact details:

Abdulaziz Alblwi

Faculty of Science and Technology
Bournemouth University
BH12 5BB

aalblwi@bournemouth.ac.uk

Tel: 01202 961217

What if something goes wrong?

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:

Professor Tiantian Zhang, E-mail: researchgovernance@bournemouth.ac.uk

Bournemouth University, Faculty of Science and Technology

Talbot Campus, Fern Barrow, Poole, BH12 5BB, Tel: 01202 965721

Thank you for reading this information sheet and for considering taking part in this research.