HIGH SCHOOL STUDENTS' ATTITUDE, SUBJECTIVE NORM, PERCEIVED BEHAVIORAL CONTROL, AND BEHAVIORAL INTENTION TOWARD CLIMATE CHANGE IN RELATION TO PRO-ENVIRONMENTAL BEHAVIOR IN KLATEN REGENCY INDONESIA

A Thesis

Submitted to the Master Study Program of Education at the Faculty of Education in partial fulfillment of the requirements for the degree of

Master of Arts (M.A.)

Universitas
Islam Internasional
Indonesia

by:

Irkham Zamzuri

04212210013

UNIVERSITAS ISLAM INTERNASIONAL INDONESIA

DEPOK

1446 H/ 2024 M

HIGH SCHOOL STUDENTS' ATTITUDE, SUBJECTIVE NORM, PERCEIVED BEHAVIORAL CONTROL, AND BEHAVIORAL INTENTION TOWARD CLIMATE CHANGE IN RELATION TO PRO-ENVIRONMENTAL BEHAVIOR IN KLATEN REGENCY INDONESIA

A Thesis

Submitted to the Master Study Program of Education at the Faculty of Education in partial fulfillment of the requirements for the degree of

Master of Arts (M.A.)

Universitas
Islam Internasional
Indonesia

by:

Irkham Zamzuri

04212210013

UNIVERSITAS ISLAM INTERNASIONAL INDONESIA

DEPOK

2024

ACKNOWLEDGEMENT

All the praises to Allah SWT for the grace, guidance, and blessings that have allowed me to complete this thesis. This thesis is evidence to the incredible academic journey that I've been through it on, it filled with challenges, growth, and the unlimited support from many special figures. Once I reflect on this journey, my heart is full of gratitude.

Firstly, I would like to express my deepest appreciation to my excellent thesis supervisors, Bambang Sumintono, Ph.D., and Dr. Destina Wahyu Winarti. Their tireless dedication, profound suggestions, and the unwavering motivation for sure plays crucial role as the foundation of this thesis. Both of them are more than supervisors; they are like personal mentors. When I doubted myself, they always believe in me. Secondly, I would like to express my gratitude to A/Professor Charyna Ayu Rizkyanti, Ph.D., and Dr. Lukman Nul Hakim, they always present during my toughest times. Embracing my unstable emotions, but at the same time proposing constructive solutions without any judgements. I am forever grateful for your compassion and support.

Thirdly, I would like to express my gratitude to Tati Lathipatud Durriyah, Ph.D. She is the first person who interviewed me two years ago during the scholarship offering. I was quite often visiting his office to share not only about academic challenges, but mostly also about personal obstacles as graduate student. She knows my background well. Such an honor to work under her academic supervision. I am

deeply thankful, Ibu Tati. Additionally, the other lecturers of the faculty of education UIII who have touched and contributed to my life, thank you very much for the unforgettable moments and memories shared in and out the classroom. Each of you has contributed to the development of my academic and personal lives. Moreover, to my dearest classmates. Guys, you are the best companions one could ask for support. The past two years have made each and every detail journey not only bearable but also definitely joyful for all ups and downs.

Lastly, I will dedicate this thesis to all my family members who have given their best to support me exploring my full potential as a son, as a big brother, as a husband, and as a father of lovely son. My brother, the best research assistant to collect data. My parents, buk e, pak e, your constant support and belief in my dream is my greatest motivation. My beloved wife and adorable son, you are my heart and soul. Your pure love, patience, and encouragement are my strongest foundation to go this far. You have been with me through every late night and early morning, every success and setback. My words will not be enough in expressing how grateful I am having both of you in my life. My greatest blessing. Thank you.

ABSTRACT

Irkham Zamzuri
04212210013
irkham.zamzuri@uiii.ac.id
MA in Education
Universitas Islam Internasional Indonesia

Currently, human-induced climate change causes difficulties, affecting the environment, health and well-being. Indonesia encounters distinct climate-related problems. It underscores the urgency of comprehensive educational approach. There is a lack of detailed evaluation specifically targeting high school students in Indonesia. The gap may impede the successful promotion of pro-environmental behavior (PEB) among youth generation. The absence of regular monitoring of high school students' attitude (ATT), subjective norm (SN), perceived behavioral control (PBC), and behavioral intention (BI) towards climate change hinders effort to improve educational programs or initiatives in Indonesia. The objective of the study is evaluating the ATT, SN, PBC, and BI of high school students in Klaten Regency, Central Java Province, Indonesia about the climate change in relation to PEB. It aims to examine the correlation between these variables and their impact on PEB. The study employed a quantitative research approach within a positivist paradigm, non-experimental with cross-sectional design. The data were collected through structured questionnaires administered to a sample of 1,336 students. The questionnaire included Likert-type scales to measure the constructs of interest. Data were analyzed using the Rasch Model Measurement, descriptive statistics, ANOVA, DIF analysis, correlational tests, and multiple regression analysis. The study reveals significant insights into high school students' ATT, SN, PBC, and BI towards climate change, and their influence on PEB. Descriptive statistics indicated that students generally exhibit moderate to high levels of PEB, with variations based on gender and school type. Female students and those from senior high schools demonstrated higher levels compared to their counterparts. Correlational analyses showed strong positive associations between SN ($r = 0.548$), PBC ($r = 0.570$), and BI ($r = 0.533$), which are significant predictors of PEB ($r = 0.529$). Multiple regression analysis confirmed that SN ($\beta = 0.3329$, $p < 0.001$) and PBC ($\beta = 0.3876$, $p < 0.001$) significantly influence BI, which in turn predict PEB ($\beta = 0.2865$, $p < 0.001$). However, ATT alone did not directly affect PEB ($\beta = -0.0303$, $p = 0.2309$), highlighting the critical role of social and control factors in driving environmentally friendly actions among students. The study concludes that enhancing climate change education (CCE) is crucial for fostering proactive attitudes and behaviors among high school students. To promote PEB, the study recommends integrating climate change topics across subjects, adopting gender-sensitive approaches, mandating environmental education at all schooling types, and providing resources and professional development for teachers.

Keywords: *Climate change, climate change education, high school students, attitude, subjective norm, perceived behavioral control, behavioral intention, pro-environmental behavior*

ABBREVIATION AND GLOSSARY PAGE

ANOVA Test	:	A statistical technique that is employed to determine whether there is a significant difference between the means of three or more groups.
ATT	:	Attitude
BI	:	Behavioral Intention
CCE	:	Climate Change Education
Climate Change	:	Long-term changes in temperature, precipitation, wind patterns, and other elements of the Earth's climate system, frequently influenced by human activity.
Correlation Test	:	A statistical technique assessing the relationship and the direction between two or more variables.
Descriptive Statistic	:	Statistical methods that summarize and describe the features of a dataset, such as mean, median, and standard deviation.
DIF	:	Differential Item Functioning
Global Warming	:	The primary cause of the long-term increase in the average temperature of the Earth's climate system is human activities, including the combustion of fossil fuels and deforestation.
Human-Induced Phenomena	:	Human activities, including pollution, deforestation, and the emission of greenhouse gases, are responsible for environmental changes and impacts that contribute to climate change.

IBM SPSS	:	International Business Machines Statistical Package for the Social Science
Inferential Statistic	:	Statistical methods used to make inferences or predictions about a population based on a sample of data, including hypothesis testing and confidence intervals.
IPCC	:	Intergovernmental Panel on Climate Change
Multiple Regression	:	A statistical approach that is employed to investigate the correlation between one dependent variable and two or more independent variables.
NASA	:	National Aeronautics and Space Administration
PBC	:	Perceived Behavioral Control
PEB	:	Pro-Environmental Behavior
PROCESS Macro	:	An add-on tool for SPSS that allows for advanced statistical modeling, including mediation, moderation, and conditional process analysis.
SN	:	Subjective Norm
TPB	:	Theory of Planned Behavior
UNCED	:	United Nations Conference on Environment and Development
Winsteps	:	A software program used for Rasch measurement analysis in educational and psychological research.

TABLE OF CONTENT

STATEMENT OF AUTHENTITICY iii

ANTI-PLAGIARISM STATEMENT..... iv

THESIS ATTESTATION..... v

THESIS APPROVAL SHEET..... vi

ACKNOWLEDGEMENT vii

ABSTRACT..... ix

ABBREVIATION AND GLOSSARY PAGE..... x

TABLE OF CONTENT xii

CHAPTER 1 INTRODUCTION 1

1.1 Research Background 1

1.2 Research Questions 9

1.3 Research Hypotheses 9

1.4 Research Objectives 10

1.5 Research Significance 11

CHAPTER 2 THEORETICAL FOUNDATION..... 13

2.1 Introduction 13

2.2 Literature review 13

2.2.1 Climate Change Education 14

2.2.2 Historical Perspective of Climate Change Education 15

2.2.3 Climate Change Education in Indonesia 18

2.2.4 Attitude Toward Climate Change 20

2.2.5 Subjective Norm toward Climate Change 21

2.2.6 Perceived Behavioral Control toward Climate Change 23
2.2.7 Behavioral Intention toward Climate Change 25
2.2.8 Pro-Environmental Behavior 27
2.2.9 Research Gap 30
2.3 Theoretical Framework 31
2.3.1 The Theory of Planned Behavior 32
2.3.2 Conceptual Framework 34
CHAPTER 3 RESEARCH METHODOLOGY 36
3.1 Introduction 36
3.2 Research Approach 36
3.3 Research Paradigm and Research Design 39
3.3.1 Research Paradigm 39
3.3.2 Research Design 39
3.4 Research Subject 40
3.5 Data Collection 41
3.6 Pilot Testing 44
3.6.1 The First Data Set Pilot Testing 45
3.6.2 The Second Data Set Pilot Testing 48
3.6.3 The Third Data Set Pilot Testing 50
3.7 Data Analysis 52
3.8 Ethical Considerations 57
CHAPTER 4 FINDINGS AND DISCUSSION 58
4.1 Introduction 58

4.2 The level of ATT, SN, PBC, BI, and PEB toward climate change among high school students in Klaten Regency, Central Java Province, Indonesia 59
4.2.1 The Level of Item Difficulty 61
4.2.2 The Level of Person 78
4.3 The students' demographic data of attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change. 93
4.3.1 Gender Differences in ATT, SN, PBC, BI, and PEB 93
4.3.2 School Type Differences in ATT, SN, PBC, BI, and PEB 98
4.3.3 Differential Item Functioning Analysis 102
4.4 The relationship between attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students 105
4.5 The strength contribution of attitude, subjective norm, perceived behavioral control, and behavioral intention to pro-environmental behavior toward climate change among high school students 109
CHAPTER 5 CONCLUSION 116
5.1 Summary of Findings 116
5.2 Recommendation 119
5.3 Limitation 120
REFERENCES 121
APPENDICES 176
Appendix A: Research Instruments in Indonesian 176
Appendix B: Research Instruments in English 181
Appendix C: Research Permits 186
Research Permit from Faculty of Education UIII to Schools 186

Research Permit from Faculty of Education to Region V Education District Office of Central Java Province 187

Research Permit from Region V Education District Office of Central Java Province 188

Appendix D: Winsteps 3.73 Output Tables of Pilot Testing 189

First Data Set of Pilot Testing 189

Second Data Set of Pilot Testing 191

Third Data Set of Pilot Testing 192

Appendix E: Winsteps 3.73 Output Table of Item Measure 193

Output Table 13 Item Measure of ATT 193

Output Table 13 Item Measure of SN 194

Output Table 13 Item Measure of PBC 194

Output Table 13 Item Measure of BI 194

Output Table 13 Item Measure of PEB 195

Appendix F: Different Item Functioning (DIF) 195

Winsteps 3.73 Output Table 30 Item DIF of Gender 195

Winsteps 3.73 Output Table 30 Item DIF of School Types 196

Gender DIF Plots 197

School Types DIF Plots 199

ANOVA Mean Plots of Gender 202

ANOVA Mean Plots of School Type 203

Appendix G: Regression PROCESS Macro Hayes 205

Appendix H: Documentation of Data Collection Process 208

Appendix I: Research Instruments Permit 209

Appendix J: Google Form Questionnaire for Real Data Collection 209

Appendix K: Google Form Questionnaire for Pilot Testing Data Collection 210

CHAPTER 1
INTRODUCTION

1.1 Research Background

In the 19th century, there was an increasing scientific interest in understanding the insulating properties of human-generated carbon dioxide (CO2) and other gases in the Earth's atmosphere. Eunice Newton Foote made the discovery in the 1850s that water vapor and carbon dioxide have a greater warming effect on air compared to dry air. By the late 1950s, measurements of carbon dioxide (CO2) levels began to indicate the presence of global warming. As the warming effect of CO2 gas was further verified, our comprehension of global warming progressed (Halley, 2024).

Global warming is defined by scientists as the mean global surface temperature resulting from the release of greenhouse gases by human activities. The term was initially employed in a 1975 Science paper authored by geochemist Wallace Broecker from Columbia University's Lamont-Doherty Geological Observatory. The article was titled "Climatic Change: Are We on the Brink of a Pronounced Global Warming?" Prior research on the influence of humans on climate referred to it as "unintentional climate alteration" (Barrett & Landsberg, 1975). This was due to the fact that although numerous scientists acknowledged the potential for human actions to induce climate change, they lacked knowledge regarding the specific trajectory of such change. It would be intriguing to determine whether the cooling impact of industrial aerosol emissions or the warming impact of greenhouse gas emissions will prevail.

The inaugural and conclusive investigation conducted by the National Academy of Science in 1979, discarded the notion of "unintentional climate alteration" caused by carbon dioxide. The report, sometimes referred to as the Charney Report, was led by Jule Charney from the Massachusetts Institute of Technology in Cambridge, USA. Charney stated that if carbon dioxide levels continue to rise, there is no doubt that climate changes will occur and there is no reason to expect that these changes will be insignificant. Charney embraced Broecker's terminology instead of unintentional climate modification. Charney coined the term "global warming" to describe changes in surface temperature. Charney, in the NRC report of 1979, referred to the various alterations that would result from the rise in carbon dioxide as "climate change".

In the field of climate research, the terms "global warming" and "climate change" gained prominence throughout the 1980s, with "global change" also becoming prevalent by the late 1980s. The term "global warming" became widely recognized in June 1988, following NASA scientist James E. Hansen's testimony to Congress, which specifically focused on this phenomenon (Bailey, 2016; Morano, 2018). In the 1990s, computer models and observational evidence supported the Milankovitch theory of ice ages, which holds those fluctuations in the Earth's location relative to the Sun drive glacial periods, resulting in a scientific consensus. The majority of climatic changes are caused by greenhouse gases, and most people agree that human-caused emissions contribute to global warming (Sörlin et al., 2018).

The shifting of terminology from "global warming" to "climate change" indicates that there was a better understanding of Earth's climate system. The term of

"global warming" is only referring to the temperature increases, meanwhile the term of "climate change" is encompassing the broader spectrum of changes in the Earth's climatic system including the causes and impacts. Following what has been discovered by Lineman et al. (2015), he addressed that the term "climate change" has grown in prominently in the recent years, stressing the deep and multifaceted character of climatic changes. It clarifies the idea of Weart (2008), it emphasizes that the usage of multiple terminologies to describe different aspects of the same phenomena demonstrates the advancement of scientists' understanding of the problem. However, a substantial changing happened during the presidency of George H.W. Bush. The term of climate change was more preferred to be used than the term of global warming. It was widely considered as a political movement to soften the public's impression of the issue. It was attempting deliberately to make less severe concept and more appealing to the public and policymakers (Nisbet, 2009).

The Intergovernmental Panel on Climate Change (IPCC) has officially acknowledged that climate change as an unprecedented phenomenon, typified by escalating the global surface temperature, the melting ice caps, and incidence of severe weather (IPCC, 2021). An observation that has been done by Hansen et al. (2010) and also the National Aeronautics and Space Administration (NASA) in 2020 exposed there was a substantial rise in global average surface temperatures that primarily attributed to human activities like the burning of fossil fuels for energy. Anthropogenic climate change is a significant and complex issue in the 21st century, as extensively shown in the research articles that have been published by Hulme et al. (1999). Mitchell

et al. (2006), Schlesinger et al. (2007), Cohen & Waddell (2009), and Eyring et al. (2021). According to Nyborg et al. (2016) and Han & Ahn (2020) the impacts of global climate change extend beyond environmental harm. Lindwall (2022) highlights that it also influences people economic, public health, and overall human well-being globally.

As reported by Oppenheimer et al. (2019) the impact of climate change is quite diverse in a different region, they might experience different events as well. In one particular region may face heatwave and drought while the other is struggling with flooding and sea level rise. Meanwhile, in the Arctic region, the warming is twice as rapidly as the world average, it will cause significant ice loss and wider ecological problems (Post et al., 2019). In addition, small islands in poor nations face immediate threats from the increase in sea level (United Nations, 2019). Smith & Katz (2013) argue that the environmental changes have led to an increase in the occurrence and severity of natural catastrophes, exacerbating challenges connected to food security and water scarcity.

Indonesia, a country with abundant biodiversity spread across its thousand islands, faces distinctive obstruction due to climate change (Adyasari et al., 2021; Handayani et al., 2019; Gan et al., 2021; Yokoyama et al., 2023). De Clippele et al. (2023) covers one of the Indonesia's problems, the Coral Triangle, is experiencing severe coral bleaching due to rising sea temperatures, impacting marine biodiversity and fisheries The Indonesian government's National Action Plan on Climate Change Adaptation (RAN-API) aims to mitigate these effects through various strategies (Djalante & Thomalla, 2012). A news broadcasted by Lee & Sihombing (2023) via

Bloomberg.com on December 7th, 2023, explained that Jakarta, the capital city of Indonesia, will be the fastest-sinking megacity on the planet. According to experts, the city must find a solution by 2030, else it will be unable to prevent the Java Sea from advancing.

Indonesia is witnessing an increase in extreme weather events, with significant socio-economic implications (Djalante & Garschagen, 2017). Sea-level rise threatens millions in coastal areas, challenging urban planning and coastal community welfare (Marfai, 2008). In agriculture, climate change endangers food security, with variability in rainfall and temperature affecting staple crops like rice (Naylor, 2007). This diversity highlights the necessity of comprehensive climate change policies that include social, economic, and political factors.

One of the attempts is through education for the next generation, as Adger (2017) says. It is critical to have a complete approach that includes educating the younger generation about climate change. Kollmuss and Agyeman (2002) emphasizes that Climate change education (CCE) is essential for creating knowledgeable and ecologically concerned societies. Education will equip individuals with the necessary knowledge, abilities, and attitudes required to understand the complexity of climate change, recognize its consequences, and effectively mitigate its effects (Mochizuki & Bryan, 2015). The importance of CCE extends beyond the mere dissemination of factual information. Cordero et al. (2020) discusses the objective of CCE is to enable individuals to rigorously examine environmental concerns and motivate them to become catalysts for change in their own communities. According to McGuire (2015)

and Ernst et al. (2017), CCE plays crucial role in promoting environmental responsiveness by converting knowledge into concrete environmentally friendly actions such as reducing carbon emissions, adopting sustainable practices, and advocating for the betterment of environment. Additionally, Anderson (2012), Stevenson et al. (2017), Monroe et al. (2019), and Rousell & Cutter-Mackenzie-Knowles (2020) have all emphasized the significance of education in tackling climate change challenges.

The research takes a focus on high school students aged 15 to 18 years who attend high school in Klaten Regency, Central Java Province, Indonesia. Based on Darmawan and Dagamac (2021) study, they explained that adolescents at their age go through a critical period of maturation which is defined by significant advances in cognitive and moral development. Nowadays era provides an excellent opportunity to raise environmental awareness and support sustainable actions as long-term principles through educational intervention. Moreover, Ramadani et al. (2023) illustrates how people in adolescent range are more likely to accept change and have higher awareness of their roles in social responsibility and environmental obligation.

Despite its accepted importance, unfortunately there is significant barrier to implement CCE. Yuan et al. (2022) found that the lack of comprehensive assessments primarily geared to toward high school students poses the obstacle for effective and efficient practice of CCE. In the global level, there are various implementations of educational strategies such as curriculum integration, awareness campaigns, and environmental projects, however there is frequently lack of systematic monitoring of

high school students' attitude (ATT), subjective norm (SN), perceived behavioral control (PBC), and behavioral intention toward climate change in relation to environmentally friendly activities. Reid (2019) noted that the lack of empirical evidence demonstrates the efficacy of educational intervention in raising climate change awareness and turning it into sustainable habits.

CCE initiatives have been implemented not only in a local context but also in global level. The United Nations Decade of Education for Sustainable Development (DESD) 2005 – 2014, referred to Cho (2023), established ambitious goals to develop climate change knowledge and encouraging environmentally friendly actions among students worldwide. The importance of CCE as a key strategy to promote environmental sustainability has been recognized by the global authorities. Various international agreements have been agreed such as the Sustainable Development Goals and Paris Agreement 2015, those aimed to provide future generations with the essential skills to effectively address climate change concerns (Obergassel, 2015; Morton et al., 2017; Masson-Delmotte et al., 2022). Nevertheless, the existing array of projects reveals various degrees of effectiveness and incorporation into curricula, necessitating a thorough review of the efficacy. Besides global trends, CCE considers local and regional environmental situations. Local educational policies and practices, as well as regional environmental challenges, may influence the spatial dimensions of CCE. Acquiring comprehensive understanding of the obstacles and rewards within the structure improves the research' usefulness and importance (Fitriana et al., 2019; Djuwita & Benyamin, 2019; Ramadani et al., 2023).

It is critical to assess the impact of CCE program for high school students' context. Given the severity of the situation and the target audience's distinct characteristics, evaluating the outcomes of CCE campaign is critical for the sake of effective and efficient implementation. Trying to address this evaluation criteria may considerably benefit the sector by offering valuable insight into the impact of educational programs and the development of sustainable behavior in young people. The study entitled "High School Students' Attitude, Subjective Norm, Perceived Behavioral Control and Behavioral Intention toward Climate Change in relation to Pro-Environmental Behavior in Klaten Regency, Central Java Province, Indonesia" aims to understand the students' opinion or perception toward climate change in relation to pro-environmental behavior. Not only that, but the study also intended to examine the high school students' level on climate change, and to what extent those variables contribute to environmentally friendly actions. The researcher examines the research questions, the research hypotheses, the research objectives, the research significance, the literature review, the theoretical, and the conceptual framework, and the methodology of the research. The main objective is to increase the knowledge of climate change, awareness toward climate change and promote pro-environmental behavior among senior high school students. This study acknowledges the worldwide significance of climate change education and the pressing need to equip future generations to tackle its intricate issues.

1.2 Research Questions

The study investigates the climate change education to promote pro-environmental behavior in one of the regencies in Central Java Province, Indonesia. There are variables to predict the pro-environmental behavior namely, attitudes toward climate change, subjective norm toward climate change, and perceived behavioral control toward climate change (Ajzen, 1991; Masud, 2016). The study will be underpinned by the Theory of Planned Behavior.

1. What is the level of attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students?
2. Is there any significant difference in the demographic data related to attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students?
3. Is there any significant relationship between attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students?
4. How much do students' attitude, subjective norm, perceived behavioral control, and behavioral intention toward climate change contribute to pro-environmental behavior?

1.3 Research Hypotheses

There are three hypotheses below, the first hypothesis is related to the second research question, the second hypothesis is related to the third research question, and lastly the third hypothesis is related to the last research question.

H1a: There is significant difference in attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students based on their demographic data.

H1o: There is no significant difference in attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students based on their demographic data.

H2a: There is significant relationship between attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among senior high school students.

H2o: There is no significant relationship between attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among senior high school students

H3a: High school students' attitude, subjective norm, perceived behavioral control, and behavioral intention towards climate change significantly contribute to pro-environmental behavior.

(H3o): High school students' attitude, subjective norm, perceived behavioral control, and behavioral intention towards climate change do not significantly contribute to pro-environmental behavior.

1.4 Research Objectives

1. To assess the level of attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students.

2. To investigate whether there is significant difference in demographic data (such as gender and school type) related to attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students.

3. To examine the relationship between high school students' attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior toward climate change.

4. To examine the extent to which high school students' attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior toward climate change.

1.5 Research Significance

The context of this study is urgent to be able to address the knowledge gap related to the influence of CCE on high school students' ATT, SN, PBC, BI, and PEB in Klaten Regency, Central Java Province, Indonesia. The findings of the study are beneficial to educational stakeholders including educational policymakers and educational curriculum designers. Since they can encourage young people in Indonesia to comprehend and take an action to fight for climatic changes.

Furthermore, the study has higher probability to motivate environmentally friendly behavior regarding reduce climate change effects by preparing Indonesian future generation to tackle for environmental challenges. The goal of the study is to investigate and analyze the relationship between educational resources and pro-environmental acts, with the aims of developing successful educational practices that

promote environmental awareness in young people to be able to mitigate and adapt the climatic challenges.

CHAPTER 2

THEORETICAL FOUNDATION

2.1 Introduction

The robust theoretical foundation of the study is investigated underpinning the research of high school students' ATT, SN, PBC, and BI toward climate change in relation to PEB in Klaten Regency, Central Java Province, Indonesia. The theoretical foundation chapter is separated into two main sections, the literature review and the theoretical framework. The first section explores comprehensive analysis of the previous studies and related literature to support the study. The researcher looks at the factor that influence student behavior about climate change with particular emphasis on the role of ATT, SN, PBC, and BI in influencing environmentally friendly behaviors. The goal is to establish a solid foundation of current knowledge and identify any gaps that the study aims to address.

The next section is the theoretical framework. It offers the conceptual paradigm which will drive the research. The researcher employs the conceptual paradigm devised by Icek Ajzen, known as Theory of Planned Behavior (TPB), that is used by Masud et al. (2016). Its paradigm aids to understand the complex interplay of the various psychological factors that influence pro-environmental behavior among high school students in Klaten Regency.

2.2 Literature review

The literature review below is required to analyze the existing studies on CCE and the components that influence PEB, for example ATT, SN, PBC, and BI as defined

by the TPB. The purpose of it is to provide a contextual framework for the current inquiry by placing it into a larger scholarly debate.

2.2.1 Climate Change Education

Referring to "A New Green Learning Agenda" (2022), CCE exist at the intersection of environmental research, environmental policy, and public awareness. The study that is conducted by Vaughter (2016) discusses that CCE extends beyond the traditional purview of scientific learning by addressing the ethical dilemmas, behavioral insights, and civic obligations. The main goal is to equip people with the required skills and knowledge to tackle and adapt the challenges caused by climate change. Valentín et al. (2015) suggests that preparing for CCE involves understanding of its causes and effects, as well as developing skills to live a sustainable lifestyle. Additionally, Monroe at al. (2019) point out that CCE should be integrated into national educational curriculum around the world to be able to promote both comprehensive local and global engagement.

Meanwhile, Mbah et al. (2022) emphasizes the critical necessity of CCE in the modern society like nowadays, especially as the consequences of climate change become more apparent. It is increasingly crucial to educate citizens so that they may decide educated decisions and actively involved in fighting for better environmental condition. CCE must be able transform students' character. Cordero et al. (2020), stresses that education is beyond than just providing information, CCE is a catalyst for transformation. The study carried out by Ofori et al. (2023) tells that public's opinion regarding climate change are possible influenced by many factors. Those could be from

the provided information or the previous experiences or even their diverse cultural backgrounds. Likewise, Bailey et al. (2022)'s study found that younger generations, including millennials and Gen-Z, are more likely to give concern about climate change. They have more optimistic perceptions on how to mitigate climate change consequences. They do have higher level of confidence in scientific evidence compared to the previous generations.

Sparkman et al. (2020) emphasize that SN significantly impacted climate-related actions. It has potential either hindering or aiding the climate change mitigation efforts. Using efficient approaches can incentivize desirable behaviors even when the prevalent norms are negative (Constantino et al., 2022). It shows how CCE may have significant impact to foster long-term sustainability transformation. The other multiple research projects conducted by Swim et al. (2009). Wang et al. (2014), Galván-Mendoza et al. (2022), and Dhakal et al. (2023) have underscored that PBC is essential predictor in the process of character changing. Maiella et al. (2020) explains that PBC or self-efficacy is a condition when people believe in their own ability to perform an action. People will likely take ecologically responsible actions if they see CC as concrete problems that will impede their lives.

2.2.2 Historical Perspective of Climate Change Education

CCE has been modified significantly in recent decades. According to Kim (2020) it mirrors the broader shifting in the environmental awareness and policy development. Environmental education was primarily only concerned with the nature conservation and core ecological principles during the period of 1970s and 1980s

(McCrea, 2006; Carter & Simmons, 2010, p. 3-16). The rise of widespread awareness of the environmental challenges and the adoption of global environmental values were quite clear seen from those era. Braus & Wood (1993) noted that educational system began incorporating environmental topics into school exam syllabuses in 1970 to response people's awareness toward environmental conditions.

The scope of environmental education grew because the severity of climate change became more apparent in the later part of the 20th century. The discussion broadened to include the complex and pressing environmental issues such as climate change, an alternative energy resources, as well ecologically beneficial approaches. As investigated by Cordero et al. (2020) about the relationship between education and lifetime carbon emissions. They concluded that well-rounded educational experiences may have a considerable impact on individual's carbon footprint.

There are several global policy initiatives that have played pivotal roles in shaping the development CCE. To mention some for examples, The United Nations Conference on Environment and Development (UNCED) 1992, familiarly known as the Earth Summit. It underlined the necessity of including environmental education into the national curricula. One of the earth summits 1992 goals was to promote sustainable development (Weiss, 1992). The Earth Summit was held in Rio De Janeiro Brazil, and it marked the 20th anniversary of the first conference on the human environment in Stockholm, Sweden in 1972. Moreover, the other international agreements related to environmental concern were the Kyoto Protocol 1997 and the Paris Agreement 2015. Those two international society commitments stressed out the

importance of public awareness and education programs in fighting for the rising of climatic changes, despite the differences in scope and technique (Pramudianto, 2015; World Bank, 2018).

There is a big shifting from traditional instructional methods to more engaging and collaborative approaches regarding effective and efficient good practices strategies of CCE. As reported by Hargis et al. (2021) the use of project-based learning, experiential learning, and digital learning engages students in understanding and solving the climate change more effectively. The choice of CCE approaches have a fundamental standpoint for the success of transforming students' eco-friendly daily habits. Similarly, Monroe et al. (2019) discussed that project-based learning has become a good tool for effective dissemination of CCE because it allows students to improve their comprehension and develop the skills through actual climate-related projects at school levels.

The transdisciplinary nature of CCE has also been acknowledged. Climate change is a challenging issue that intersects with several fields of study, including science, social studies, and literature. Students can make links between scientific knowledge, social issues, and practical applications by incorporating CCE into these themes. Implementing an interdisciplinary curriculum focusing on climate change, for example, may improve students' overall awareness of how climate change affects them and their communities (Eilam, 2023). Kelly et al. (2022) highlight that CCE has evolved from an initial emphasis on conservation and core ecological principles to a comprehensive, action-oriented educational strategy.

2.2.3 Climate Change Education in Indonesia

A study that is conducted by Nugroho (2020) taking place in Samboja District, East Kalimantan Province, Indonesia found that the majority of high school students, they have heard about climate change, but unfortunately, they do have limited understanding and misconceptions about climate change. It clearly emphasizes the urgency of integrating climate change topics into school subjects accordingly following the path of national education curricula. For that reason, it will raise students' knowledge and awareness related to climatic changing. Additionally, Sofiyan et al. (2019) examines the national curriculum about geography subject. It reveals that actually high school students have opportunities to learn about climate change, however the syllabus does not completely support these possibilities. The current curriculum focuses mostly on cognitive factors, making it difficult for teachers to properly teaching about climate change themes due to insufficient knowledge of the subject.

Parker (2017) highlighted the effectivity of environmental education implementation. Even though, Indonesia is quite active in an environmental international involvement and dedication to sustainable development program, the good practice of environmental education is still patchy. It strongly indicates that the integration of environmental education into school curriculum is crucially needed to boost students' understanding toward sustainable actions. Mustangin (2017) focused on the unproper teacher competency as one of the biggest challenges to successful climate change teaching in Indonesia. Many Indonesian educators having low expertise. Therefore, training to develop their professionalism is required to be able to

teach climate change topics properly. If it is not address well, it will always hinder the effectiveness of climate change instruction in the school context. Besides that, public understanding of climate change issues in Indonesia is minimal, and mass media does not prioritize climate change over other topics such as politics and corruption. This lack of focus in the media impedes efforts to mainstream climate change education (Wahyuni, 2017).

To promote climate change education in Indonesia, government policy should expressly support the inclusion of comprehensive climate change education in the national curriculum. These policies should emphasize both cognitive and practical aspects to encourage deeper comprehension and proactive behaviors among students (Nugroho, 2020). Implementing comprehensive teacher training programs can help instructors become more competent in teaching climate change themes. To guarantee that instructors are well-prepared, these programs should emphasize cutting-edge climate research, teaching approaches, and practical applications (Mustangin, 2017). The curriculum should be updated to incorporate detailed and actionable information about climate change. It should include chances for hands-on activities, projects, and community service to help students apply their knowledge in real-world situations (Parker 2017). Media campaigns and community programs can help to raise public awareness in addition to school-based education. Raising public awareness can improve the overall effectiveness of climate change education (Wahyuni, 2017).

2.2.4 Attitude Toward Climate Change

Studying the research undertaken by Masud et al. (2016) and Kyselá et al. (2019, according to their findings the ATT is substantial in CCE since it influences how people react to climate-related issues. At the same time Armstrong et al. (2018) underscored that ATT towards climate change range from skepticism and indifference to profound concern and active participation. Sambrook et al. (2020) discovered that the complex interplay of individual convictions, cultural norms, and one's understanding of climate change influenced students' ATT.

For the context of schooling, educational institutions without any doubts have a major role in developing students' ATT. The study that was conducted by Tasquier & Pongiglione (2017) found that if school institutions implement comprehensive CCE programs, it may give meaningful shift related to students' views of climate change. Not only that, but also may improve students' comprehension and enthusiasm to act on climate issues. The study of Wachholz (2014) is in line with the research's finding, it claimed that the better the awareness regarding the causes and effects of climate change will frequently lead to a greater sense of responsibility and motivation to counteract the climate change problems.

Meanwhile, the perplexing interaction between knowledge and ATT concerning climate change were discussed by several researchers. Some studies indicated a clear link between an increased information and positive ATT, while others argue that knowledge itself is insufficient to transform deeply rooted ideas or ATT. Corner et al. (2015) spotlighted the inability of simply knowledge to modify students

act. It was also responded by Mochizuki (2015), he emphasized that critical urgency of CCE topics which must go beyond simply transmitting facts, with the goal of actively engaging students on an emotional and personal level. Another point emphasized by Hall (2020) where the use of local and cultural aspects in CCE could successfully shape ATT. Stringer (2009) further found that educational concepts that relate to students' own experiences and localities may have a stronger impression on ATT. Local and Indigenous knowledge encourages a deeper understanding and personal connection to climate change (Kleinertz, 2023).

Yet, social and psychological factors also play pivotal roles in the creation of students' ATT regarding climate change. According to Ojala (2015) she laid stress on social norm, peer influences, and societal pressures all have a big influence on how people perceive and react to climate change. Similarly, a study that was undertaken by Moser (2010) underlined the establishment of ATT frequently reflects the larger societal narratives and discourses that are prevalent in each cultural and social milieu. Besides, Wang et al. (2018) argue that emotional reactions to climate change, such as fear, hope, or apathy, have a significant impact on ATT and subsequent behavior. CCE that directly addresses such emotional aspects may be more effective in motivating behavioral change (Monroe et al., 2019). This, in turn, has the potential to lead to more long-term changes in environmental ATT and behaviors.

2.2.5 Subjective Norm toward Climate Change

Referring to Masud et a. (2016) SN, an important component of the TPB, has a big role on climate change awareness, especially to support PEB. SN refers to the

perceived society impact on whether to engage in or refrain from specific acts, particularly those linked to environmental stewardship (Harland, 1999). According to Rees & Bamberg (2014) and Saracevic & Schlegelmilch (2021), those researchers discussed how combining educational programs that include lectures on societal expectations and responsibilities toward environmental behaviors might affect students' awareness of socially accepted standards within their circles. Likewise, the role of peer groups and public figure are quite remarkable in establishing the SN. As highlighted by Collado et al. (2019), they mentioned that the influence of peer mostly drives youth to perform PEB. Moreover, the intense portrayal of climate change issues by media celebrities and public figures has a positive impact on preserving or challenging to establish SN, hence affecting public perception and behavior (O'Neill & Nicholson-Cole, 2009).

The growing of SN toward climate change may also be possibly constructed by educational intervention. Many researchers like Redman & Larson (2011), Redman (2013), Boca & Saraçli (2019), and Braßler & Sprenger (2021) have clearly pointed out the big task of teachers. According to them teachers have a higher likely to influence students' ATT and urge for sustainable actions through innovative curriculum design and teaching tactics. Similarly, O'Brien & Sarkis (2014) and Axon (2020) found that community-based projects in education programs can help promoting sustainable behaviors as a daily basis of community life. Meanwhile, according to Epstein et al. (2018), the successful educational programs aimed at changing subjective and societal standards should be broad and long-lasting. It must include not only

students but also their families and the larger community to work together hand-in-hand.

To dig deeper, the interrelationship of SN and other factors, such as economic position, political ideology, and geographical location, have possibility to complicate the changing process of ATT and behaviors related to climate change. It is at least confirmed by Hamilton (2011). He found that an individual's socioeconomic level and political ideology can have a meaningful effect to understand the climate change. Not only limited on understanding, but it may also motivate people to engage in environmentally friendly activities. Similarly, Brody et al. (2008) discussed the differences condition on how people impacted from the severe climate change. Their study found that people who live in coastal regions or areas directly impacted by climate change may have different viewpoints on the subject and a stronger feeling of urgency than those who live in less impacted areas.

2.2.6 Perceived Behavioral Control toward Climate Change

Another crucial predictor to perform environmental action is perceived behavioral control (PBC). PBC based on Masud et al. (2016), which is predicated on the concept of TPB, is essential for understanding an individual's involvement in climate change initiatives. The term of PBC is quite related to the extent to which people believe that they can take action to address climate change. The conception of PBC is underpinned by factors such as personal effectiveness, the availability of resources, and external constraints (Gifford et al., 2011; Odou & Schill, 2020).

Critical research undertaken by Nguyen et al. (2020) stressed out that education intervention is essential to leverage students' PBC or self-efficacy. Education is intended to improve the PBC because it will help students to manage responsive behaviors in response to climate change. Education programs that provide comprehensive knowledge and practical skills have a bigger probability in inspiring individuals, fostering a sense of confidence in their environmental capacity to make improvements. The prominence of educational role aligns with the explanation provided by Kricsfalusy et al. (2018). They stated that involving students in hands-on educational programs that necessitate active participation in the resolution of environmental issues may positively improve the involved students' sense of control and effectiveness in addressing inevitable climatic challenges.

Furthermore, Cleveland et al. (2020) have shown that there is a positive correlation between education and PBC. Equally, more convincing study from Yli-Panula et al. (2022) have accentuated that students who receive a comprehensive CCE topics are more likely to have confidence in their ability to contribute to mitigation and adaptation endeavors. Consequently, it may lead to a higher level of engagement in PEB. The relationship between actual conduct and PBC is intricate and can be possibly influenced by external factors, including SN and ATT (Ajzen, 2002). Thus, the acceleration of innovative educational interventions should be integrated into a comprehensive framework as soon as possible that also takes these characteristics into account to improve PBC (Steinmetz et al., 2016). Additionally, the integration of experiential and digital learning to inclusive and diverse educational settings, can

facilitate the promotion of long-term and active encounter in the mitigation and adaptation of climate change (Ho, 2022; Vieira et al., 2023).

The need for personalized teaching methods is emphasized by the differences in PBC among different demographic groups. Age, cultural heritage, and social level are influential factors that may shape individuals/ students' self-efficacy. Hence, Gifford & Nilsson (2015) demanded that it is urgent to fasten the educational intervention that thorough and flexible, encompassing the many viewpoints and difficulties encountered by different socioeconomic groups. In addition, Stern (2011) points out that community-based and experiential learning are crucial for improving students' PBC. Experiential learning combines practical situations with instructional material. It can be beneficial in bridging the gap between comprehension and application. Those two will provide students with tangible examples of how their individual efforts can lead to positive environmental outcomes, thereby bolstering their confidence in their own effectiveness.

2.2.7 Behavioral Intention toward Climate Change

After exploring the previous studies discussing ATT, SN, and PBC as the predictors of Behavioral Intention (BI) based in the TPB framework. The sub-chapter focuses on the discussion of BI. The concept of BI is critical for raising climate change or global warming awareness. It has been widely researched within the context of the TPB (Ajzen, 1991). The theory demonstrates that BI is a strong predictor of actual conduct. It is influenced by ATT, SN, and PBC. Ajzen (1991) defines BI as the immediate antecedent of action, which means that a person's desire to engage in a

behavior is a good predictor of whether they will do so. This idea has helped to explain a wide range of behaviors, including those related to climate change awareness and ecologically responsible practices.

Another reference that was researched by Sheeran (2002) expanded on Ajzen's findings, stressing that the motivational elements drive BI. Sheeran emphasized that BI includes the amount of work that people are willing to put in and the perseverance with which they pursue a habit. It highlighted the relevance of motivation in shaping BI and, ultimately, affecting behavior. Furthermore, Fishbein and Ajzen (2011) gave a thorough description of BI. They define it as a person's motivation to put forth effort to perform a given conduct. Additionally, Conner and Sparks (2015) advanced the discourse of BI by highlighting the strength and the elements that drive it. They defined BI as a measure of the strength with which people intend to engage in certain behavior by considering personal and social factors.

The various employing of TPB has provided beneficial insights on the three predictors of BI. Take an example from Chen & Tung (2014), they used TPB to study the factors that influence consumers' inclinations to participate in green hotel operations. BI has been successfully predicted by three predictors as follow ATT, SN, and PBC in the context of their study. The other study led by Wang et al. (2022) uncovered that the main predictor variables for PEB, highlighting the importance of responsibility, innovation, and PBC. Wang's research confirmed the importance of TPB in predicting PEB and provided new comprehension into the elements that influence such behavior.

Meanwhile, the COVID-19 epidemic has stimulated additional research into the link between BI and environmental behavior. Lucarelli et al. (2020) used the TPB framework to investigate how the pandemic affected people's PEB. The study revealed that those who understood the links between COVID-19 and climate change were more likely to have strong intentions and engage in PEB. Furthermore, a study for the context of university student showed the same pattern. Takshe et al. (2023) used Q-methodology to investigate the factors that influence PEB among university students. It revealed that human activities endanger environmental sustainability, and that individual environmental decisions are linked to PEB. The study underlined the crucial role of BI in generating sustainable habits, as well as the need of understanding the factors influencing these intentions.

2.2.8 Pro-Environmental Behavior

Steg & Vleg (2009) described PEB as measures taken by people to reduce the negative effects on the environment. The initiatives are classified into four types namely, conservation behaviors, waste management behaviors, sustainable consumption behaviors, and advocacy activities. Several research articles discussed that conservation behaviors are acting that limit resource use, such as turning off lights when not in use, taking public transportation, and using less water (Gregor et al., 2019; Lu et al., 2023). Further, the waste management practices include recycling, composting, and correctly disposing of hazardous garbage (Janmaimool, 2017; Whitmarsh et al., 2018; Wu et al., 2022). Vergura et al. (2023) mentioned that sustainable consumption behaviors include purchasing ecologically friendly products, such as energy-efficient appliances or locally sourced food. Not to mention, Champers

(2024) defines advocacy activities as joining environmental organizations, supporting environmental regulations, and raising environmental awareness (Chambers, 2024).

When the researcher refers to the TPB theory, the intended theory has a comprehensive framework for analyzing and forecasting the PEB that is being studied. TPB states that an individual's action is directly controlled by their BI, which are defined by three factors like ATT, SN, and PBC. Individuals' ATT about climate change action reflect their beliefs about the importance and effectiveness of taking steps to mitigate climate change. Meanwhile, positive ATTs of climate change are influenced by the knowledge of the environmental consequences toward climate change and the perceived advantages of pro-environmental initiatives. Research that has been conducted by Bamberg & Möser (2007) demonstrated that providing sufficient information about the risks of climate change and the effectiveness of mitigation efforts can boost positive ATTs and improve the chance of performing PEB.

The following factor of BI predicted by the TPB is SN. It is defined as the perceived social pressures to take climate change action. The standard is shaped by the actions and expectations of important others, such as family, friends, and classmates. When people believe that important persons in their lives value and participate in PEB, they are more inclined to adopt comparable behaviors. A paper studied by Cialdini (2003) underlined that the social impact initiatives emphasizing the prevalence of PEB among peers can effectively promote the real-world action climate change. However, The PBC alludess to people's perceptions of their ability to engage in climate change-related activities. This covers the resources, opportunities, and skills required to

participate in PEB. Individuals who have a higher perceived level of control are more likely to act because they believe they can make a difference. Interventions that offer skills, resources, and support can improve perceived behavioral control and promote PEB (Kollmuss & Agyeman, 2002).

The understanding of PEB is relatively easier after laying the foundation of those three previous predictors. In the context of TPB, PEB in relation to climate change action refers explicitly to measures taken by individuals to reduce the effects of climate change. The activities are critical for lowering carbon footprints and fostering sustainability (Masud et al., 2015). Numerous PEB's examples of climate change action fighting is energy conservation, sustainable mobility, renewable energy support, waste reduction, and sustainable consumerism. Firstly, energy conservation is minimizing energy use by using energy-efficient practices and technologies, such as LED lighting, home insulation, and smart thermostats. Secondly, sustainable mobility includes taking public transportation, cycling, carpooling, or driving an electric vehicle instead of a standard fossil fuel-powered car. Thirdly, supporting renewable energy can include installing solar panels, purchasing green energy, or pushing for renewable energy policies. Fourthly, waste reduction entails reducing trash through recycling, composting, and eliminating single-use plastics, and lastly is sustainable consumption. It entails selecting products with lesser environmental impact, such as locally grown food, products with little packaging, and goods created from sustainable materials.

Individual behavior plays a major role in determining the number of emissions produced, and the aspects of one's lifestyle contribute significantly to the variations in

their own carbon footprints. However, Carrico et al. (2022) altered that behavior can be challenging, and skeptics caution that focusing on human efforts to address climate change may have unintended negative consequences. Therefore, interventions aimed at increasing pro-environmental behavior have generally resulted in modest impacts, nonetheless a few encouraging strategies have been identified. While values are important, methods that emphasize social, informational, and structural conditions have a greater influence.

2.2.9 Research Gap

The research took place in one of the regencies in Central Java Province, Indonesia. It primarily targeted the high school students. This research was inspired by the study that was conducted by Masud et al. (2016). The study has been cited 224 times in Google Scholar when this research is taking place. The paper explores that attitude, subjective norm and perceived behavioral control have positive impact on behavioral intention to adapt or mitigate climate change and pro-environmental behavior. It is done to analyze the public perception in the state of Selangor, Malaysia. Consequently, the researcher aims to explore new areas of inquiry by specifically addressing two important gaps in existing knowledge.

First, this research will be in Central Java, Indonesia. Central Java Province in Indonesia currently facing the growing issue of 'tidal rob' or tidal flooding in coastal communities like Pekalongan (Miftakhudin, 2021) and Semarang (Muzakki et al., 2022) and global warming's influence on the region's substantial rice crop. The research attempts to customize climate change education to students' lived experiences by

integrating local challenges like rising sea levels affecting coastal communities and rising heat harming traditional rice growing. Moreover, Dewi (2017) found that unpredictable rainfall had impacted the tobacco production and the farmers' livelihoods in Klaten Regency. Additionally, Sumastuti & Pradono (2016); Setyaningrum & Banowati (2020) also highlighted the impact of climate change on rice crops in Klaten Regency. Meanwhile, Prastono (2019) discussed the relationship between climate change and water resources that potentially hinder the agricultural sector in Klaten Regency.

Second, the research examines the dynamic environment of high school students, who are between youth and adulthood. Students with inquiring brains and developing attitudes are appropriate for this study. The study examines how age-specific education affects these kids. It seeks to investigate how teenagers' growing worldviews react to CCE. Whether traditional ways work, or these young minds need more engaging ones. The study examines how CCE tactics shape these kids' long-term environmental attitudes, subjective norms, and perceived behavioral control.

2.3 Theoretical Framework

To inspire the PEB, CCE research requires a robust theoretical foundation. The chosen theory as the theoretical framework serves as a guiding notion for the research design and aids in the interpretation of findings. This viewpoint provides a framework for investigating the intricate interaction of factors influencing environmental awareness and behavior.

2.3.1 The Theory of Planned Behavior

The Theory of Planned Behavior or TPB is a comprehensive framework that is intended to clarify and predict behavior. The proximate determinant of action is BI. Acknowledging the potential variation in someone ability to regulate its action in various ways. Ajzen (1991) expanded upon his earlier Theory of Reasoned Action or TRA. The TPB argues that intention is the primary determinant of behavior, and it is influenced by ATT, SN, and PBC. As Masud et al. (2016) have noted, the ATT regarding climate change awareness and PEB are determined by the evaluation of the significance and relevance of environmental issues.

Research has consistently demonstrated that individual who hold favorable ATT of the environment is significantly more likely to engage in PEB (Zhang, 2019; Suntornson, 2022). Lucarelli (2020) conducted a study that revealed no adverse effects of the Covid-19 pandemic on the relationship between the component of the TPB and PEB. Conversely, those who had a more comprehensive understanding of the connection between climate change and Covid-19 exhibited a greater level of intention and bolstered the PEB.

Zhang (2019) conducted a study that improved the TPB by incorporating the cognitive aspect of environmental concern. The objective was to investigate the influence of purchasing intention on various categories of environmentally responsible products. The study revealed that the desire to acquire practical green products was more significantly influenced by environmental concern than the desire to purchase pleasurable green products. The aspect of the concept serves as the basis for

comprehending the way students prioritize and perceive environmental issues. Additionally, it offers substantial insight into the potential of the ATT to encourage sustainable and PEB.

SN, a fundamental element of the TPB, integrate social dimension into the equation. These norms are determined by the notion of whether most individuals endorse or condemn the behavior (Ajzen, 1991). Based on Binder et al. (2020), adolescents are critically affected by the peers in terms of the formation of their environmental ATT and behavior. Another study that was conducted by Xu et al. (2022) examined the ATT, SN, and PBC in relation to consumer green purchasing behavior. Investigating the factors and mechanisms that influence the PEB, Xu et al. (2022) introduced a new affective variable called environmental indebtedness.

The PBC is another crucial concept in the TPB. It denotes an individual's confidence related to their capacity to effectively execute the desired activity and surmount obstacles (Ajzen, 1991). It is particularly pertinent in the context of PEB, as it underscores the urgency of self-efficacy and the perceived capacity of individuals, such as students, to engage in environmentally conscious behavior (Tamar, 2021). Besides, a study undertaken by Poškus (2018) on Lithuanian university students discovered that PEB, including recycling, the use of eco-friendly transportation, the conservation of water, and the conservation of electricity, are relatively influenced by ATT, SN, and PBC. Therefore, it is noteworthy that the study demonstrated ATT toward behavior do not necessarily correspond to intention to behave in a particular way. These results suggest that promotion of PEB can be possibly influenced by PBC.

2.3.2 Conceptual Framework

This study used the Theory of Planned Behavior (TPB) to investigate the intricate correlation between climate change education and pro-environmental behavior among senior high school students. This framework allows us to analyze how climate change education can promote pro-environmental behavior. In this study CCE is the main theme, and pro-environmental behavior is the specific topic that I intend as scope limitation. The researcher will explore climate change education and pro-environmental behavior using the lens of TPB. In TPB, it has three predictors to predict pro-environmental behavior of individuals. Those three predictors are attitude, subjective norm, and perceived behavioral control. If the predictors are met by someone, it will lead to positive behavioral intention, and finally behavioral intention will decide someone pro-environmental behavior.

The researcher will frame the variables from TPB to investigate the topic that is related to climate change and education. The first variable will be students' attitude toward climate change, the second variable will be students' subjective norm, and the third variable will be students perceived behavioral control. The researcher will assume that if those three variables are interplayed with one another, it will lead to students' intention to promote climate change awareness. Consequently, those TPB variables toward climate change will determine students' pro-environmental behavior.

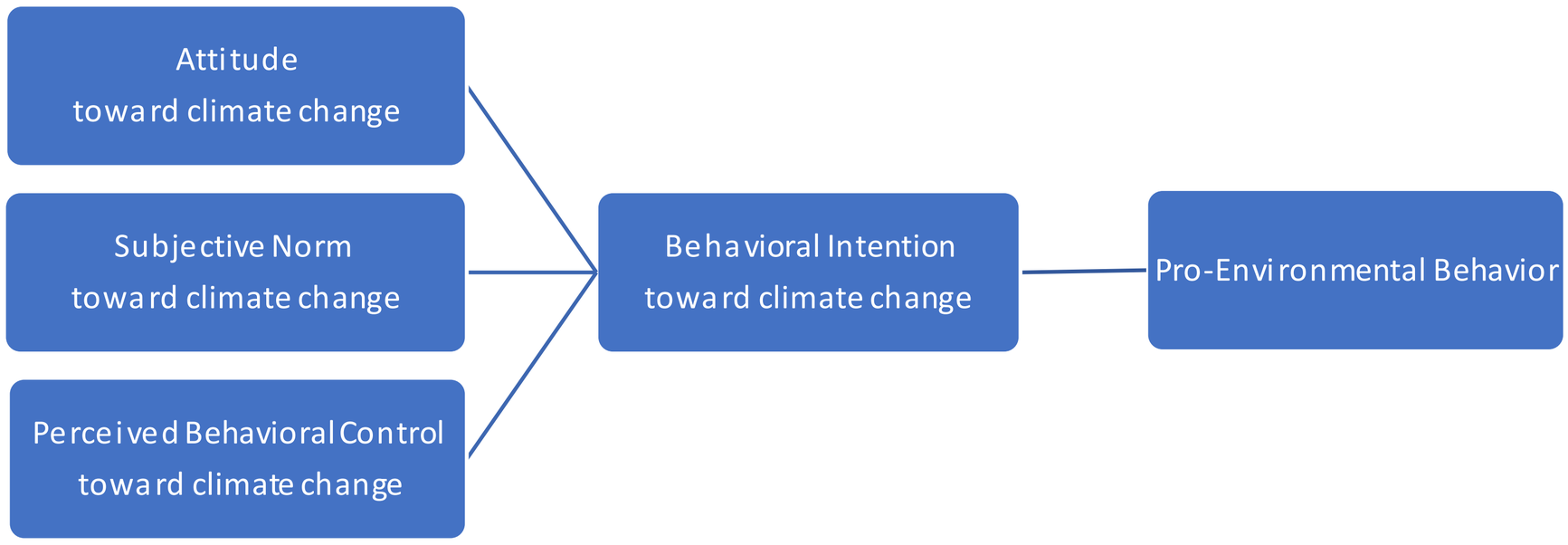


Figure 1 Conceptual Framework (Masud et al., 2016)

The conceptual framework as described in Figure 1 stresses attitudes, subjective norms, and perceived behavioral control's dynamic interaction. The effectiveness of CCE's advocacy for student environmental behavior is contingent upon this link. The framework recommends a comprehensive CCE approach that addresses all these factors to permanently alter environmental behavior. This conceptual framework is expected to demonstrate the extent to which Indonesian senior high school CCE initiatives are fostering pro-environmental attitudes, norms, and behaviors.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the research methodology that is used in this study. The methodology examines the ATT, SN, PBC, and BI of high school students toward climate change, and how those factors influence students' PEB in Klaten Regency, Central Java Province, Indonesia. It is essential to guarantee the reliability and validity of the study because it is designed to be consistent with the study's objectives and the theoretical framework. Therefore, the methodology properly facilitates a methodical approach to collect and analyze the data. Quantitative approach is employed for the sake of the measurement and statistical analysis of the relationship between variables. The positivist paradigm is utilized to advocate the use of structured instruments and objective measurements to assess hypotheses. Those serve as the foundation for comprehensive investigation. Non-experimental with cross-sectional design is selected to analyze the variables without manipulating any conditions. By utilizing a comprehensive and structured research methodology, the study offers valuable insights about factors that influence high school students' PEB in the context of Klaten Regency, Central Java Province, Indonesia. The research methodology consists of research approach, paradigm, design, population, sample, instrument, data collection, data analysis, and ethical consideration.

3.2 Research Approach

This study takes a quantitative research method, focusing on the systematic collecting and analysis of numerical data to identify patterns, correlations, and effects

amongst variables. This method is founded on the positivist worldview, which holds that reality is objective and measurable. As a result, quantitative research is particularly well-suited for investigations that seek to establish causal linkages and evaluate hypotheses using statistical methods.

Quantitative research conducts systematic investigations of phenomena by measuring links and behaviors. This procedure is well-documented in many research methodology textbooks. According to Creswell and Creswell (2017, p. 206), quantitative research collects data for statistical analysis utilizing organized methods such as surveys, questionnaires, and tests. It focuses on objective measurements and data analysis, whether statistical, mathematical, or numerical. Similarly, Bryman (2016, p. 74) defines it as a logical strategy to testing theories and hypotheses by gathering evidence that can be quantified and examined statistically. Additionally, Babbie (2020, p. 416) emphasizes its purpose of quantifying data and generalizing conclusions from a sample to the population by employing fixed-response instruments that allow for replication and validation. Furthermore, Neuman (2014, p. 204) states that quantitative research is systematic and structured, focused on numerical data to analyze patterns and test links, and frequently involves hypothesis testing to yield generalizable and replicable conclusions.

In the context of this study, a quantitative technique is suited for investigating high school students' views, subjective norms, perceived behavioral control, and behavioral intentions on climate change. The goal is to quantify these psychological constructs and evaluate their interrelationships quantitatively. To do this, a structured questionnaire will be distributed to a significant number of high school students in

Klaten Regency. This questionnaire, which includes Likert-type rating scales, will assess attitudes, subjective norms, perceived behavioral control, behavioral intentions, and actual pro-environmental behavior (Creswell & Cresswell, 2017, p. 2016). As a result, the data obtained will allow for objective measurement and analysis utilizing statistical methods such as Pearson correlation and multiple regression analysis to investigate the correlations between variables. The study is based on the Theory of Planned conduct (TPB), which holds that attitudes, subjective standards, and perceived behavioral control influence behavioral intentions, which then influence actual conduct. As a result, this framework will be examined in terms of pro-environmental behavior among high school students (Ajzen, 1991).

According to Neuman (2014, p. 246) taking a quantitative approach in the study has various advantages because it offers representative sample and systematic data collection methods. Moreover, Babbie (2020, p. 282) explains that the form of quantitative data collection may promote impartiality and consistency. It could reduce the possibility of researcher bias. Additionally, the advanced of statistical approach strengthens the data-driven insight (Bryman, 2016, p. 76). The quantitative research strategy is an effective way to examine the high school students' ATT, SN, PBC, and BI about climate change. It gives a thorough understanding of the elements that shape PEB using organized data collection tools and statistical analysis. Thus, in turn, it provides vital insight into the fields of environmental education and behavior modification.

3.3 Research Paradigm and Research Design

3.3.1 Research Paradigm

The positivist research paradigm presents as the cornerstone of the study. Referring to Cohen et al. (2018, p. 550), positivism is a philosophical theory that posits the scientific knowledge is only a genuine value if it is derived from the empirical evidence. It is distinguished by the conviction that reality is unchanging, and it can be observed and described from an objective perspective without affecting the phenomena that is under investigation. Further, positivism is predicated on quantifiable observation from statistical analysis.

This study endeavors to evaluate hypotheses that are derived from existing theories through objective measurements and quantitative data analysis by adhering to the positivist paradigm. Positivist research typically employs structured instruments, including questionnaires and surveys, to generate valid and reliable data, as per Creswell and Creswell (2017, p. 44). This paradigm is appropriate for research that aims to establish relationships and determine causality between variables, as is the case with this study on high school students' attitudes, subjective norms, perceived behavioral control, and behavioral intentions pertaining to climate change.

3.3.2 Research Design

The research design selected for this study is non-experimental and cross-sectional. A non-experimental design is chosen because the study does not involve manipulation of variables or experimental control but rather seeks to observe and analyze existing conditions and relationships. As noted by Johnson and Christensen (2017, p. 994), non-experimental research is useful for descriptive and correlational

studies where the primary goal is to describe variables and examine relationships among them.

A cross-sectional design is employed to collect data at a single point in time. This design allows for the efficient collection of data from a large sample, facilitating the examination of patterns and relationships among variables within a specific timeframe (Neuman, 2014, p. 44). Gall et al. (2003) emphasize that cross-sectional studies are advantageous for their ability to provide a snapshot of the phenomena being studied, making them ideal for large-scale surveys and public health research.

In this study, data will be collected using a structured questionnaire distributed to high school students in Klaten Regency. The questionnaire will measure attitudes, subjective norms, perceived behavioral control, behavioral intentions, and actual pro-environmental behaviors using Likert-type rating scales. The cross-sectional design will enable the analysis of these variables at one point in time, providing insights into the current state of students' pro-environmental behavior and the factors influencing it.

3.4 Research Subject

According to the data taken from Basic Education Data Directorate General of Early Childhood Education, Basic Education and Secondary Education Ministry of Education, Culture, Research and Technology even semester 2023/2024 in Klaten Regency the total population of high school students being approximately 17.271, then a rigorous and representative sampling method is essential. Adhering to the principles of random sampling, as outlined by Cohen et al. (2018, p. 206), the study aims to select participants in a manner that ensures each member of the population has an equal chance of being included, thus minimizing sampling bias and enhancing the

generalizability of the findings. The focus of study is on high school students in one of the regencies in Central Java Province, Indonesia, which is in Klaten regency.

Cohen et al. (2018, p.206) suggest that for populations larger than 10,000 and less than 20.000, a sample size of approximately 370 is typically sufficient to achieve a 95% confidence level with a 5% margin of error. However, given the substantial population size in this study, a decision has been made to increase the sample size slightly above this recommendation. The purpose of this increase is to augment the statistical power of the investigation and guarantee the strength and reliability of the findings.

3.5 Data Collection

The questionnaires instrument designed by Masud (2016) to measure pro-environmental behavior that consists of five constructs such as ATT, SN, PBC, BI, and PEB toward climate change were adopted and adapted appropriately. The researcher tried to contact the author regarding the adoption of the research instruments several times, but unfortunately after sending four emails at different times the researcher didn't receive any responses until this thesis was written. The researcher considered that the author of the instrument gave permission to adopt and adapt the instrument for academic purposes only. Specific constructs measurement aims to assess distinct constructs associated with climate change, students' ATT, SN, PBC, BI, and PEB. The 26 items in this section are assessed utilizing a 5-point Likert rating scale (Vagias, 2006), ranging from "strongly disagree" (1), "disagree" (2), "neither agree nor disagree" (3), "agree" (4), "strongly agree" (5).

To ensure that the questionnaires are suitable for the Indonesian setting in terms of culture and language, the researcher performed back-to-back translation method. The researcher initially translated the original questionnaires from English to Bahasa Indonesia. After that, a sworn translator was employed to carefully examine the translations' precision and uniformity. It was crucial to uphold the integrity of the questionnaire items and guarantee their comprehensibility and relevance to Indonesian students.

There were two phases of data collection through Google Form questionnaire, pilot testing and real data collection. The researcher collected the pilot testing data by sharing the Google Form questionnaire link to high school students in Klaten Regency, Central Java Province, and Gunung Kidul Regency, both from Special District of Yogyakarta Province. The researcher got massive support from Titian Foundation Scholarship Awardees to share the Google Form questionnaire link. After several days collecting the data, the researcher received 205 respondents. Data checking and cleaning was conducted attentively one by one to make sure that the researcher obtained good quality responses. The respondents that responded more than once on certain items were considered failed. Thus, the data must be deleted. Then, the final total data for pilot testing was 203 participants. After the pilot testing completed, the researcher conducted necessary revision for the instruments before gathering the real data.

When the researcher completed its pilot testing analysis, he continued to the second data collection that was aimed at gathering the real data. The researcher got the research instrument's approval from the two research supervisors. Hence, the

researcher also secured the research permit from the faculty of education. The real data collection must be conducted cautiously and ethically; therefore, the researcher successfully obtained the permit to collect the data in several high schools in Klaten Regency from Regional Education Office Branch V which is in Boyolali Regency Central Java.

Consequently, the real data collection went smoothly with the involvement of 20 research assistants since all the school principals in the intended schools automatically gave their concern as well. The researcher has recruited all the research assistants during the pilot testing data collection because it was not that easy to assemble sufficient research data. Six research assistants are high school teachers, and fourteen research assistants are the president of student council (OSIS) or the members of student council. Therefore, it eases the data collection process because the research assistants have the power to organize the respondents. To motivate all those twenty research assistants to work their best, the researcher rewards them with the free TOEFL preparation class for the duration of 10 meetings.

The researcher obtained 1.414 total respondents via Google Form questionnaire. Akin to previous pilot testing data checking and clearing, those stages were also done thoughtfully to this data that was intentionally used for the research. After deleting the respondents' name, all the received data were verified one by one and re-verified by two selected research assistants to ensure human error free. The double submissions and responses on the items were considered invalid. That's why, those were removed from the raw data. As a result, the author of this research finalized 1.336 participants that eligible for data analysis. The real final data is more than three

times higher than the approximate sample size that required by Cohen et al. (2018, p.206). Therefore, this study should be more representative of the population in which it was conducted.

3.6 Pilot Testing

The researcher analyzed the pilot testing data using Winsteps Version 3.73 Software with the help of the first thesis supervisor. The pilot testing aimed to test the instruments' validity and reliability. From the total of five variables, the researcher divided it into three parts. The first part consists of the three predictors variables based on the theory of planned behavior that is attitude toward climate change (ATT), subjective norm toward climate change (SN), and perceived behavioral control toward climate change (PBC). It has 14 items. The second part is the behavioral intention to promote climate change awareness (BI). For this part, it has 6 items. The third part is pro-environmental behavior variable (PEB). It has 6 items as well.

During the process of pilot testing data analysis, at first, the researcher prepared the data to be readily available for Winsteps Version 3.73 Software. Then, all those three parts instruments were checked one by one using the Winsteps Version 3.73 Software. The researcher performed four checks using four different output tables to investigate the data thoroughly. Whether the data is suitable or not for statistical analysis. The researcher checked Winsteps output tables 3.1 summary statistics, output table 3.2 rating scale, output table 23 item dimensionality, and the last output table 10 item fit order of the first data set.

Table 1

Summary of Research Instruments' Pilot Testing

Pilot Test	Cronbach Alpha	Person's Reliability	Item's Reliability	Raw Variance Score	Misfit Items	Outfit Mean Square (MNSQ) Scores
ATT, SN, PBC	0.81	0.79	0.99	44.4%	ATT 2, ATT 3	2.38, 1.61
BI	0.81	0.78	0.98	54.9%	BI 1	2.13
PEB	0.68	0.69	0.99	54.1%	-	All items fit within 0.5 – 1.5

The pilot testing data sets for ATT, SN, PBC, BI, and PEB showed promising reliability and validity results. The Cronbach Alpha scores for ATT, SN, and PBC, and BI were both 0.81, indicating very good reliability, while the PEB score was 0.68, indicating sufficient reliability. Person's reliability scores ranged from 0.69 to 0.79, showing consistent responses, and item reliability scores were very high (0.98-0.99), reflecting excellent item quality. The raw variance scores exceeded 40% for all data sets, confirming the instruments' effectiveness. However, misfit items were identified in ATT, SN, PBC, and BI sets, requiring adjustments, while all PEB items fit within the acceptable range.

3.6.1 The First Data Set Pilot Testing

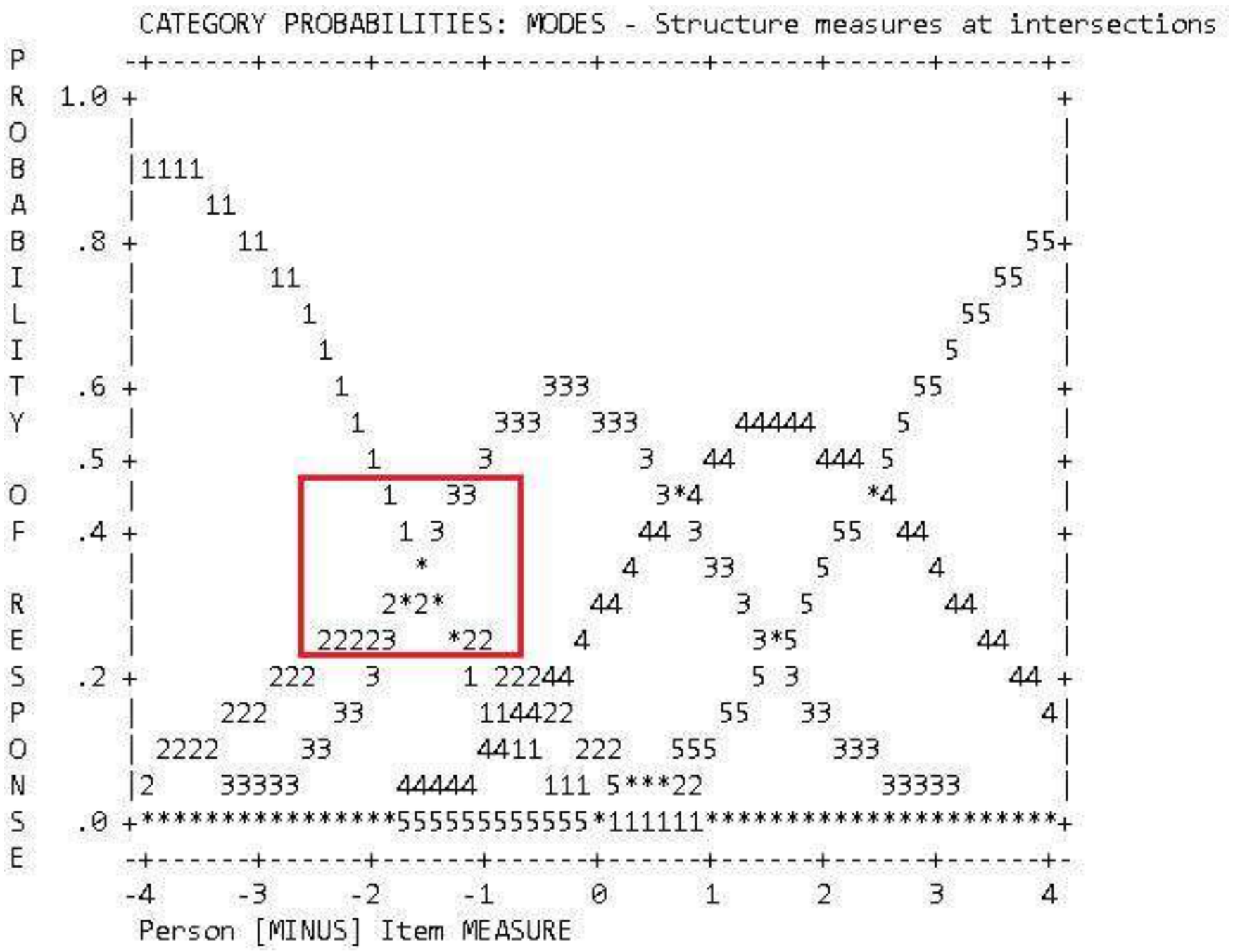
The first pilot testing data set that consists of ATT, SN, and PBC is analyzed. Referring to the 3.1 summary statistics output table, the researcher may clarify several things. The Cronbach Alpha score is 0.81. If the score is more than 0.80, it means that the reliability score is very good. The person's reliability score is 0.79. If the score is

between 0.67-0.80, it means that the respondent is quite consistent in answering the questionnaire. The item's reliability score is 0.99. If the score is more than 0.94, it means that the item's quality is excellent (Sumintono & Widhiarso, 2014, p. 112).

The researcher then investigated the 3.2 rating scale output tables. It is used to confirm whether the rating scale that is utilized confuses the respondents or not. Previously during the pilot testing the researcher employed a 5–point rating scale ranging from strongly disagree – strongly agree. After closely examined the data, the researcher found that the respondents were quite difficult to differentiate between the option of disagree and neutral. It can be seen from the result below that the peak of option two is not clear because it is covered by the other options. Evaluating from the that case, therefore, the researcher would like to simplify the rating scale from 5-point rating scale to 4-point rating scale by omitting the neutral rating scale since it caused confusion to the respondents. The ideal result should show all the peak options at different points (Sumintono & Widhiarso, 2014, p. 123)

Figure 2

Winsteps 3.73 Output Table 3.2 Rating Scale Analysis of ATT, SN, & PBC



The researcher also examined table 23 of item dimensionality. It is used to evaluate whether the instrument being developed can measure what it is supposed to measure. From the pilot testing first data set, it is known that the raw variance score is 44.4%. The dimensionality score limitation is 20%. The actual score is more than 40%, it means that the instrument is categorized as a good instrument because it is really measure what is supposed to be measured (Sumintono & Widhiarso, 2014, p.122)

The final checking of the first pilot testing data set was the table 10 item fit order. The table functions to detect the misfit items that are sorted from least fit or the least suitable. From the first pilot testing data set, it is known that 2 items are misfit. Those are the items that measure ATT, the second (ATT 2) and the third (ATT 3) items.

The acceptable Outfit Mean Square (MNSQ) score is 0.5 – 1.5 for productive measurement. The data set shows that those two items exceed the acceptable score. The second item score is 2.38 and the third item score is 1.61, so it means that it will distort or degrade the measurement system or nonproductive for construction of measurement, but not degrading, respectively (Boone et al., 2013, p.167., Sumintono & Widhiarso, 2014, p. 115). Therefore, before the real data collection those two items will be adjusted or fixed properly to be understood more easily by all the senior high school students' participants.

3.6.2 The Second Data Set Pilot Testing

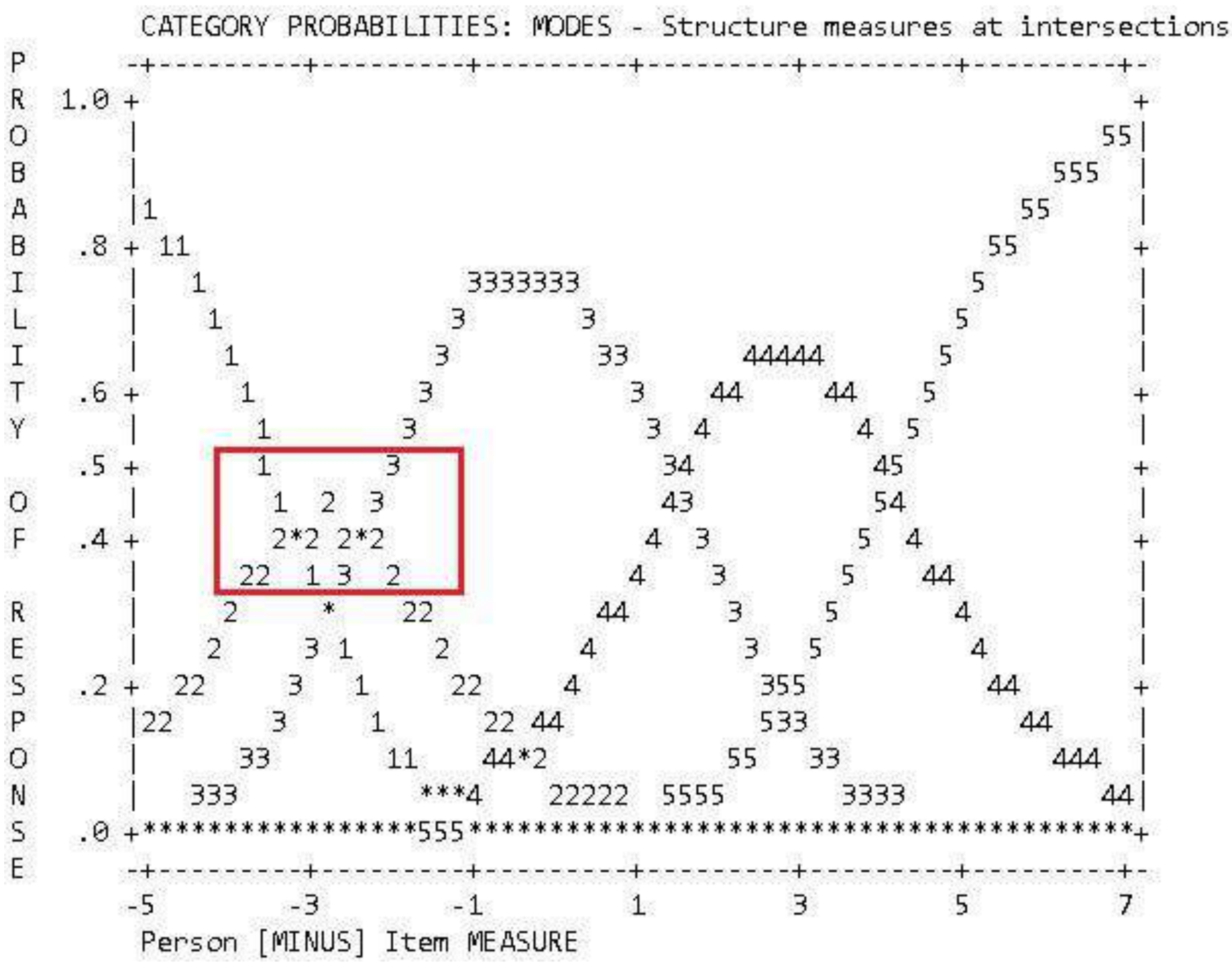
The second pilot testing data set that consists of BI is analyzed. Referring to the 3.1 summary statistics output table, the researcher may clarify several things. The Cronbach Alpha score is 0.81. If the score is more than 0.80, it means that the reliability score is very good. The person's reliability score is 0.78. If the score is between 0.67-0.80, it means that the respondent is quite consistent in answering the questionnaire. The item's reliability score is 0.98. If the score is more than 0.94, it means that the item's quality is excellent (Sumintono & Widhiarso, 2014, p. 112).

The researcher then investigated the 3.2 rating scale output tables. It is used to confirm whether the rating scale that is utilized confuses the respondents or not. Previously during the pilot testing the researcher employed a 5–point rating scale ranging from strongly disagree – strongly agree. After closely examined the data, the researcher found that the peak of option two located below 50%. It shows that the respondents were having trouble deciding. Evaluating from the case, therefore, the researcher would like to simplify the rating scale from 5-point rating scale to 4-point

rating scale by omitting the neutral rating scale since it caused confusion to the respondents. The ideal result should show all the peak options at different points and above 50% level. It is also showing consistency with the other instruments. (Sumintono & Widhiarso, 2014, p. 123)

Figure 3

Winsteps 3.73 Output Table 3.2 Rating Scale Analysis of BI



The researcher also examined table 23 of item dimensionality. It is used to evaluate whether the instrument being developed can measure what it is supposed to measure. From the second pilot testing data set, it is known that the raw variance score is 54.9%. The dimensionality score limitation is 20%. The actual score is more than 40%, it means that the instrument is categorized as a good instrument because it is

really measure what is supposed to be measured (Sumintono & Widhiarso, 2014, p.122)

The final checking of the second pilot testing data set was the table 10 item fit order. The table functions to detect the misfit items that are sorted from least fit or the least suitable. From the second pilot testing data set, it is known that only 1 item is misfit. That is the item that measures BI, the first BI (BI 1). The acceptable Outfit Mean Square (MNSQ) score is 0.5 – 1.5 for productive measurement. The data set shows that the item exceeds the acceptable score. The BI 1 item score is 2.13, so it means that it will distort or degrade the measurement system (Boone et al., 2013, p.167., Sumintono & Widhiarso, 2014, p. 115). Therefore, before the real data collection the item will be adjusted or fixed properly to be understood more easily by all the senior high school students' participants.

3.6.3 The Third Data Set Pilot Testing

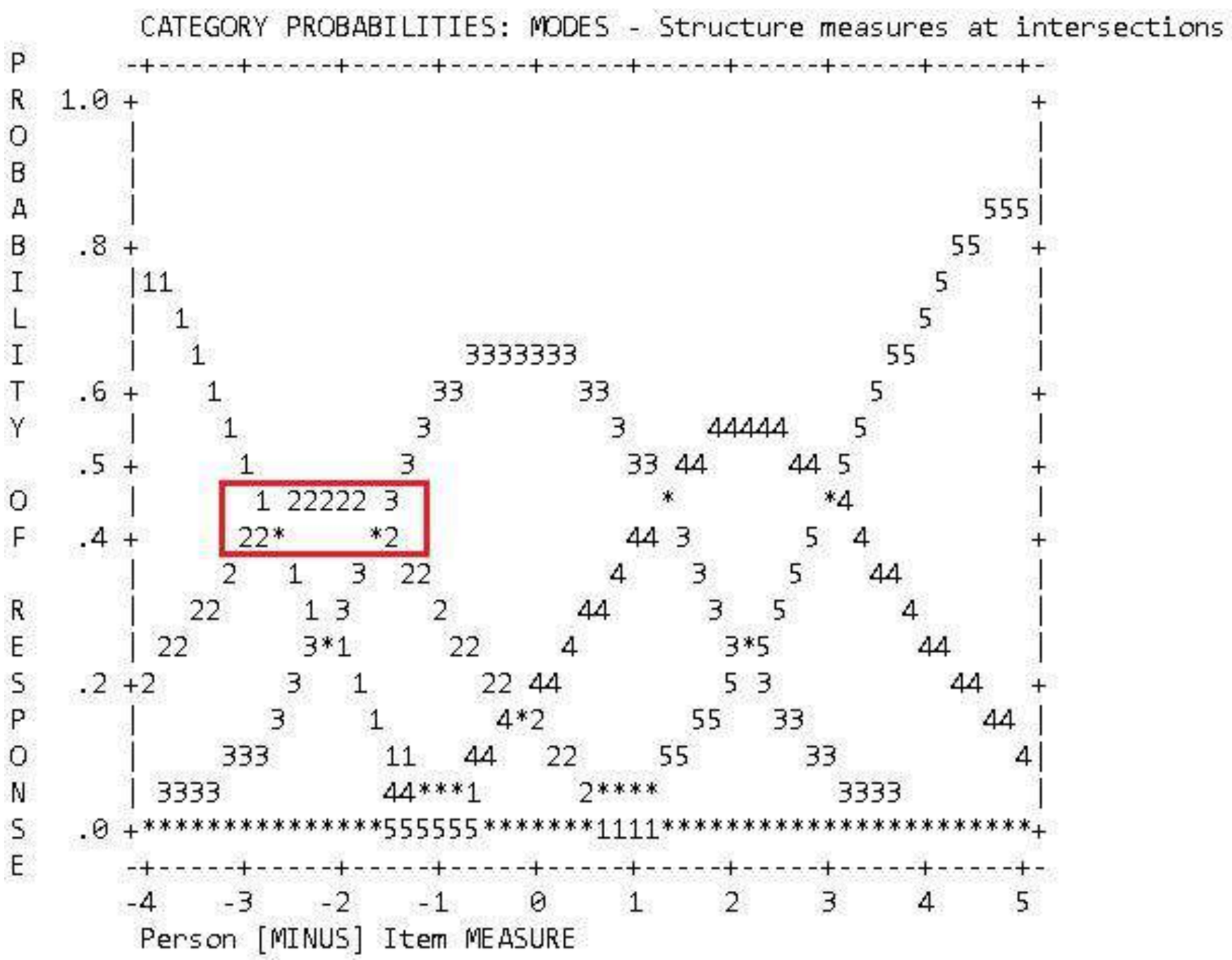
The third pilot testing data set that consists of PEB is analyzed. Referring to the 3.1 summary statistics output table, the researcher may clarify several things. The Cronbach Alpha score is 0.68. If the score is between 0.6 – 0.7, it means that the reliability score is enough. The person's reliability score is 0.69. If the score is between 0.67-0.80, it means that the respondent is quite consistent in answering the questionnaire. The item's reliability score is 0.99. If the score is more than 0.94, it means that the item's quality is excellent (Sumintono & Widhiarso, 2014, p. 112).

The researcher then investigated the 3.2 rating scale output tables. It is used to confirm whether the rating scale that is utilized confuses the respondents or not. Previously during the pilot testing the researcher employed a 5–point rating scale

ranging from strongly disagree – strongly agree. After closely examined the data, the researcher found that the peak of option two located below 50%. It shows that the respondents were having trouble deciding. Evaluating from the case, therefore, the researcher would like to simplify the rating scale from 5-point rating scale to 4-point rating scale by omitting the neutral rating scale since it caused confusion to the respondents. The ideal result should show all the peak options at different points and above 50% level. It is also showing consistency with the other instruments. (Sumintono & Widhiarso, 2014, p. 123)

Figure 4

Winsteps 3.73 Output Table 3.2 Rating Scale Analysis of PEB



The researcher also examined table 23 of item dimensionality. It is used to evaluate whether the instrument being developed can measure what it is supposed to measure. From the second pilot testing data set, it is known that the raw variance score is 54.1%. The dimensionality score limitation is 20%. The actual score is more than 40%, it means that the instrument is categorized as a good instrument because it is really measure what is supposed to be measured (Sumintono & Widhiarso, 2014, p.122)

The final checking of the third pilot testing data set was the table 10 item fit order. The table functions to detect the misfit items that are sorted from least fit or the least suitable. From the third pilot testing data set, it is known that all PEB's items are fit. The acceptable Outfit Mean Square (MNSQ) score is 0.5 – 1.5 for productive measurement. The data set shows that the item is in the acceptable score (Boone et al., 2013, p.167., Sumintono & Widhiarso, 2014, p. 115).

3.7 Data Analysis

In this study, data analysis methods were carefully suited to the research topics. Rasch Model Measurement in Winsteps Version 3.73 Software is the main method for ordinal data analysis. According to Boone (2014, p. 8), the Rasch Model helps translate ordinal survey responses into interval-level metrics. This transformation is achieved using person logits to represent each respondent's latent trait continuum. These logits, computed from odds ratio logarithms, help explain respondent abilities and item difficulties. This initial phase of analysis also rigorously evaluates data gathering tools to confirm their dependability and validity, ensuring data accuracy and integrity (Bond & Fox, 2015, p. 56).

After the Rasch analysis, the study uses statistical methods to expand on the Rasch Model's findings. Descriptive statistics will summarize simple data aspects, trends, and patterns (Creswell & Creswell, 2017, p. 247). Differential Item Functioning (DIF) analysis will then be used to identify items with differing levels of difficulty among respondent groups to ensure that the measurement is fair and unbiased across demographics (Linacre, 2002). Multiple regression analysis will be utilized to determine how various independent factors affect a dependent variable (Field, 2018, p. 397), whereas correlational tests will examine variable associations (Field, 2018, p. 342). From Rasch modeling to regression analysis, this comprehensive set of analytical methods provides a deep, diverse comprehension of the data, offering important insights into the study topics.

Descriptive statistical analysis will be implemented to assess the degree of attitude, subjective norm, and perceived behavioral control among senior high school pupils with respect to climate change in the initial research question. This analysis will involve the condensing of the data to provide a comprehensive overview of the participants' responses and attributes. The demographic data and responses regarding climate change education and pro-environmental behavior will be accurately depicted by computing essential statistical metrics, including means, standard deviations, frequencies, and percentages (Cohen et al., 2018).

The discussion is divided into two categories: item level and person level. Each category is further analyzed into four levels: very high, high, moderate, and low. The difficulty of each item is determined by the degree of student agreement, as the item level evaluates students' responses to five constructs. In contrast, the person level

evaluates students' responses by considering demographic factors, including sex (male and female) and the type of school (vocational high school and senior high school). Greater difficulty in pupil agreement is evidenced by higher item levels. The subsequent sections contain comprehensive analyses of both item and individual levels. The data was leveled using Mean (M) and Standard Deviation (S.D.) scores in the Rasch Model Measurement in Winsteps Version 3.73 Software, which was used to refine the final dataset. The analysis commenced with the generation of output files from Winsteps, specifically the Person File. This file was exported to Microsoft Excel for further processing, as it can accommodate large datasets swiftly and efficiently. In order to expedite the leveling process, the processed data was arranged from the highest to the lowest person logits score.

The next research question, which seeks to investigate demographic variations in attitude, subjective norm, and perceived behavioral control toward climate change, was addressed using a statistic inferential t-test and DIF analysis within the Rasch measurement framework. In Rasch measurement, Differential Item Functioning (DIF) analysis is a reliable method for determining whether distinct demographic groups exhibit dissimilar responses to specific items on the questionnaire, which may indicate potential biases or varying effects of these demographic characteristics (Boone et al., 2014, p. 273).

A correlational test will be conducted using SPSS software to investigate the relationship between attitude, subjective norm, and perceived behavioral control in relation to climate change and pro-environmental behavior for the third research question. The evaluation will determine the direction and magnitude of the

relationships between these variables. Pearson's or Spearman's correlation coefficients will be computed to quantify the relationships, contingent upon the data distribution (Field, 2018, p. 342).

In order to evaluate the influence of students' subjective norms, perceived behavioral control, and views on pro-environmental behavior, a multiple regression test will be implemented for the fourth research question. The mediator variable will be analyzed using model 4 PROCESS v4.2 by Andrew F. Hayes in this test (Hayes, 2017, p. 154). This method will enable the assessment of the influence of each predictor variable (attitude, subjective norm, and perceived behavioral control) on pro-environmental behavior, while also taking into account the influence of other variables. The relative significance of each predictor in elucidating variations in pro-environmental behavior among the students will be revealed by the multiple regression analysis (Cohen et al., 2018).

Table 2

The Summary of Research Questions, Hypotheses, and Data Analysis

No	Research Questions	Hypotheses	Data Analysis
1.	What is the level of attitude, subjective norm, and perceived behavioral control toward climate change among senior high school students?	-	Descriptive Statistic
2.	Is there any significant difference in the demographic variables related to attitude, subjective norm, and	H1a: There is a significant difference in attitude, subjective norm, and perceived behavioral control toward climate change	

	perceived behavioral control toward climate change among senior high school students?	among senior high school students based on their demographic variables. H1o: There is no significant difference in attitude, subjective norm, and perceived behavioral control toward climate change among senior high school students based on their demographic variables.	Statistic inferential with t-test, then follow with DIF analysis in Rasch Model Measurement
3.	Is there a significant relationship between attitude, subjective norm, and perceived behavioral control toward climate change to pro-environmental behavior?	H2a: There is a significant relationship between attitude, subjective norm, and perceived behavioral control toward climate change and pro-environmental behavior among senior high school students. H2o: There is no significant relationship between attitude, subjective norm, and perceived behavioral control toward climate change and pro-environmental behavior among senior high school students.	Correlational Statistical Inferential
4.	How much do students' attitude, subjective norm, and perceived behavioral control toward climate change contribute to pro-environmental behavior?	H3a: Students' attitude, subjective norm, and perceived behavioral control toward climate change significantly contribute to their pro-environmental behavior. (H3o): Students' attitude, subjective norm, and perceived behavioral control toward climate change do not	Multiple Regression Statistical Inferential

significantly contribute to their pro-environmental behavior.

3.8 Ethical Considerations

The informed consent procedure is carefully executed to guarantee that participants are thoroughly informed about the study's objectives. Prior consent from all persons engaged is obligatory prior to participation, with a focus on the voluntary nature of involvement. An effective confidentiality procedure is implemented to protect the anonymity of participants. The collected data is handled using rigorous security protocols, and strict storage regulations are implemented to limit access exclusively to the research team. Participants are guaranteed the right to voluntarily participate in the study, emphasizing their freedom to quit at any point without experiencing any negative repercussions. This notion is emphasized during the process of getting informed consent in order to foster a sense of autonomy among participants.

CHAPTER 4

FINDINGS AND DISCUSSION

4.1 Introduction

The chapter discusses the results of the study that assesses the ATT, SN, PBC, and BI of high school students regarding climate change. Not only that, but it also examines how those constructs influence students' PEB in Klaten Regency, Central Java Province, Indonesia. The gathered data are analyzed by utilizing the Rasch Model Measurement in Winsteps version 3.73 software and a various statistical technique in IBM SPSS version 26. The chapter is structured in a systematic manner to specifically address each of the research questions raised in the study. It provides comprehensive insights into the correlations among the main factors.

The chapter commences by analyzing the initial research question, which investigates the levels of ATT, SN, PBC, BI, and PEB constructs among high school students. The questionnaire instruments and the respondents are examined by presenting descriptive statistics, including item-level difficulty and person level. Furthermore, the second research question tests whether there are notable differences in the provided demographic data concerning ATT, SN, PBC, BI, and PEB constructs toward climate change. Its process entails utilizing statistical inferential techniques such as ANOVA test, followed by doing Differential Item Functioning (DIF) analysis inside the Rasch measurement framework. The objective is to detect any demographic influences on the responses, so guaranteeing that the measurement instruments remain fair and unbiased across various groups.

Moreover, the third research question investigates the correlations among ATT, SN, PBC, BI, and PEB constructs. The researcher employs correlation test in IBM SPSS version 26. The correlational analyses are performed to ascertain the magnitude and orientation of the relationships between these variables. The investigations yield insights into the interconnections and mutual influence of these components. Finally, it reviews the extent to which high school students' ATT, SN, PBC, and BI toward climate change influence PEB. The PROCESS macro v4.2 in IBM SPSS version 26, specifically Model 4, is utilized to evaluate the predictive capacity of these variables and determine the most influential predictors of PEB among high school students in Klaten Regency, Central Java Province, Indonesia.

4.2 **The level of ATT, SN, PBC, BI, and PEB toward climate change among high school students in Klaten Regency, Central Java Province, Indonesia**

The high school students' level of ATT, SN, PBC, BI, and PEB in relation to climate change is examined in the sub-chapter. To broaden the examination, it is separated into two categories: item-level difficulty and person-level. In analyzing the level of each category, further it is again divided into four levels: very high (VH), high (H), moderate (M), and low (L). The item-level evaluates the difficulty of each item in terms of the students' agreement by analyzing their responses to the five constructs that have been mentioned previously. On the other hand, the person-level evaluates the students' responses by considering two different demographic data: gender differences (male and female) and the school type differences (senior high school and vocational high school). The more difficult students to agree on the item, the higher its level. The

subsequent sections offer comprehensive analyses of both the item and individual levels.

Because the study aims to obtain robust data of high school students' respondents, the researcher obtains a diverse and representative sample by successfully collecting 1.414 respondents in Klaten Regency, Central Java, Indonesia. A thorough data cleaning and validation process was implemented to ensure the research's integrity and accuracy. The procedure began with the elimination of incomplete responses, which guaranteed that all analyses were conducted on comprehensive datasets. Duplicate entries, which may have arisen because of participants inadvertently submitting the survey multiple times, were meticulously identified and eliminated. This phase was essential to ensure that the results were not distorted and that the input of each respondent remained distinct.

The process of raw data checking and cleaning facilitated the identification of any anomalies or errors that could potentially present. Following the exhaustive procedures, the researcher concludes 1.336 as a valid respondent of this study. The rigorous procedure guaranteed the availability of reliable, high-quality data, which served as a solid foundation for the coming statistical analyses. As a result, the investigation could formulate precise and significant conclusions regarding the ATT, SN, PBC, BI, and PEB of high school pupils in Klaten Regency, Central Java Province, Indonesia with respect to climate change.

The demographic data of this study are gender and school type differences. Out of 1.336 valid respondents, there are 916 female and 420 male high school students for

the context of the study. Meanwhile, the sample comprises 948 senior high school and 388 vocational high school students. To give more foundational understanding related to the sample of the study, the researcher summarizes it into a table. The table below presents the demographic data distribution. The data shows that the proportion of high school female students are higher compared to the male students. Additionally, most of the valid respondents are coming from senior high school students.

Table 4.1

Summary of Respondents Distribution Based on Demographic Data

Demographic Variable	Frequency	Percentage
Gender		
Female	916	68.6%
Male	420	31.4%
Type of School		
Senior High School	948	71.0%
Vocational High School	388	29.0%

4.2.1 The Level of Item Difficulty

The analysis of the pilot testing data sets, which included ATT, SN, PBC, BI, and PEB, revealed several important findings. For the ATT, SN, and PBC data set, the Cronbach Alpha score was 0.81, indicating very good reliability, while the person's reliability score was 0.79, showing consistent respondent answers, and the item's reliability score was 0.99, reflecting excellent item quality (Sumintono & Widhiarso, 2014). The raw variance score for item dimensionality was 44.4%, categorizing the

instrument as good since it accurately measures what it is supposed to measure. Similarly, the BI data set had a Cronbach Alpha score of 0.81, a person's reliability score of 0.78, and an item's reliability score of 0.98, with a raw variance score of 54.9%, confirming the instrument's effectiveness. For the PEB data set, the Cronbach Alpha score was 0.68, indicating sufficient reliability, the person's reliability score was 0.69, and the item's reliability score was 0.99, with a raw variance score of 54.1%, all of which indicate that the instrument is excellent in measuring the intended constructs (Sumintono & Widhiarso, 2014)

The first level examined in this study focuses on the item level, consisting of five constructs: high school students' ATT, SN, PBC, BI, and PEB towards climate change. The final raw data from the Google Form questionnaire were meticulously filtered and analyzed using the Rasch Model Measurement in Winsteps Version 3.73 software. The leveling method utilizes the Mean (M) and Standard Deviation (S.D.) scores of each construct. Specifically, Winsteps software's Output Tables 12 (Item: map) and 13 (Item: measure) were used as ilustration. Items with measures above the M score are classified as high level, those more than one S.D. above the M score are very high level, items below the M score are moderate level, and items more than one S.D. below the M score are low level.

Table 4.2.1

Summary of Mean and Standard Deviation Scores of The Five Constructs

Construct	Mean (M)	Standard Deviation (SD)
Attitude (ATT)	0.00	0.90
Subjective Norm (SN)	0.00	1.20
Perceived Behavioral Control (PBC)	0.00	1.20
Behavioral Intention (BI)	0.00	1.70
Pro-Environmental Behavior (PEB)	0.00	1.12

The M and SD of five constructs associated with climate change among high school pupils are depicted in the aforementioned table. The ATT construct exhibits moderate variability in students' ATT toward climate change, with the M score 0.00 and the SD score 0.90. For the SN and PBC constructs, the M score is 0.00 and the SD score is 1.20. It indicates that those two constructs are subject to similar levels of variability. The BI construct has the M score 0.00 and the SD score 1.70, therefore it reflects the students' willingness to alter their lifestyle to fight for climate change is more variable and presents challenges. The final construct that is measured in this study is the PEB, the M score is 0.00 and the SD score is 1.12. Those two scores tell the variability in students' genuine in environmentally friendly practices. These statistics number underscore the necessity for targeted educational interventions to improve the PEB of students and their diverse perspectives and behaviors regarding climate change.

Table 4.2.1.1

Summary of Item Level Difficulty

CONSTRUCT	**LEVEL**			
	VH	H	M	L

ATT	ATT 4	ATT 2	ATT 1	ATT 3
SN	SN 1	SN 2	SN 4, SN 5	SN 3
PBC	PBC 2	PBC 5, PBC 4	PBC 3	PBC 1
BI	BI 1	BI 4	BI 3, BI 2, BI 6, BI 5	-
PEB	PEB 2	PEB 5, PEB 3, PEB 1	PEB 4	PEB 6

Note: VH: Very High, H: High, M: Moderate, L: Low

4.2.1.1 Item Level Difficulty of Attitude Construct

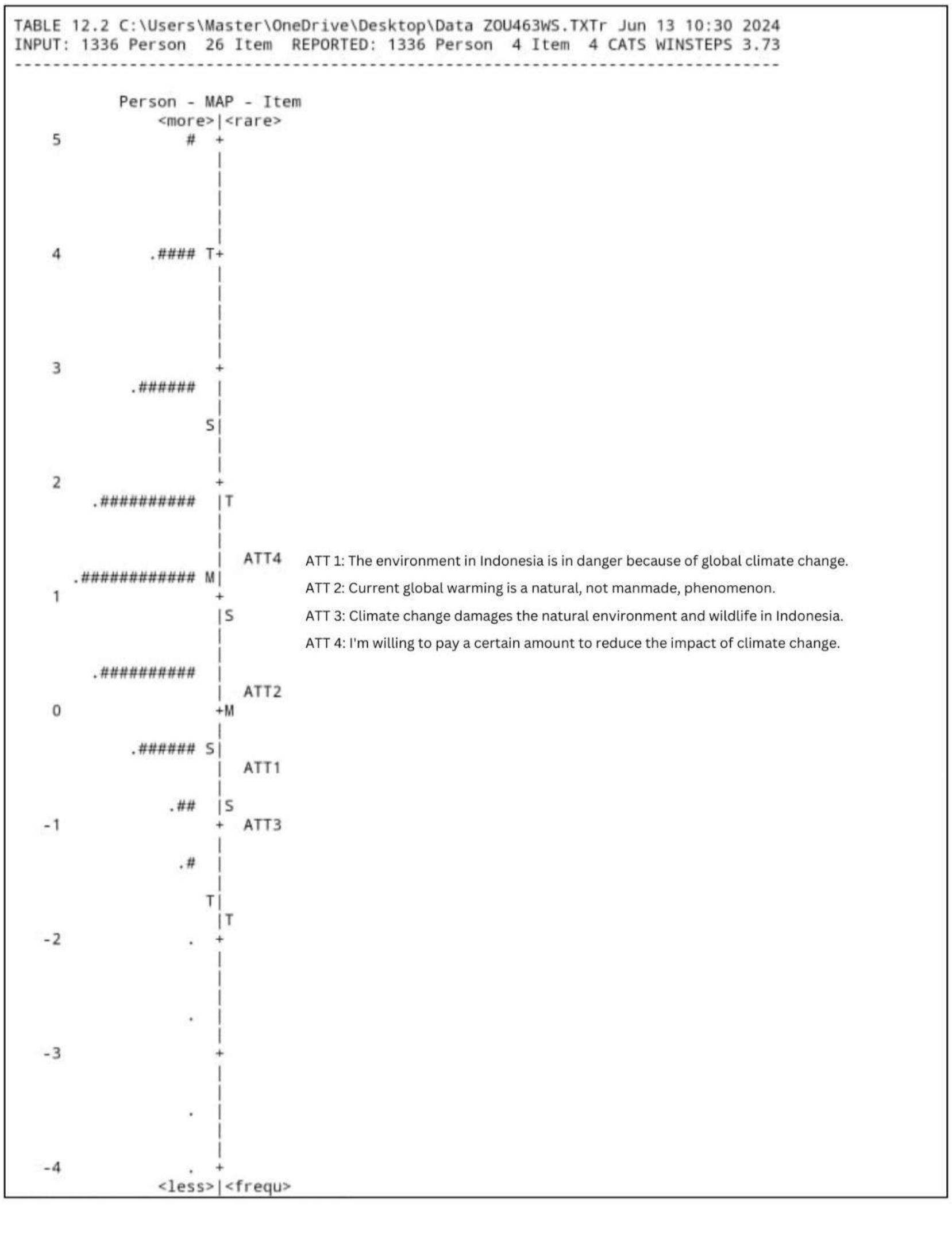
The ATT construct comprises four items with the M score 0.00 and the SD score 0.90. The most difficult item to agree by high school students is ATT 4, "I am willing to pay a certain amount to reduce the impact of climate change." It likely because many students have not personally experienced severe climate impacts. The research that has been performed by Gould et al. (2024) supporting this indication. It shows that individuals or students who have directly experienced extreme weather event are more willing to pay amount of money for climate mitigation policies. It is consistent with the findings from Graham et al. (2019), where those perceiving the severe impacts of climate change were more willing to pay for the mitigation efforts.

Similarly, ATT 2, the second most difficult to agree by the respondents, "Current global warming is a natural, not man-made phenomenon." It is crystal clear indicating a lack of proper knowledge among high school students in Klaten Regency about the causes of climate change. This lack of knowledge understanding highlights a broader issue. As identified by Yang et al. (2014), where public willingness to pay for CO_2 mitigation is also influenced by students' perception of greenhouse gases and climate risks.

Furthermore, the students' ATT related to climate change is notably shaped by the awareness levels and personal experiences with environmental impacts. Students are less likely to agree on the statement which involve personal financial sacrifices such as paying to mitigate climate change because they do have limited exposure to its severe consequences of the climatic changes (Herman, 2015). This is further corroborated by research implying that the readiness to pay for climate change mitigation varies with income and perceived seriousness of climate impacts (Graham et al., 2019). However, it critical to practice CCE since educational interventions can remarkably boost students' understanding and emotional engagement to climate issues by promoting more eco-friendly behaviors. As featured by Sinatra et al. (2012) and Bofferding & Kloser (2015 for instance, they demonstrated that persuasive texts could change college students' ATTs about climate change and their alacrity to act by building the commitment to address the issues.

Figure 5

Winsteps 3.73 Output Table 12 Item Map of Attitude



4.2.1.2 Item Level Difficulty of Subjective Norm Construct

The SN construct in this study consists of five items, with the M score 0.00 and the SD score 1.20. The most difficult item to agree for the high school students' in Klaten Regency is the SN 1, "My family/ peers often discuss climate change or global warming." It demonstrates that those high school students rarely to talk about climate in their daily lives due to the absence of proper knowledge and awareness. Chang & Pascua (2016) found that students are quite frequent having misconceptions regarding climate change. Consequently, it substantially contributes to their reluctance to participate in climate-related conversations. Limited understanding causes shallow talks about climate change due to difficulty to relate (Feierabend et al., 2012).

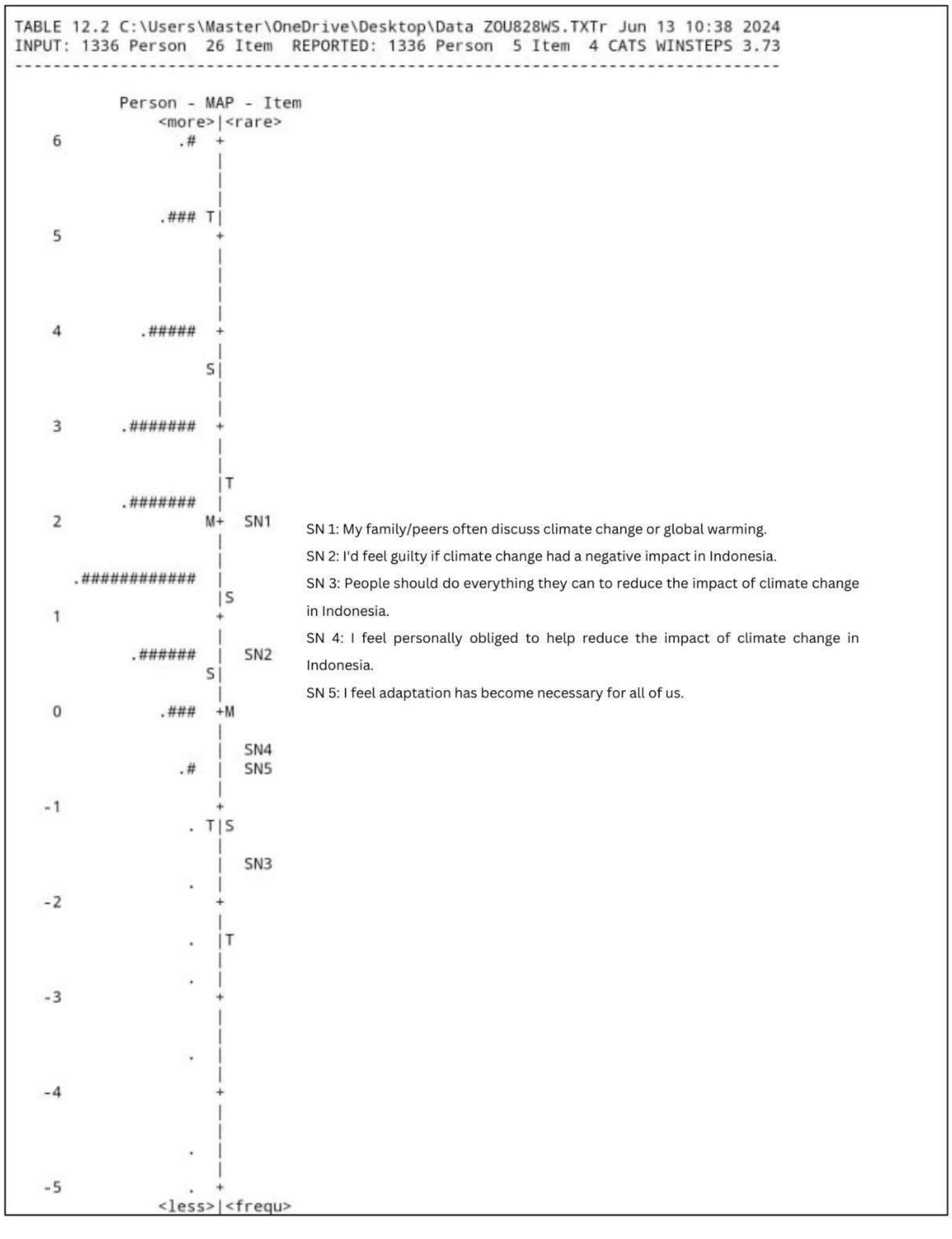
In contrast, the easiest item to agree for students' is SN 3, "People should do everything they can do to reduce the impact of climate change in Indonesia." Encouraging others to act is the most easily agreed item upon by the high school students. It can be inferred that there is a tendency to expect others to take responsibility for climate action, while at the same time they do not involve themselves discussing those environmental problems. Yu & Yu (2017) and Busch et al. (2019) argue that social norms are major predictors of young climate action, lending credence to the notion that students look to others for leadership in climate action.

According the TPB (Ajzen, 1991) SN reflects the social constraints that students experience to engage in or avoid specific actions. Regarding the high school students' inadequate scientific knowledge and awareness toward climatic changes, it may contribute to the low frequency of talks about it. For this reason, integrating

environmental education into the curriculum can help normalize these conversations in schools and with families. The urgency of practicing CCE has been confirmed by Nguyen et al. (2018) through their study. They found that educational strategies may boost students' BI to participate in climate change discussions. Furthermore, Geiger et al. (2017) discovered that knowledge-based interventions can improve public discourse about climate change by increasing efficacy beliefs.

Figure 6

Winsteps 3.73 Output Table 12 Item Map of Subjective Norm



4.2.1.3 Item Level Difficulty of Perceived Behavioral Control Construct

The PBC construct, the last BI's predictor of the TPB, has the M score 0.00 and the SD score 1.20. In this construct, the most straightforward item for high school students to agree is the PBC 1, "If everyone takes action, we can reduce the impact of climate change in Indonesia." It shows a comparable pattern to the SN construct discussed previously. The first item of PBC involves the expectation that others will act, as it emphasizes a propensity to delegate responsibility to others. PBC or self-efficacy according to the TPB (Ajzen, 1991) refers to students' perception of their capacity to engage in an action that mitigate climate change. Chang et al. (2016) discovered that those who felt the government was accountable for climate change had more impression of risk since they thought the climate change issues was beyond their capacity to act. This study reveals that students often expect outside entities to intervene.

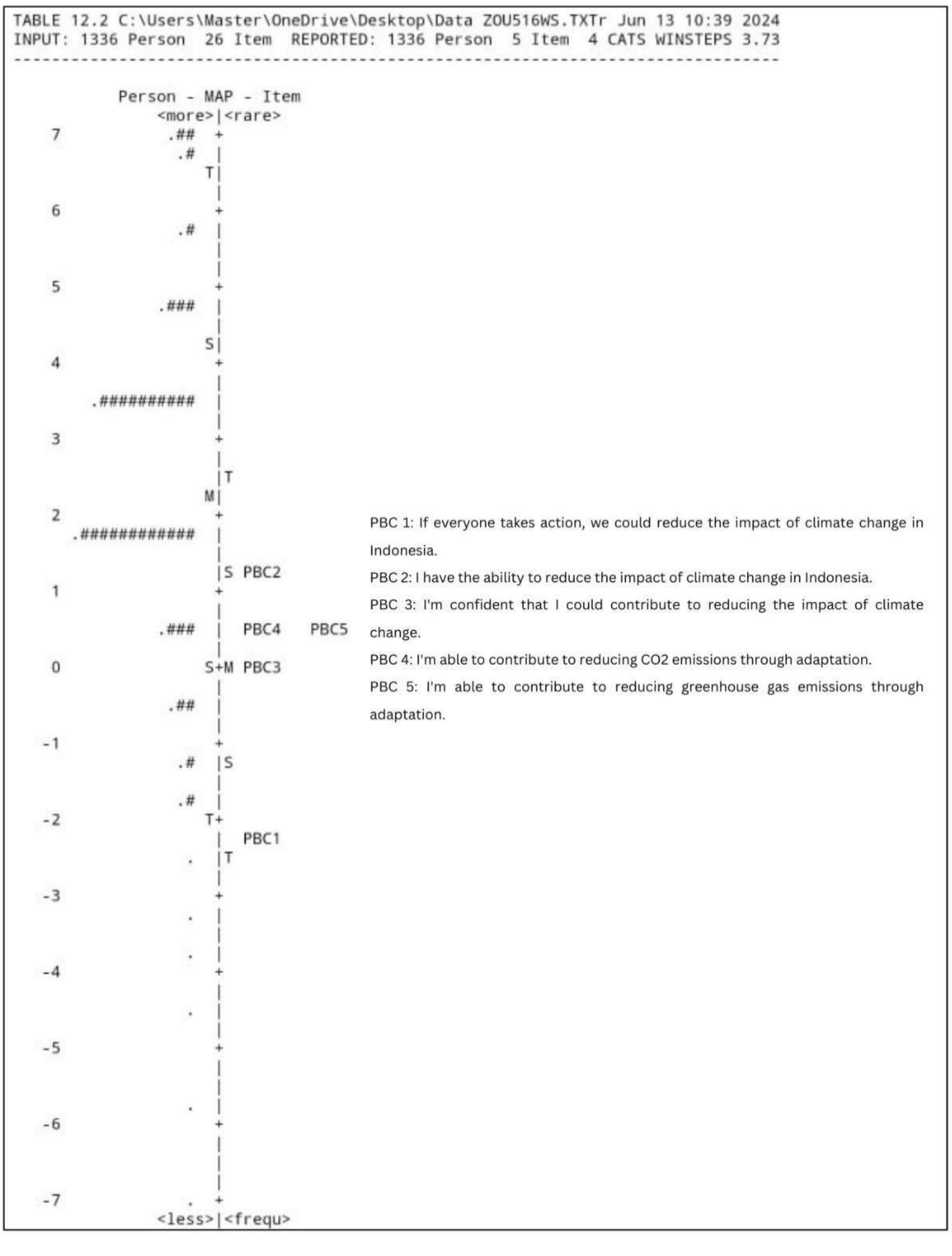
In contrast to PBC 1 as the easiest item to agree, the PBC construct item 2 is the most challenging item to consider, "I have the ability to reduce the impact of climate change in Indonesia." It means that the high school students do not have any confidence and skill to tackle the problems caused by raising climate change. Hence, educational initiatives must focus on personal agency to convince that every individual action is mattered. It can assist students in comprehending the belief that their contributions are essential to the collective endeavor to fight for climate change, regardless of their size. Several researchers discovered that students' BI to actively involve in PEB can be drastically increased by improving students' PBC and their environmental knowledge (Butt et., 2019). Additionally, another study implies that it is crucial to cultivate a sense

of personal responsibility to encourage the students to take responsible actions toward environmental protection (Ernst et al., 2017).

Furthermore, Yu et al. (2017) found that the association between environmental ethics and PEB is mediated by students' PBC. It identifies the importance of self-efficacy in climate action. High school students' in Klaten Regency, Central Java, or in other regions across Indonesia, they should have self-confidence that they are capable in participating to solve climate issues. As Lin et al. (2021) revealed that PBC acts as a mediator between ATT and BI toward responsible environmental actions.

Figure 7

Winsteps 3.73 Output Table 12 Item Map of Perceived Behavioral Control



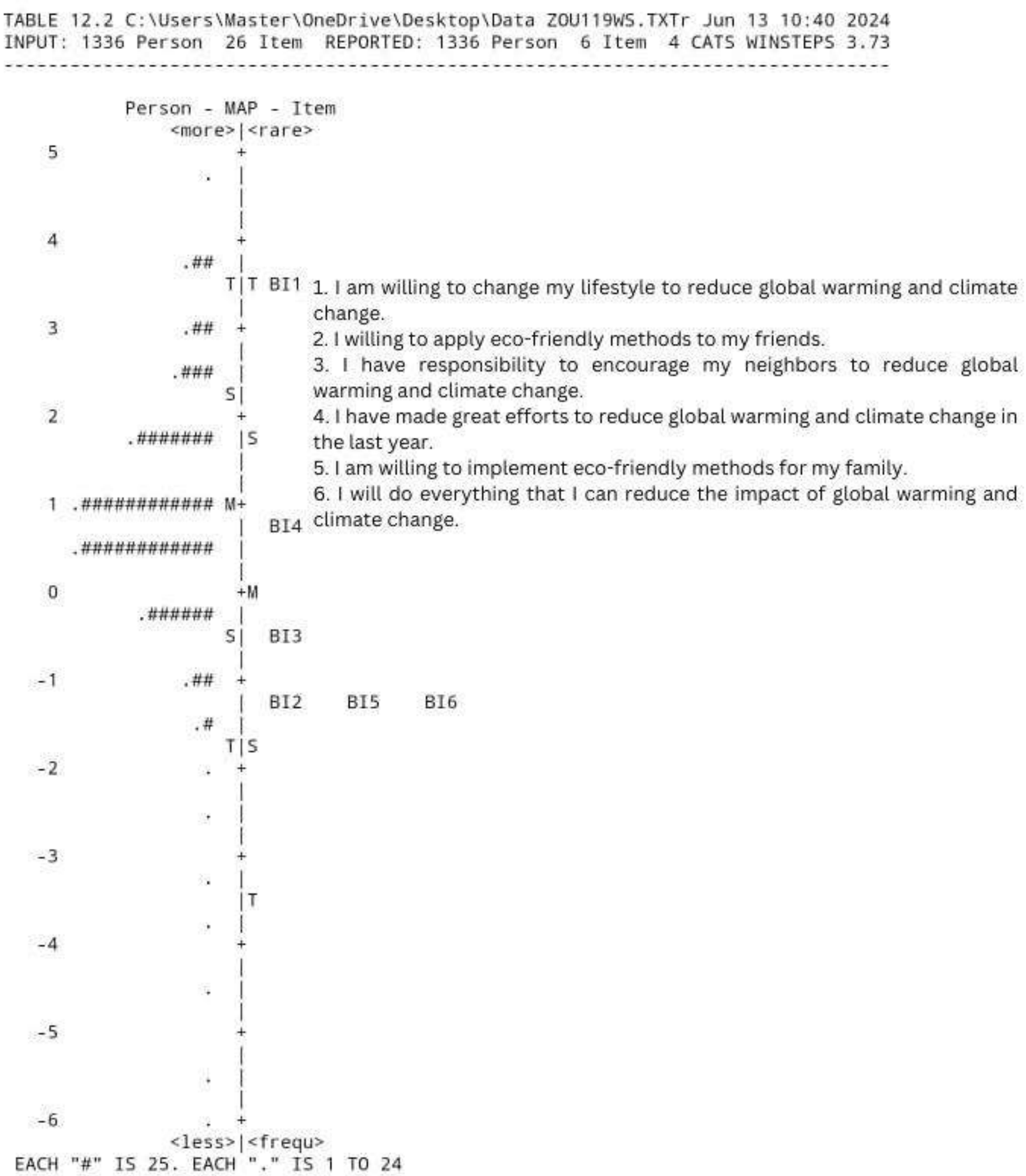
4.2.1.4 Item Level Difficulty of Behavioral Intention Construct

The 4th construct which is addressed in the context of this study is BI. From six items constructing BI, the most difficult item to agree is BI 1, "I am willing to change my lifestyle to counteract global warming and climate change." The SD score for BI is 1.70, and BI 1 has logit score 3.42 meaning that the item suggests substantial difficulty. The second most difficult item to agree is BI 4, "I have made major efforts to adopt climate change last year." It indicates that high school students in Klaten Regency reluctant to adopt more environmentally friendly conduct. However, others BI items are more easily agreed upon by the students, implying that students prefer communal action over individual efforts.

Herman (2015) expressed that students frequently seek societal changes rather than personal sacrifices to solve climate change. Improving students' technical knowledge of climate change and empowering them via participatory learning can increase their motivation to engage in environmentally friendly actions. Bissinger and Bogner (2018) discovered that educational interventions centered on environmental literacy can dramatically boost students' pro-environmental behavior intentions. Similarly, Pruneau et al. (2006) found that participatory learning activities in which students work on climate-related projects can effectively promote behavioral changes. Improving students' technical knowledge of climate change and empowering them via participatory learning can increase their motivation to engage in PEB.

Figure 8

Winsteps 3.73 Output Table 12 Item Map of Behavioral Intention



4.2.1.5 Item Level Difficulty of Pro-Environmental Behavior Construct

The final construct is PEB consisting of six items with the SD score 1.12. the most challenging item to agree for students is the PEB 2, “I use public transportation.” It demonstrates that high school students are uncomfortable to change their transportation mode. This resistance extends to other behaviors, including waste

reduction (PEB 4) and shutting off electrical appliances (PEB 6). These findings underscore a bigger dilemma, while students may express care about environmental issues, putting that concern into action, particularly actions that entail lifestyle adjustments, remains a significant challenge.

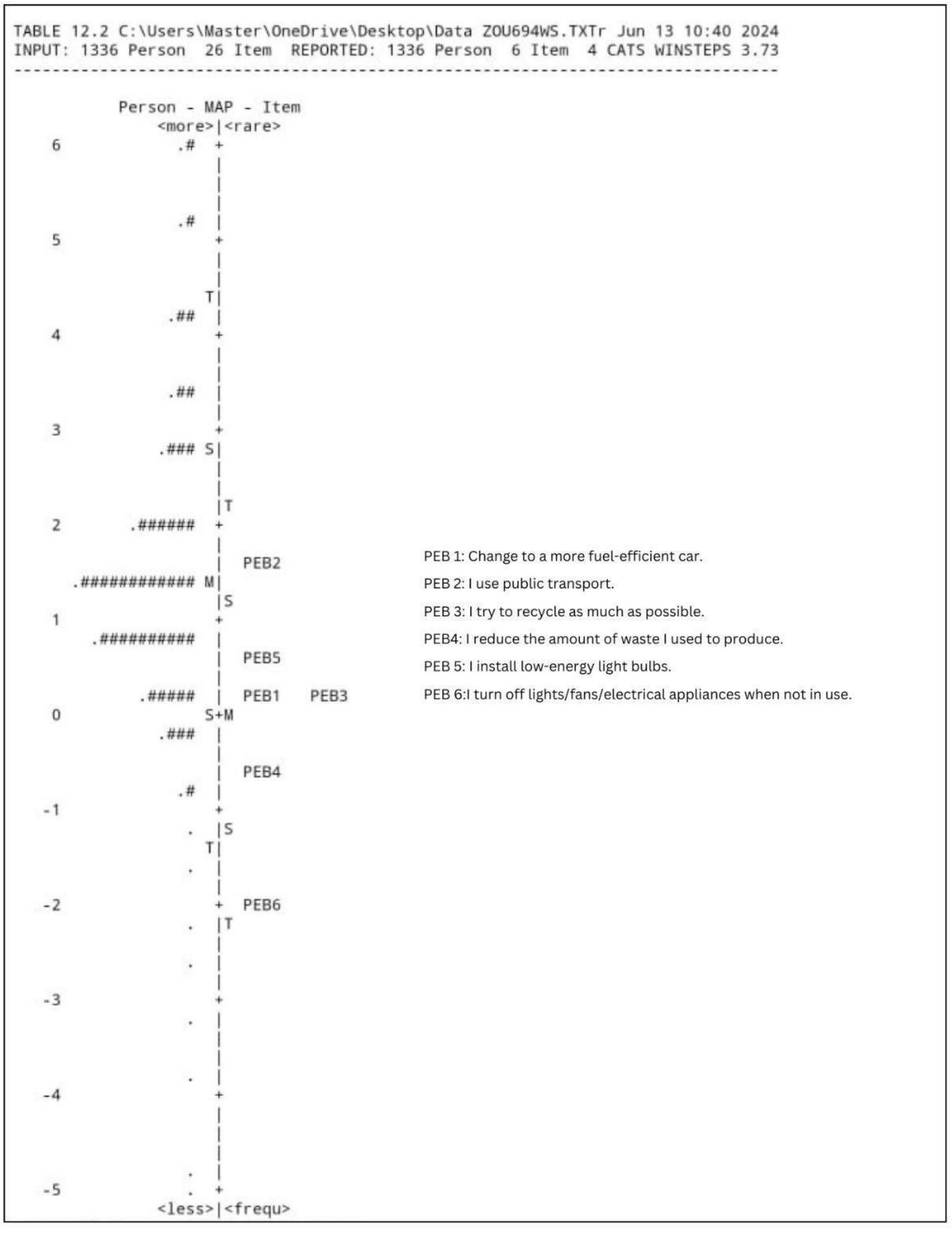
Hidayah & Agustin (2017) discovered that students' participation in extracurricular activities enhance their PEB, such as taking public transport and reducing waste. This shows that experience learning and active participation in environmental activities may be more successful than standard teaching techniques. Likewise, Dewi and Sawitri (2018) argue that practical demonstrations of environmental advantages can dramatically increase students' intentions to perform PEB. However, Carrus et al. (2008) predicted that emotions and prior behaviors are strong determinants of the intention to engage in PEB. It suggests that simply communicating factual benefits may not be enough. Students' emotional and previous experiences with environmental activities are also important.

Moreover, interactive digital narratives and other engaging instructional tools can help people feel more responsible and in control of their environmental influence. Egashira et al. (2022) found that serious games meant to enhance environmental awareness can effectively affect students' behavior by enhancing their perceived control over environmental outcomes. This finding is consistent with Pruneau et al. (2006) argument that interactive learning activities that include students in real-world environmental projects can help them realize the immediate effects of their actions and drive them to adopt more sustainable behaviors. Despite these hurdles, boosting

students' knowledge and awareness can result in better environmental habits. Showing the physical benefits of environmentally responsible practices can make them more accessible and desirable (Bofferding & Kloser, 2015). Furthermore, societal and infrastructural constraints, such as insufficient public transportation or a lack of recycling facilities, might impede students' pro-environmental activities, even if they are motivated to change. Addressing these external influences is critical to ensure that individual efforts result in real environmental effect.

Figure 9

Winsteps 3.73 Output Table 12 Item Map of Pro-Environmental Behavior



4.2.2 The Level of Person

The respondents were classified by following to their performance using the score taken from the Winsteps Software version 3.73 output tables. Individuals who scored above the M score were classified into high level. Respondents who scored more than one SD above the M score were classified into very high level. Those who scored below the M score were classified into moderate level, and below more than one SD were classified as having low level. Furthermore, for each variable, the researcher divided the total respondents by sex (female, male) and school type (senior high school, vocational high school), offering a thorough picture of the study's demographics.

Students from School S, which likely has more effective or better-integrated environmental education programs, exhibited significantly higher levels of PEB, ATT, SN, PBC, and BI towards climate change compared to those from School V. Díaz-Siefer et al. (2015) underscores the critical role of high-quality environmental education programs in the promotion of environmental literacy and PEB. The environmental behaviors of students can be substantially influenced by differences in curriculum design, teacher training, and the extent to which environmental topics are integrated into various subjects (Pooley & O'Connor, 2000; Chankrarajang & Muttarak, 2017). Additionally, research indicates that students who enroll in environmental education courses demonstrate more eco-friendly behaviors than those who do not (Mullenbach & Green, 2018). This bolsters the study that the success of School S could be attributed to the implementation of more robust environmental education initiatives and the provision of superior resources.

Moreover, high school girls generally have higher ATT, SN, PBC, BI, and PEB. Zelesny et al. (2000) and Hoffmann & Mutarak (2020) imply that women are more likely to engage in PEB and care more about the environment than men. Socialization process that fosters empathy and caregiving in women, which are linked to environmental stewardship, may explain this (Jensen, 2002; Breunig et al., 2014). According to Raisya & Djuwita (2018), environmental education programs that emphasize empathy and potential consequences engage female students better. This stresses the need for gender-sensitive CCE that capitalizes on female strengths and involve male students more.

Many instructional methods can encourage students' environmental awareness. Research shows that optimism and emotional engagement drive students to participate in environmental projects (Ojala, 2015). Adding motivational elements and making environmental education more relevant can boost students' involvement in climate change initiatives (Boyes & Stanistreet, 2012). Swaim et al. (2014) recommends climate change curriculum. The technique makes climate change and its effects more relevant and interesting for kids, helping them understand better. Outdoor activities and hands-on projects are popular with manly students (Sugandini et al., 2018). One option is to develop extracurricular activities that promote environmental knowledge to boost student participation with environmental issues (Hidayah & Agustin, 2017; Laner, 2018).

To guarantee that high school students are exposed to climate change topics in a consistent and comprehensive manner, policymakers should contemplate mandating

the internalization of environmental education into all levels of education in Indonesian context. Referring to Hoffmann and Muttarak (2020), it is imperative to allocate adequate funding and resources to assist schools in the development. Implementing an effective practice of environmental depends on the educators because they play a critical role in influencing the students' behaviors. Teacher professional development in environmental education can help instructors incorporate climate change into school lessons. Supportive that encourages students' PEB like community clean-ups and green projects are needed to foster high school students' proactiveness regarding to eco-friendly agendas (Sheldon, 2016).

4.2.2.1 The Person Level of Attitude

The analysis revealed that a significant differences in high school students' attitude about climate change between two types of school. The senior high school students exhibited higher levels of "Very High" (17%) and "High" (13%) ATT compared to vocational high school, who had 4% and 5% in these categories, respectively. The overall distribution indicated that most students fell into the "Moderate" category (51%), with fewer students in the "Very High" (20%) and "High" (19%) categories. Gender analysis showed that female students generally had higher ATT towards climate change than male students.

Figure 10

The Person Level of Attitude Based on School Type

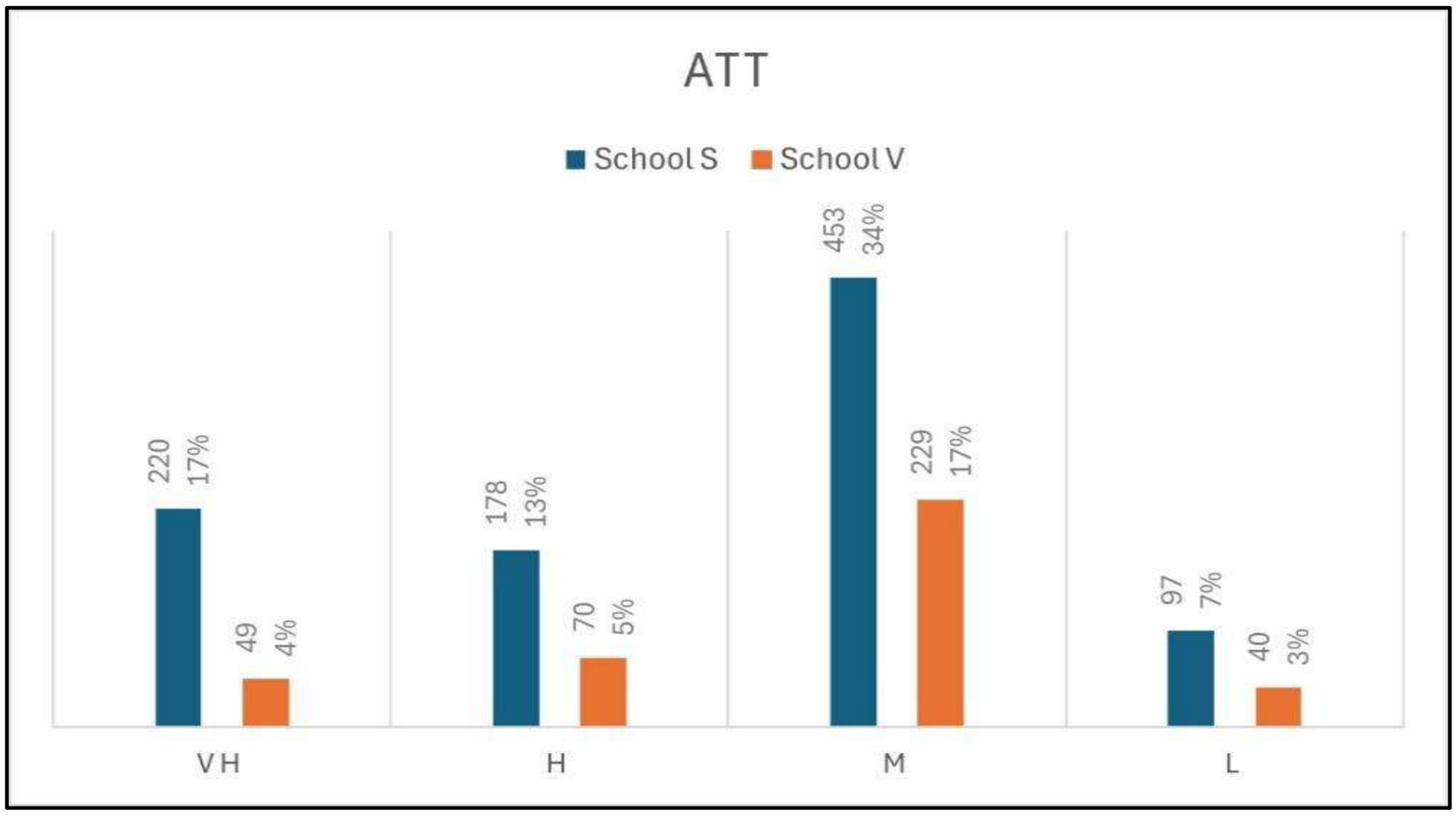


Figure 11

The Person Level of Attitude Based on Gender

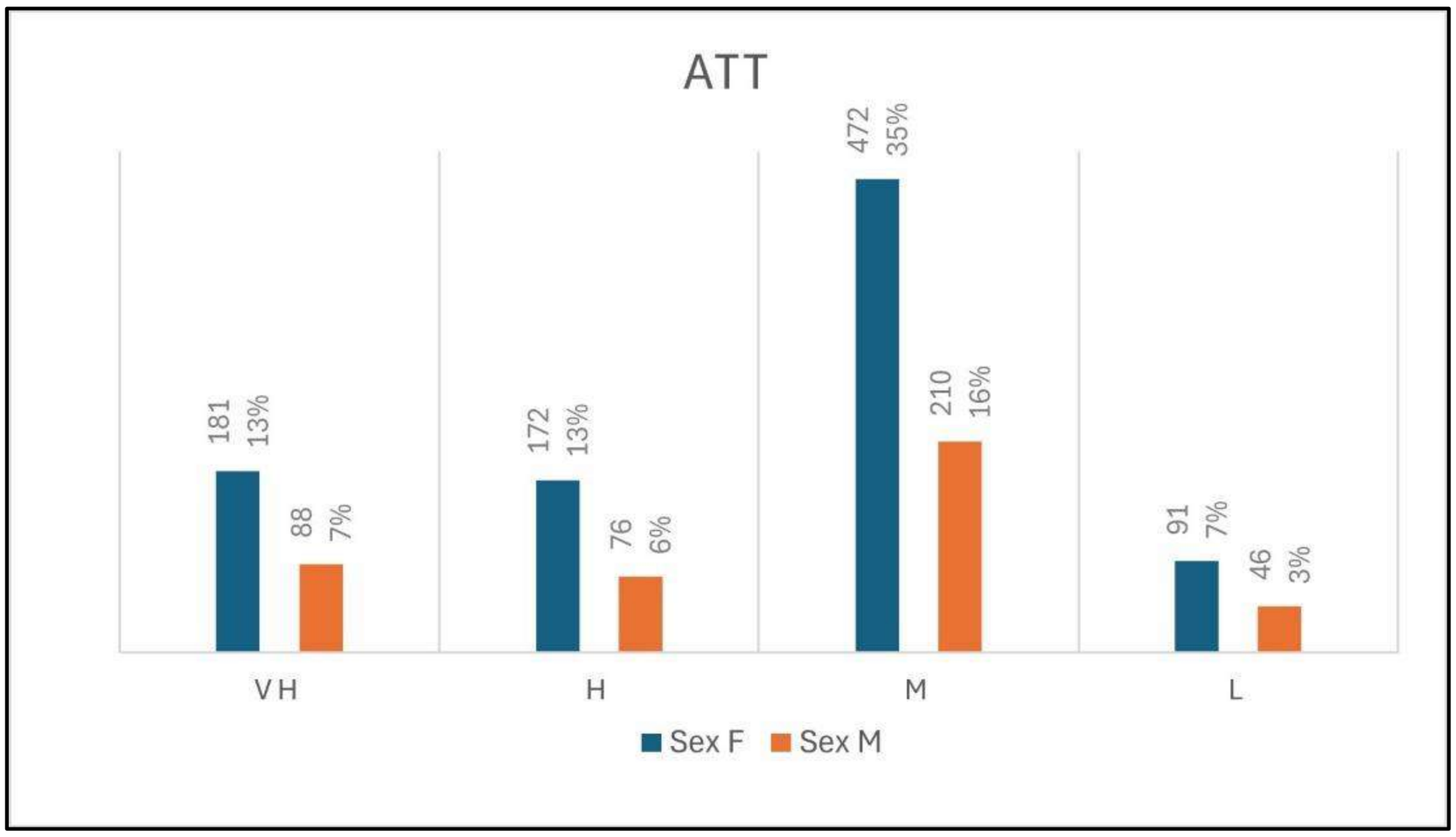


Figure 12

The Person Level of Attitude Based on Total Respondents

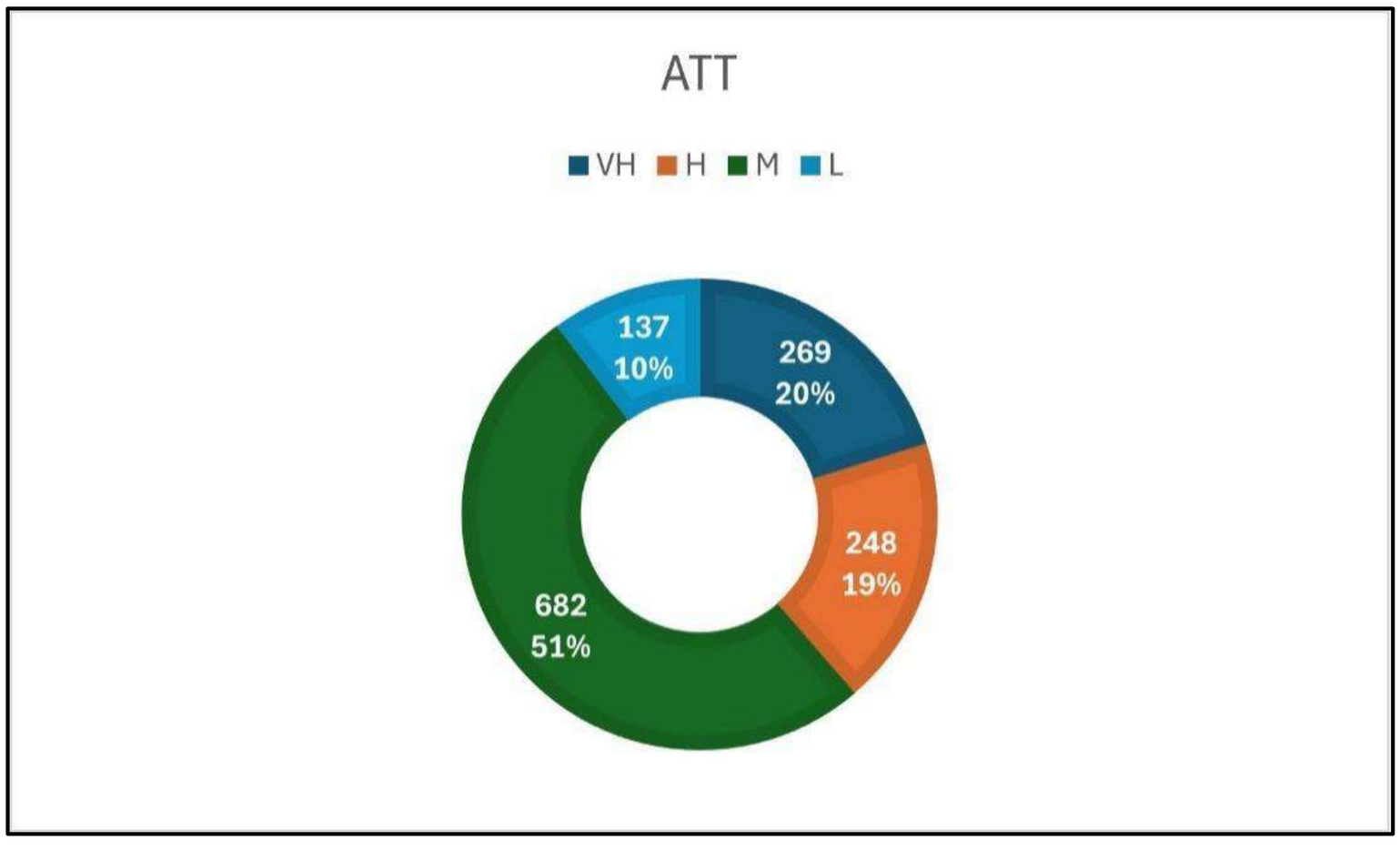


Table 4.2.2.1

The Summary of Person Level Attitude

Level	Respondents	Sex		School	
		F	M	S	V
VH	269	181	88	220	49
H	248	172	76	178	70
M	682	472	210	453	229
L	137	91	46	97	40
		916	420	948	388
Total	1336	1336		1336	

4.2.2.2 The Person Level of Subjective Norm

SN were also higher among students from senior high school students compared to those from vocational high school. At the Very High level, 15% of students from School S were represented, compared to 5% from School V. The trend persisted across other levels, suggesting that students from School S felt more social pressure and support to engage in climate change actions. The gender-based analysis indicated that

female students had higher SN levels than male students, with 14% of females at the Very High level compared to 7% of males. Most students fell into the moderate category (38%), followed by High (31%), Very High (20%), and Low (11%) categories.

Figure 13

The Person Level of Subjective Norm Based on School Type

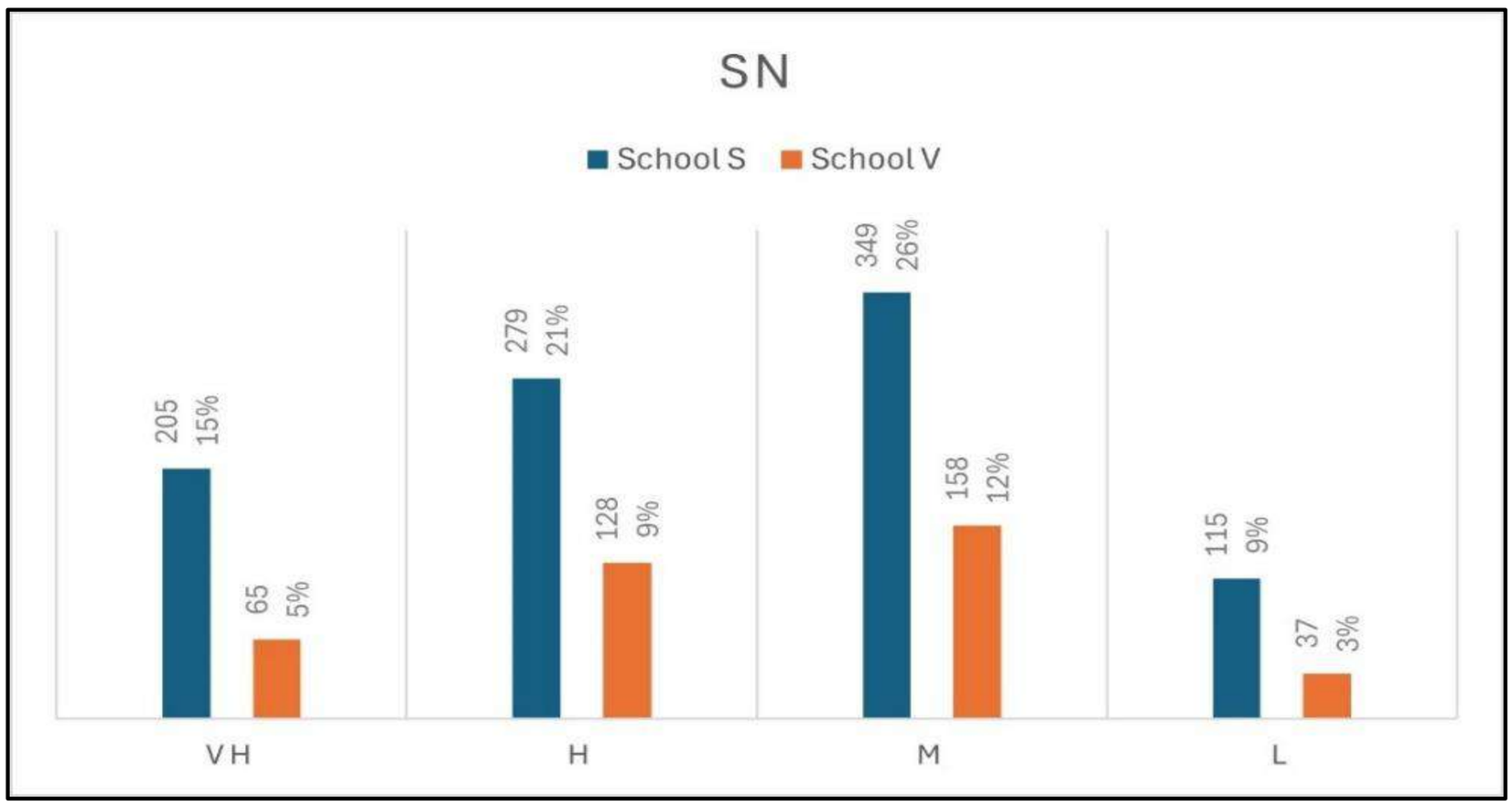


Figure 14

The Person Level of Subjective Norm Based on Gender

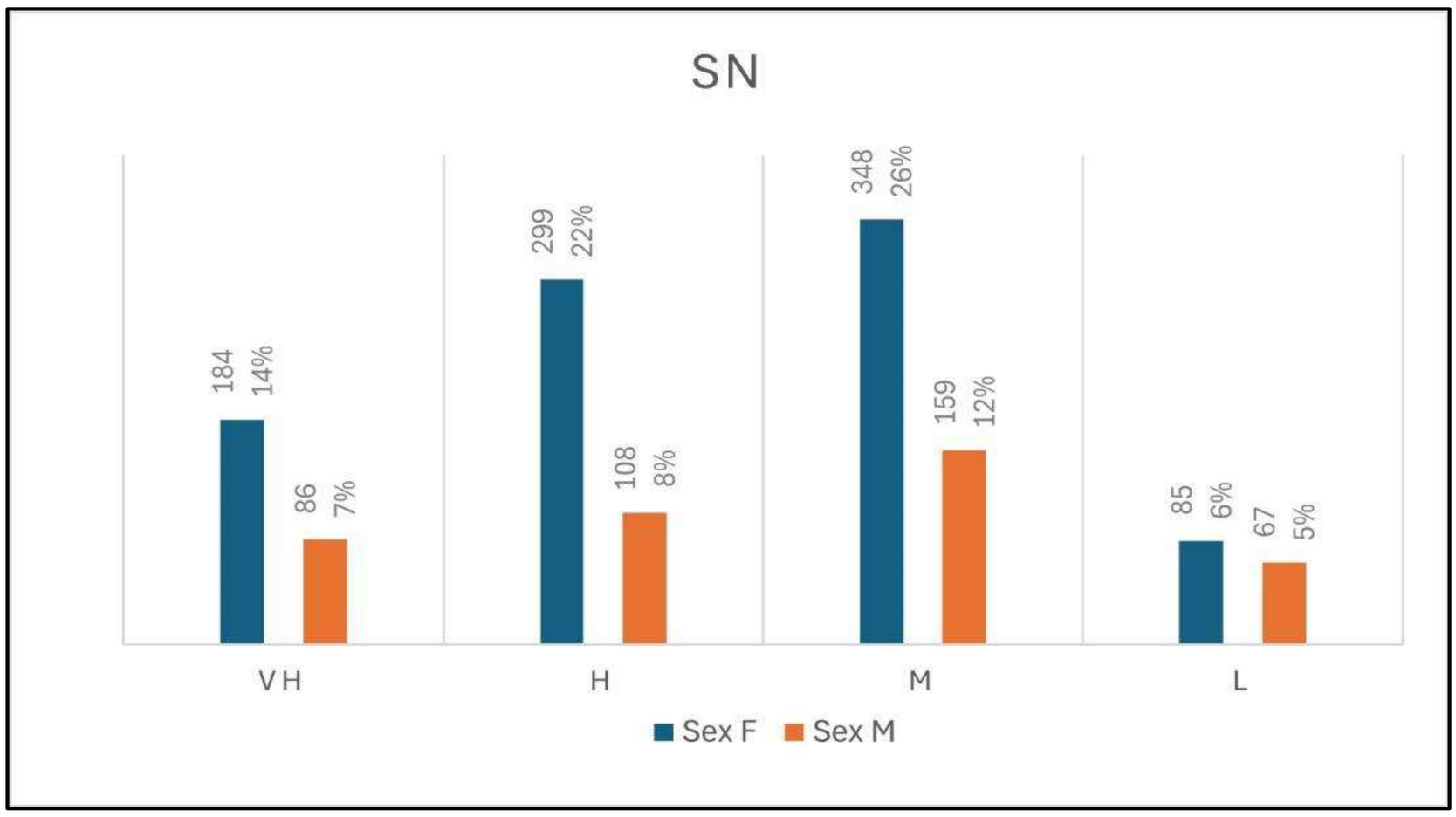


Figure 15

The Person Level of Subjective Norm Based on Total Respondents

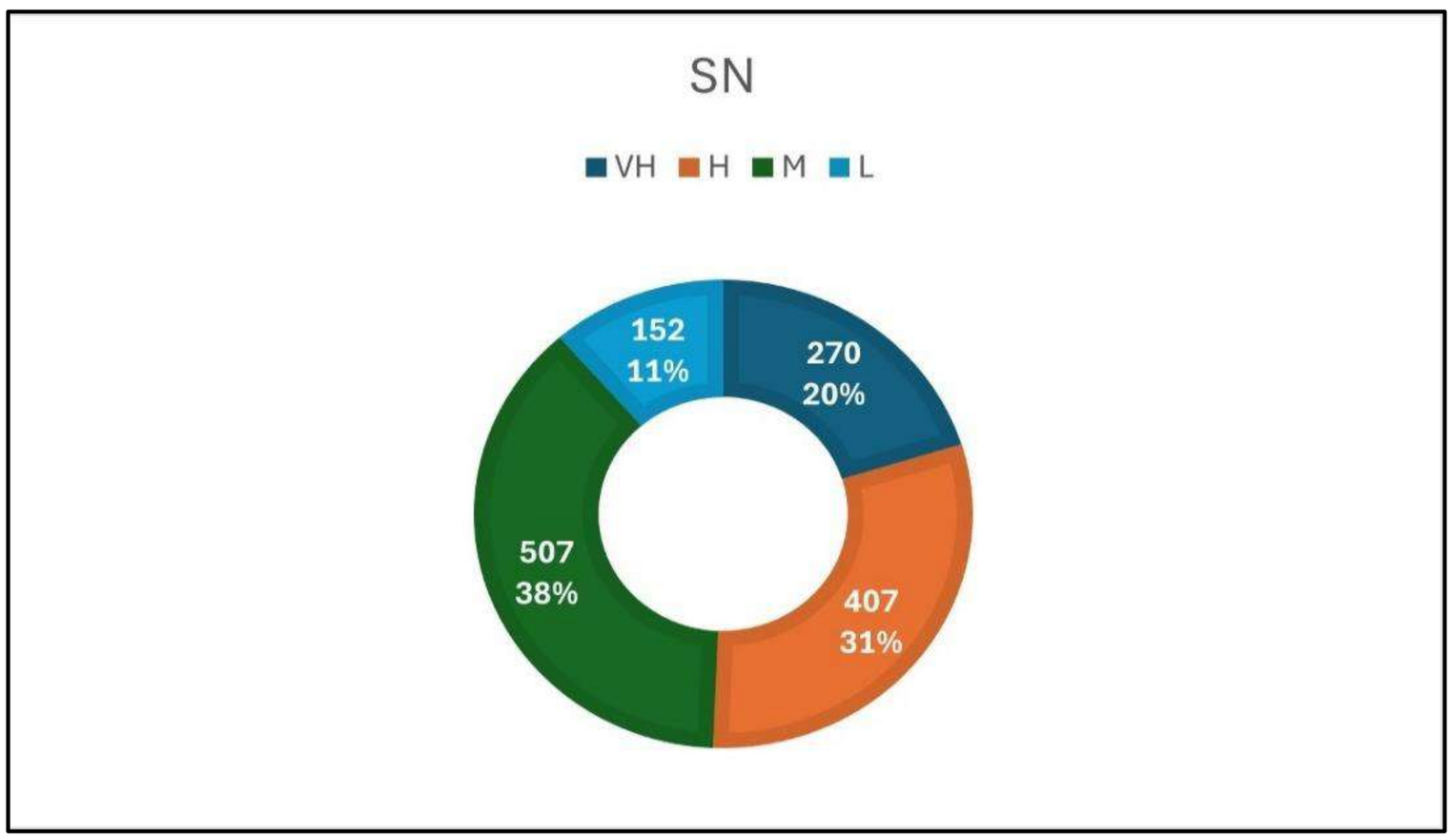


Table 4.2.2.2

The Summary of Person Level Subjective Nom

LEVEL	Respondents	Sex		School	
		F	M	S	V
VH	270	184	86	2O5	65
H	407	299	108	279	128
M	507	348	159	349	158
L	152	85	67	115	37
		916	420	948	388
Total	1336	1336		1336	

4.2.2.3 The Person Level of Perceived Behavioral Control

Students from School S exhibited higher levels of PBC compared to those from School V. At the Very High level, 9% of students from School S were represented, compared to 4% from School V. This pattern continued across other levels, indicating that students from School S felt more capable of influencing climate change. Gender analysis showed that female students demonstrated higher PBC levels than male students across all categories. The overall distribution indicated that most students fell into the moderate category (39%), followed by High (33%), Low (15%), and Very High (13%) categories.

Figure 16

The Person Level of Perceived Behavioral Control Based on School Type

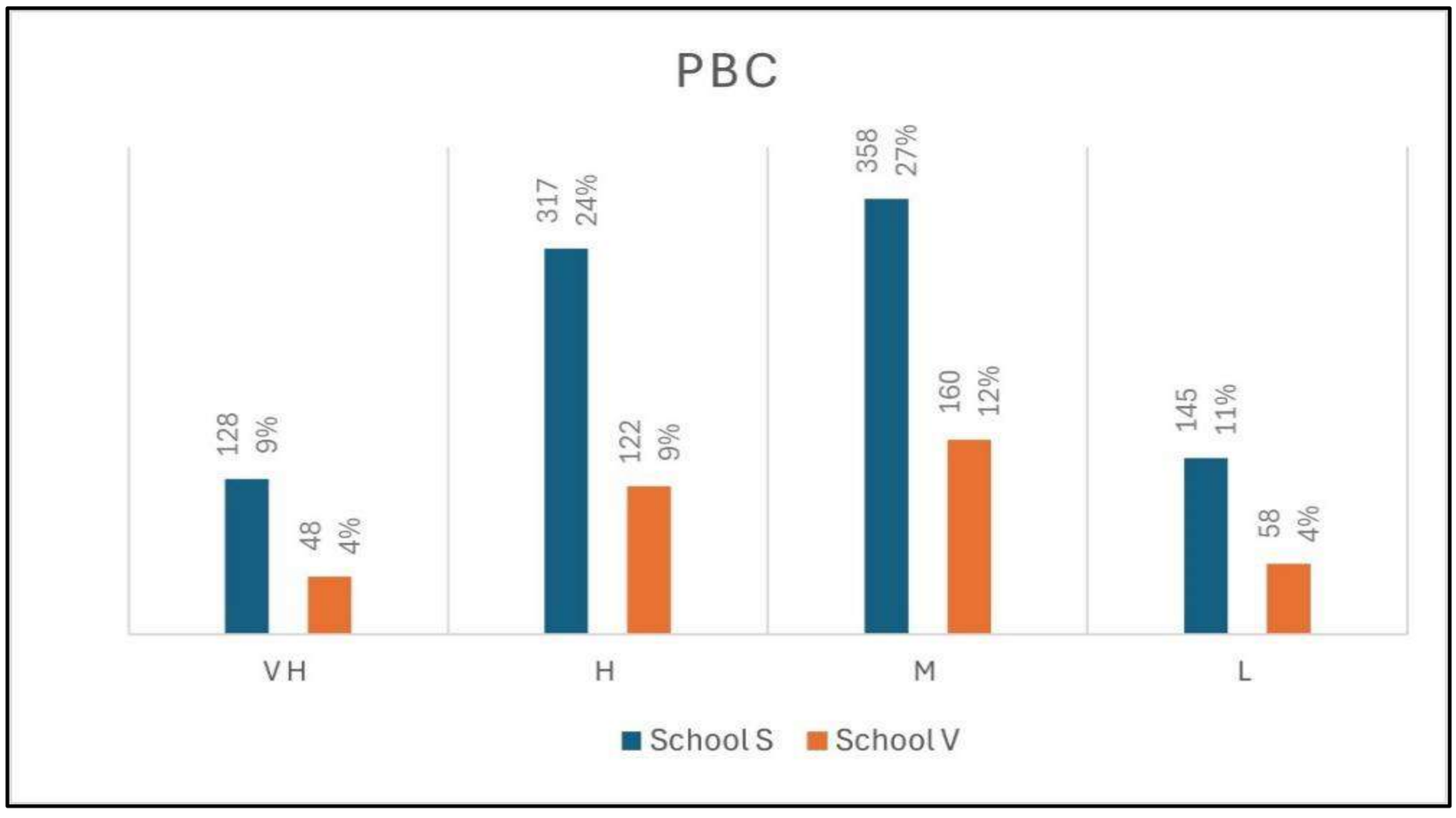


Figure 17

The Person Level of Perceived Behavioral Control Based on Gender

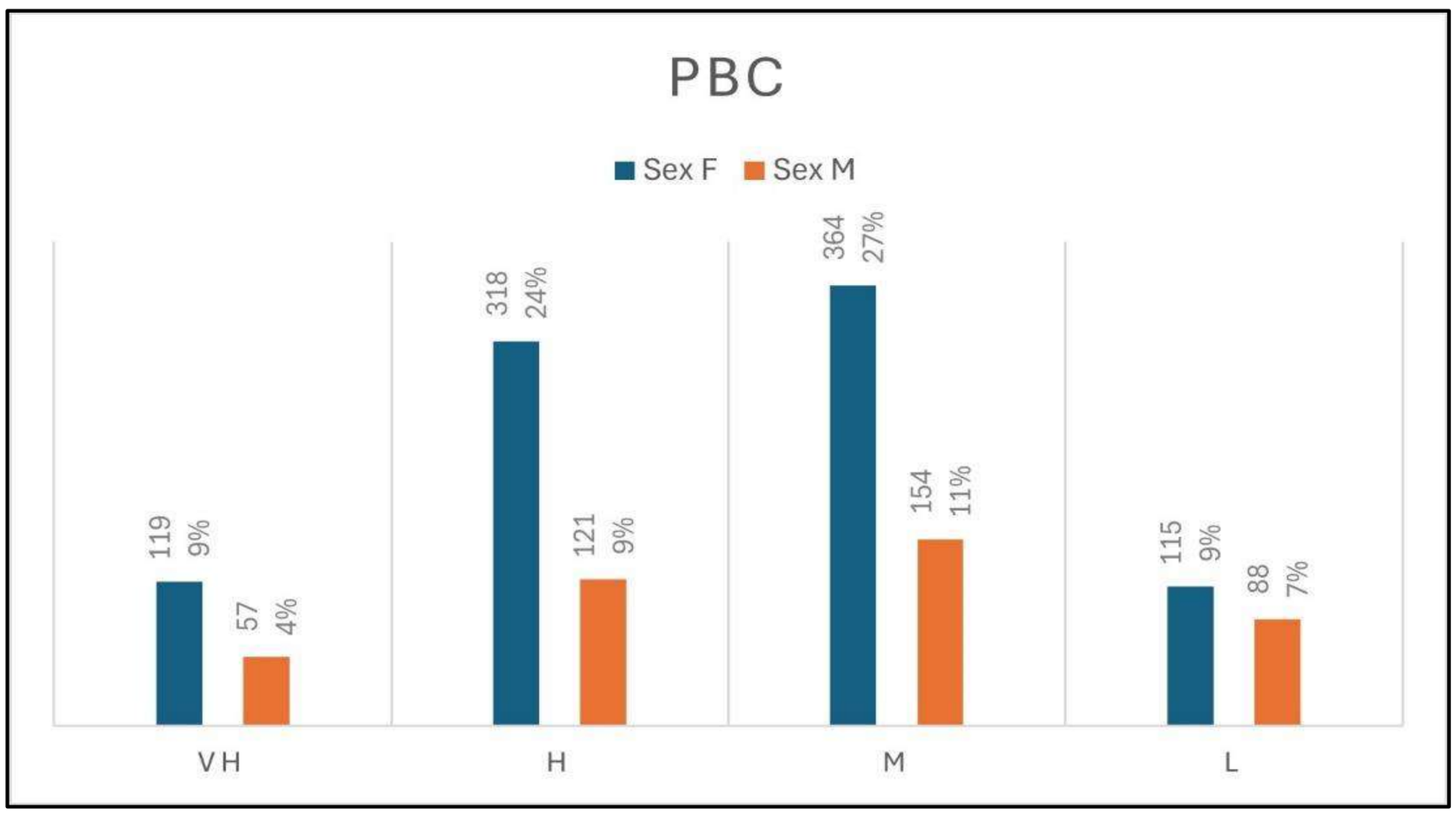


Figure 18

The Person Level of Perceived Behavioral Control Based on Total Respondents

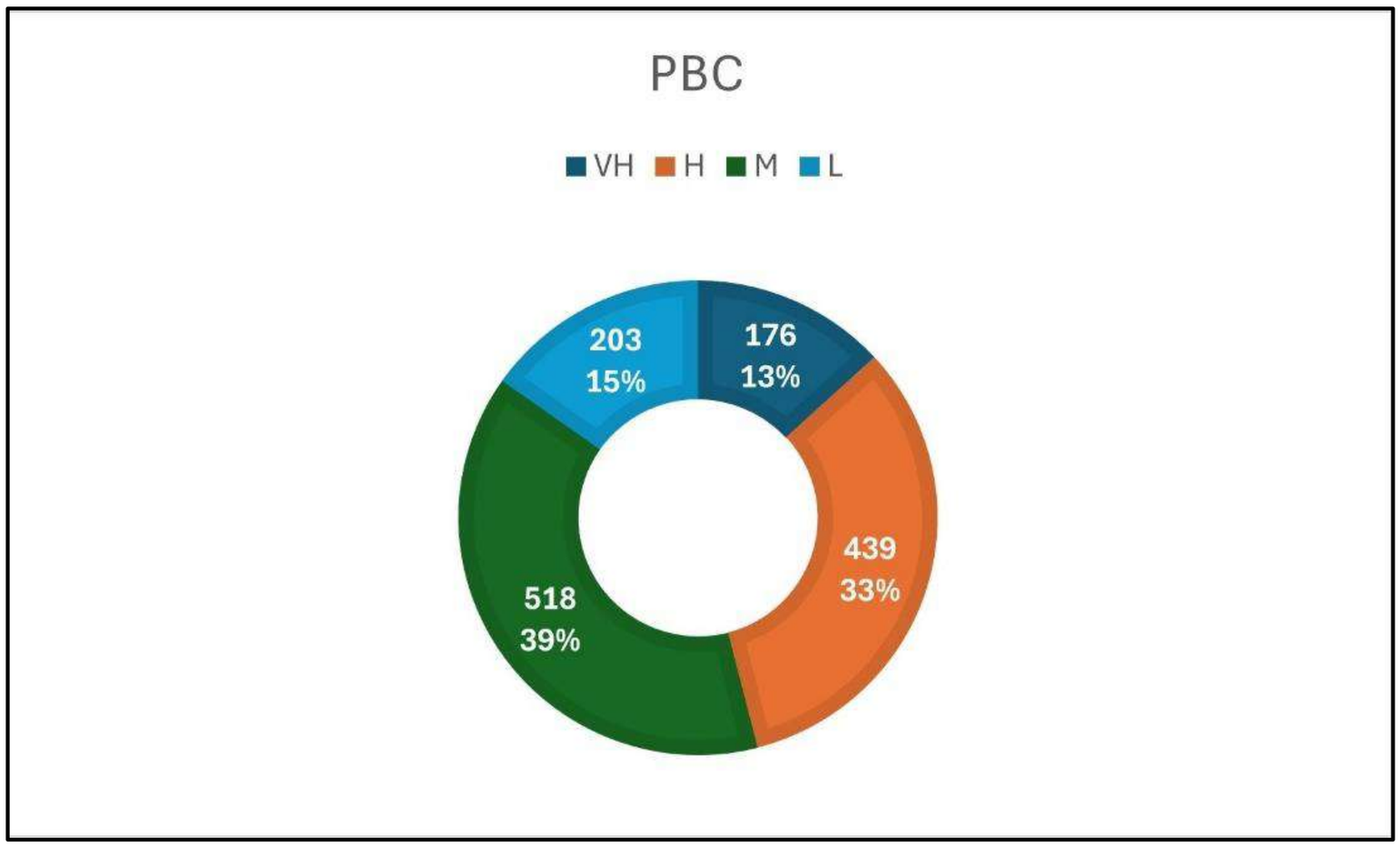


Table 4.2.2.3

The Summary of Person Level Perceived Behavioral Control

LEVEL	Respondents	Sex		School	
		F	M	S	V
VH	176	119	57	128	48
H	439	318	121	317	122
M	518	364	154	358	160
L	203	115	88	145	58
		916	420	948	388
Total	1336	1336		1336	

4.2.2.4 The Person Level of Behavioral Intention

Behavioral intention levels were significantly higher among students from School S compared to those from School V. Specifically, 27% of students from School S exhibited high BI, compared to 10% from School V. The trend persisted in the medium BI category, with 24% of students from School S versus 12% from School V. Gender-based analysis indicated that female students exhibited higher BI levels

towards climate change promotion compared to male students. The overall distribution of BI levels indicated that a substantial proportion of students were positively inclined towards promoting climate change awareness, with 38% in the high BI category, 36% in the medium BI category, and 10% in the low BI category.

Figure 19

The Person Level of Behavioral Intention Based on School Type

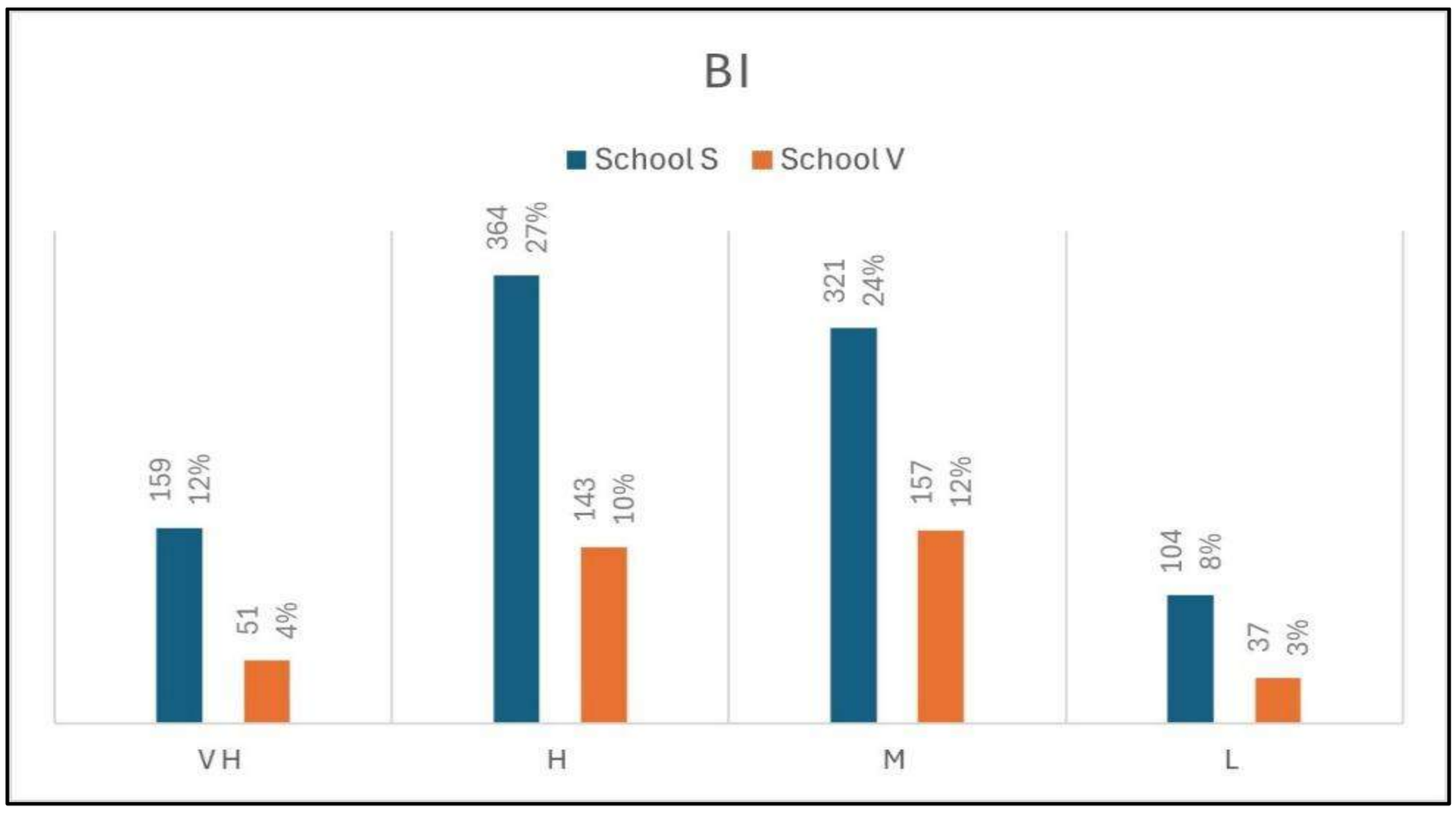


Figure 20

The Person Level of Behavioral Intention Based on Gender

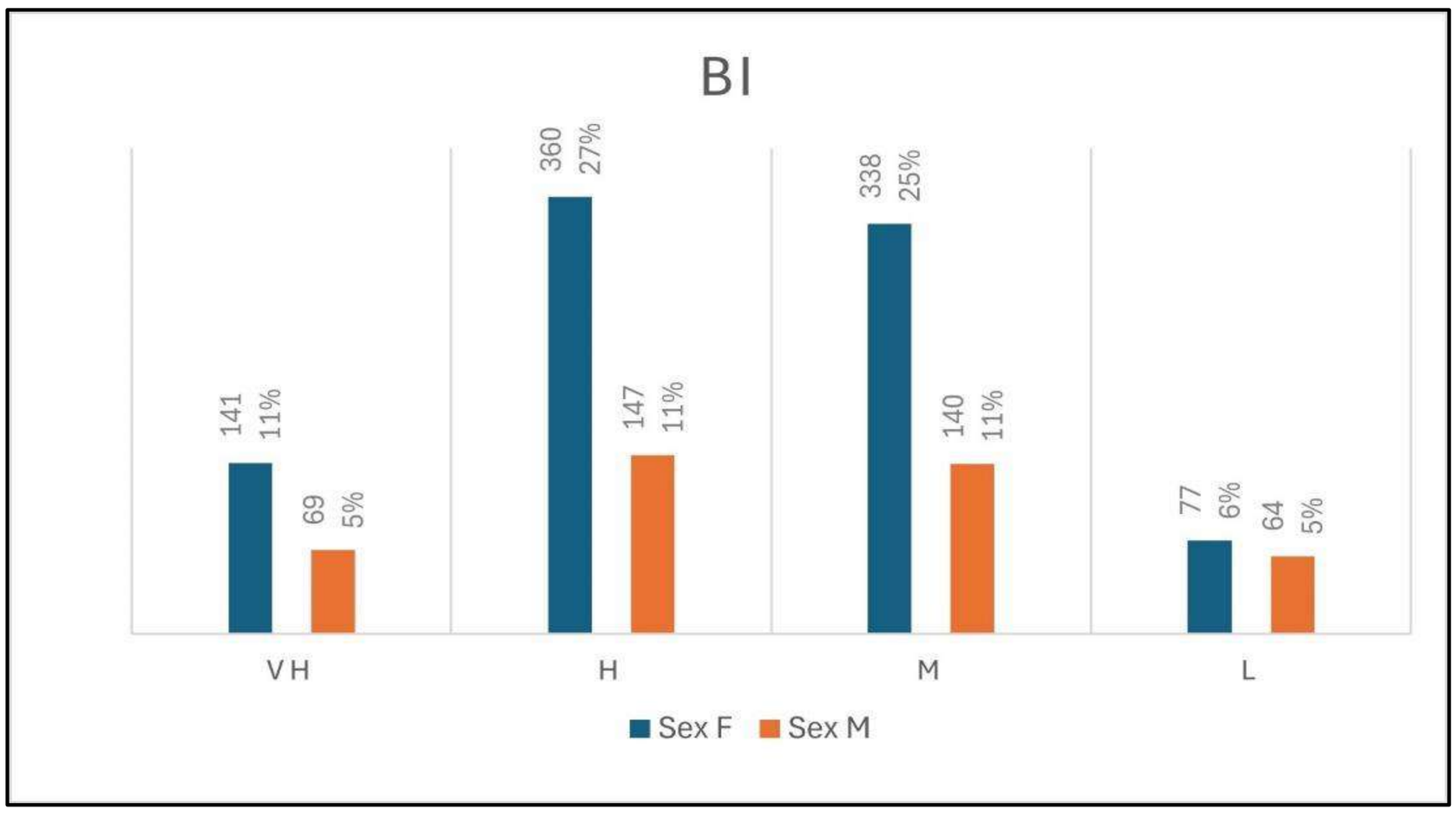


Figure 21

The Person Level of Behavioral Intention Based on Total Respondents

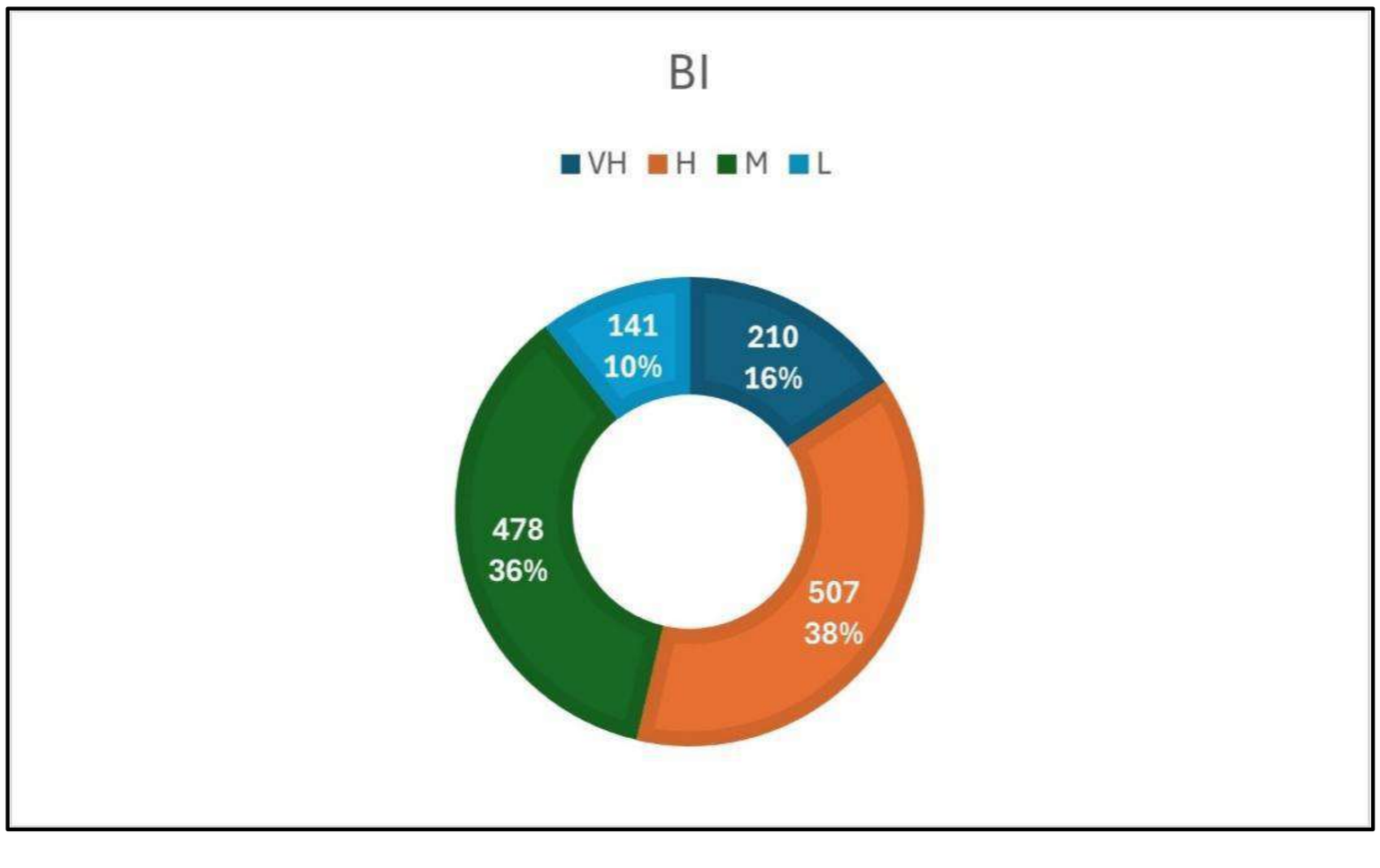


Table 4.2.2.4

The Summary of Person Level Behavioral Intention

LEVEL	Respondents	Sex		School	
		F	M	S	V
VH	210	141	69	159	51
H	507	360	147	364	143
M	478	338	140	321	157
L	141	77	64	104	37
		916	420	948	388
Total	1336	1336		1336	

4.2.2.5 The Person Level of Pro-Environmental Behavior

The study found significant disparities in PEB levels based on school affiliation and gender. Students from School S exhibited significantly higher PEB across all categories compared to those from School V. Gender-based analysis revealed that female students consistently demonstrated higher PEB towards climate change promotion compared to male students. Despite the generally positive inclination towards climate change awareness, 12% of students exhibited low PEB, highlighting barriers such as lack of awareness and perceived irrelevance of environmental issues.

Figure 22

The Person Level of Pro-Environmental Behavior Based on School Type

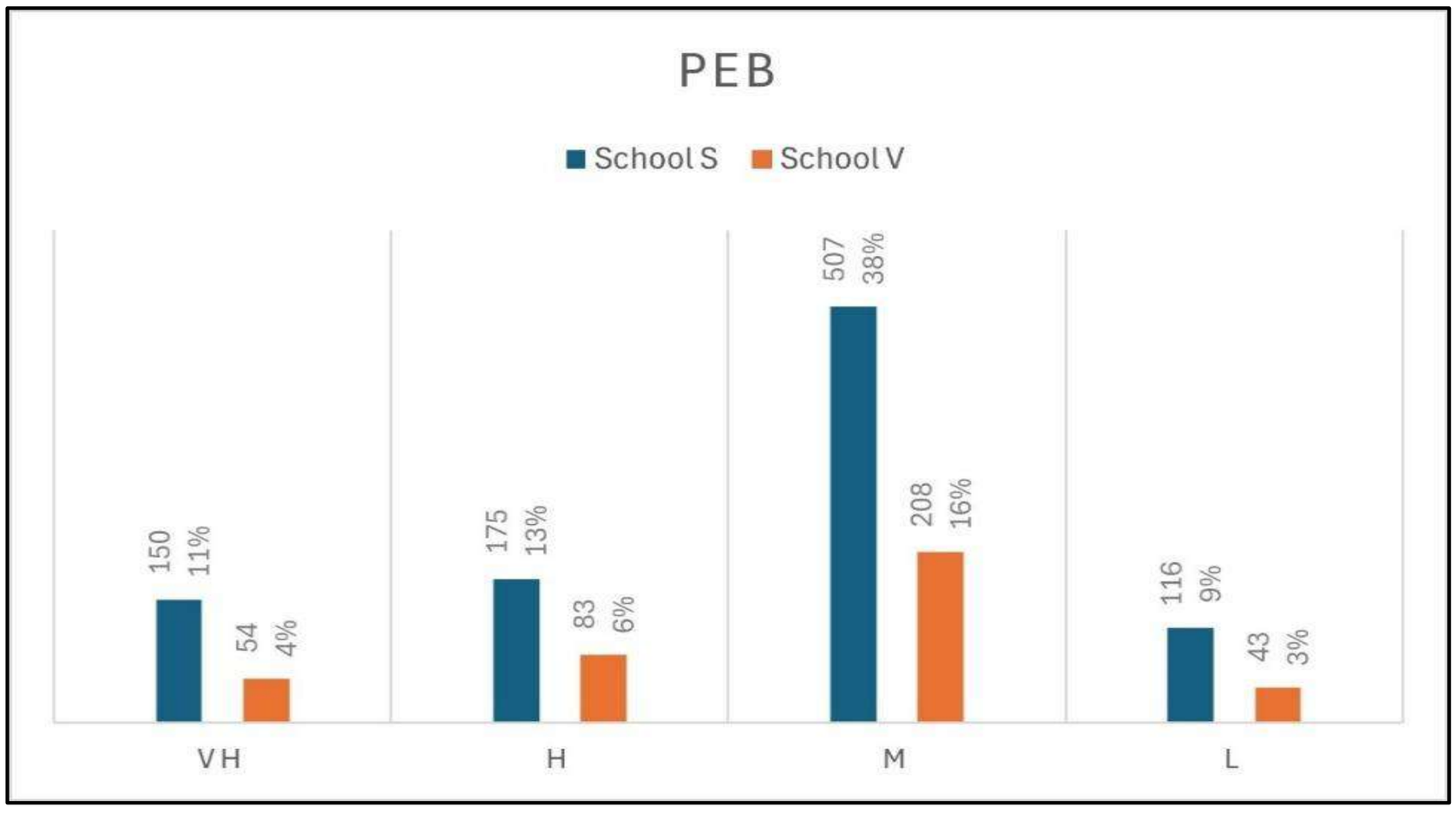


Figure 23

The Person Level of Pro-Environmental Behavior Based on Gender

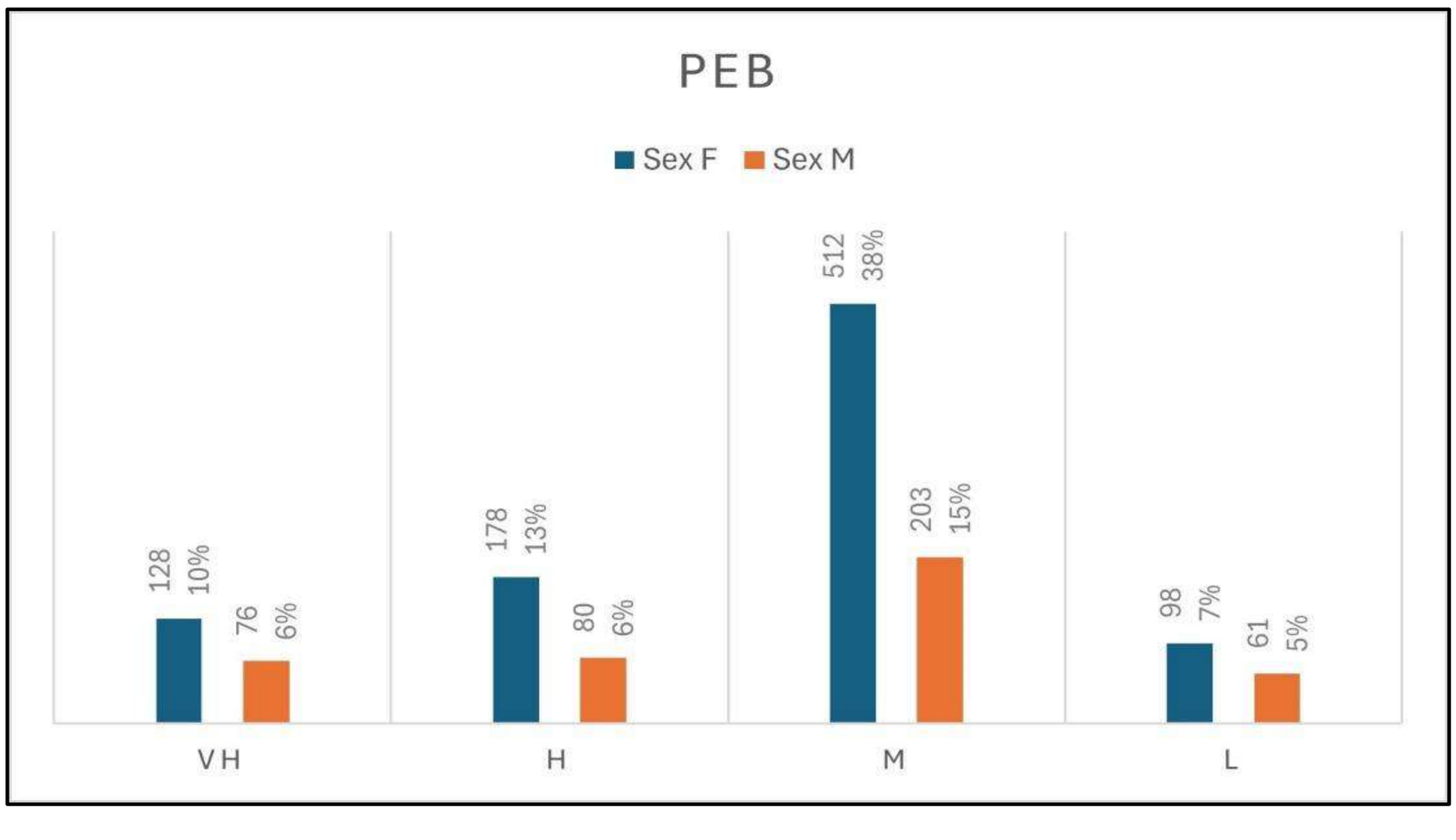


Figure 24

The Person Level of Pro-Environmental Behavior Based on Total Respondents

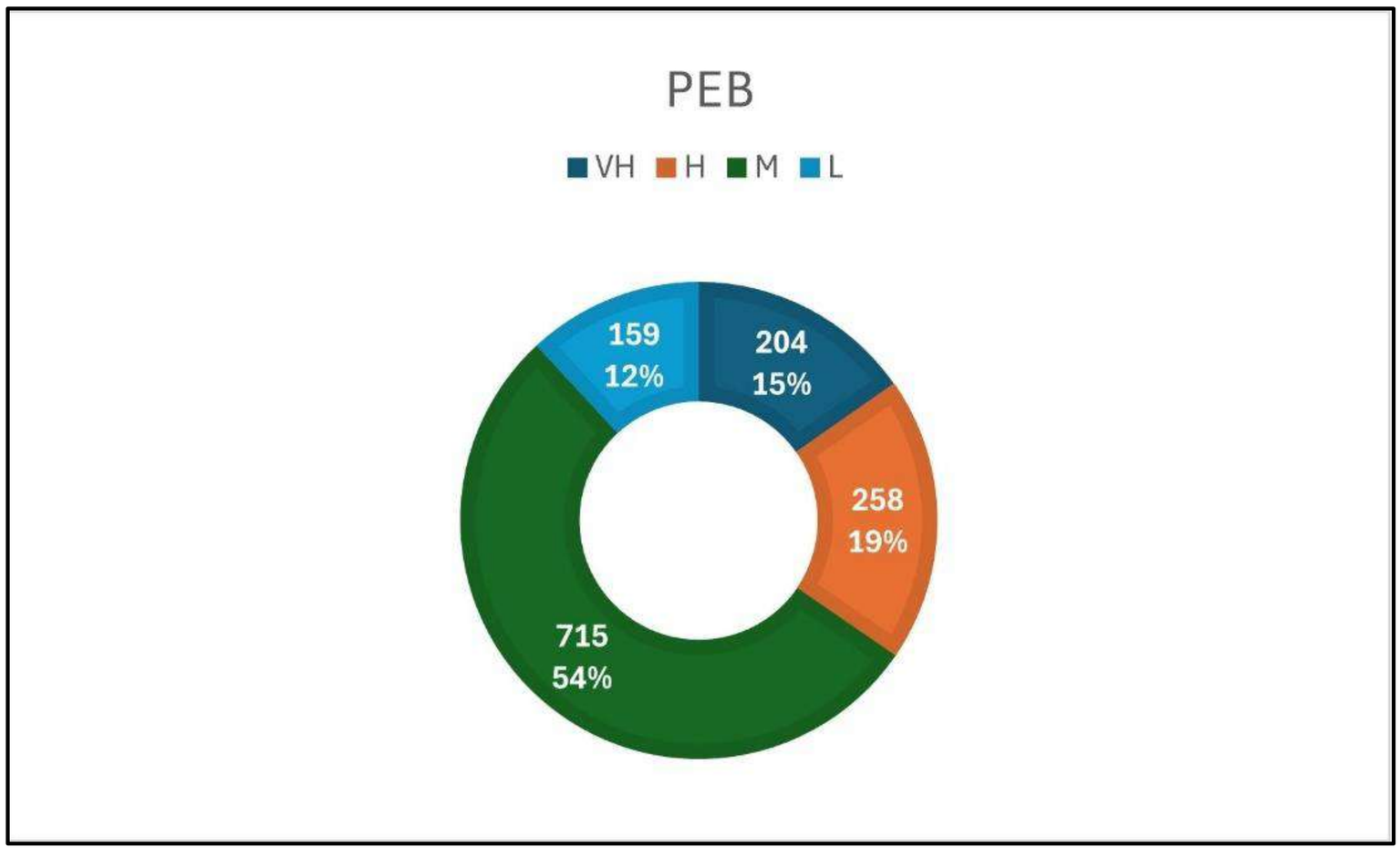


Table 4.2.2.5

The Summary of Person Level Pro-Environmental Behavior

LEVEL	Respondents	Sex		School	
		F	M	S	V
VH	204	128	76	150	54
H	258	178	80	175	83
M	715	512	203	507	208
L	159	98	61	116	43
		916	420	948	388
Total	1336	1336		1336	

4.3 The students' demographic data of attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change.

The second sub-chapter discusses the students' demographic data differences. It examines whether there are significance differences or not in term of the students' gender (female and male students) and school type (senior high school and vocational high school). The researcher employs the IBM SPSS program Version 26 to test those two students' demographic data. The ANOVA (Analysis of Variance) results provided indicate the significance of the gender differences in ATT, SN, PBC, BI, and PEB among high school students related to climate change.

4.3.1 Gender Differences in ATT, SN, PBC, BI, and PEB

Table 4.3.1

ANOVA Test Result of Gender Differences

		Sum of Squares	df	Mean Square	F	Sig.
ATT	Between Groups	.359	1	.359	.153	.696
	Within Groups	3138.546	1334	2.353		
	Total	3138.905	1335			
SN	Between Groups	21.455	1	21.455	6.736	.010
	Within Groups	4249.168	1334	3.185		
	Total	4270.623	1335			
PBC	Between Groups	27.404	1	27.404	4.354	.037
	Within Groups	8396.966	1334	6.295		
	Total	8424.370	1335			
BI	Between Groups	8.005	1	8.005	4.107	.043
	Within Groups	2600.125	1334	1.949		
	Total	2608.130	1335			
PEB	Between Groups	.262	1	.262	.094	.760
	Within Groups	3735.293	1334	2.800		
	Total	3735.555	1335			

The ATT's F-value is 0.153, with a significance (p-value) of 0.696. Since the p-value is greater than 0.05, it indicates that there is no significant gender difference in attitudes towards climate change among high school students based on demographic data. Conversely, the SN's F-value is 6.736, with a significance (p-value) of 0.010. Since the p-value is less than 0.05, it suggests a significant gender difference in subjective norms related to climate change among high school students. Similarly, the PBC's F-value is 4.354, with a significance (p-value) of 0.037, indicating a significant gender difference in perceived behavioral control related to climate change. The BI's F-value is 4.107, with a significance (p-value) of 0.043, which also shows a significant gender difference in behavioral intention towards climate change among high school students. Lastly, the PEB's F-value is 0.094, with a significance (p-value) of 0.760. Since the p-value is greater than 0.05, it indicates no significant gender difference in pro-environmental behavior towards climate change among high school students based on demographic data.

The ANOVA results indicate that there are significant gender differences in SN, PBC, and BI towards climate change among high school students based on demographic data. However, there are no significant gender differences in ATT and PEB. These findings suggest that demographic factors may influence students' perceptions of social pressures, their perceived control over performing behaviors, and their intentions to engage in behaviors related to climate change. However, their general ATT towards climate change and actual PEB do not seem to be significantly affected by demographic factors.

Figure 25

Mean Plot of Subjective Norm

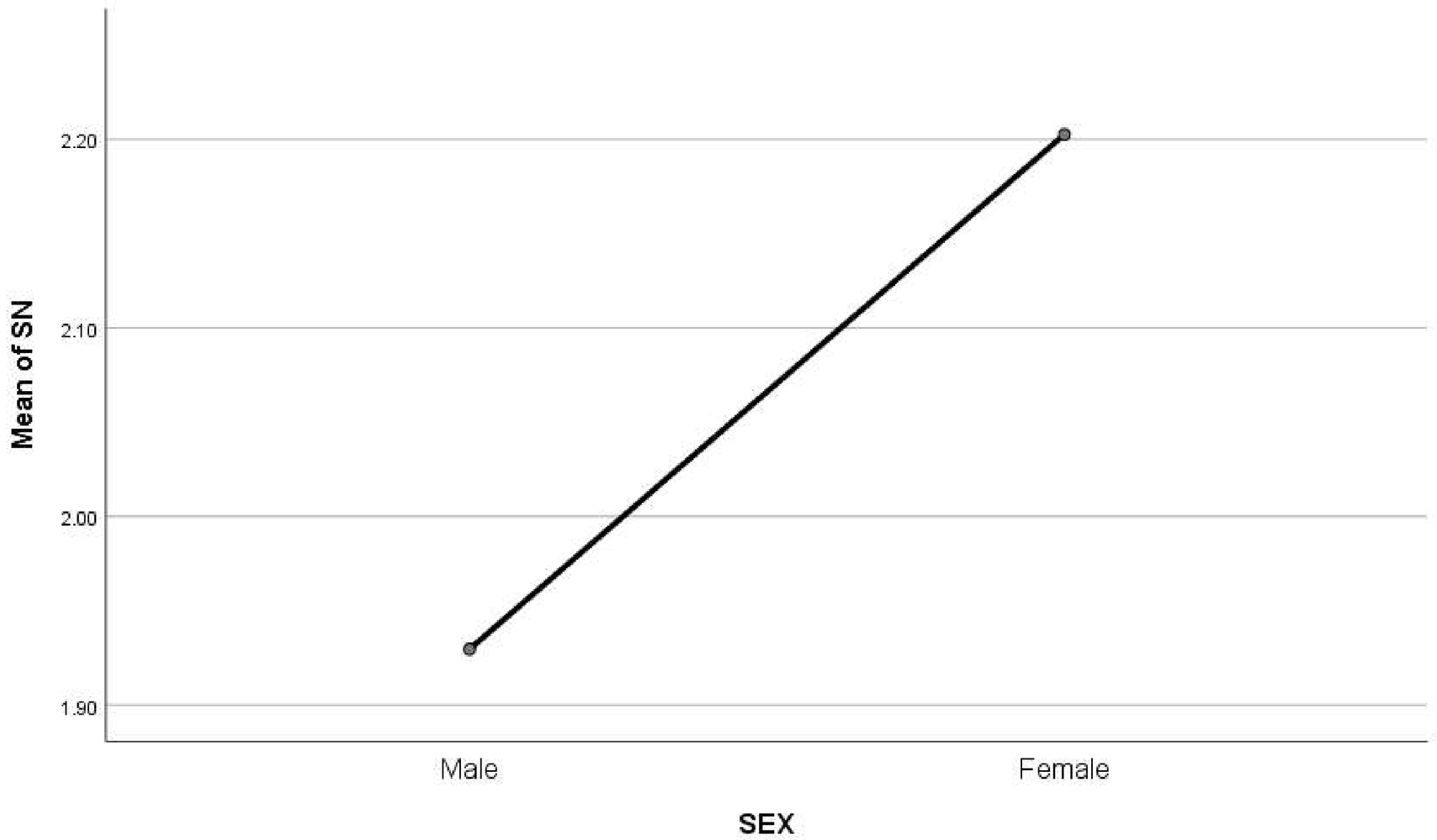


Figure 26

Mean Plot of Perceived Behavioral Control

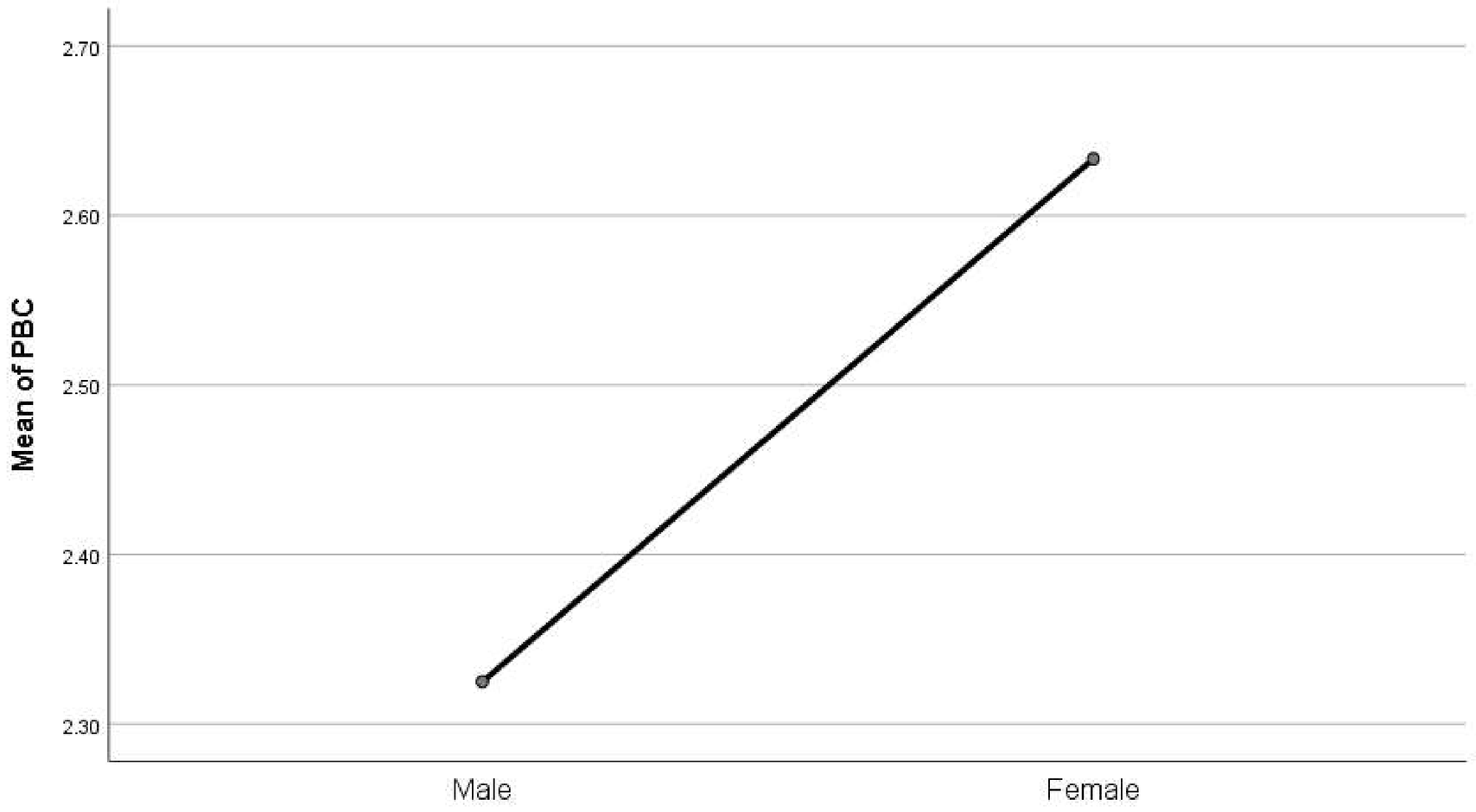
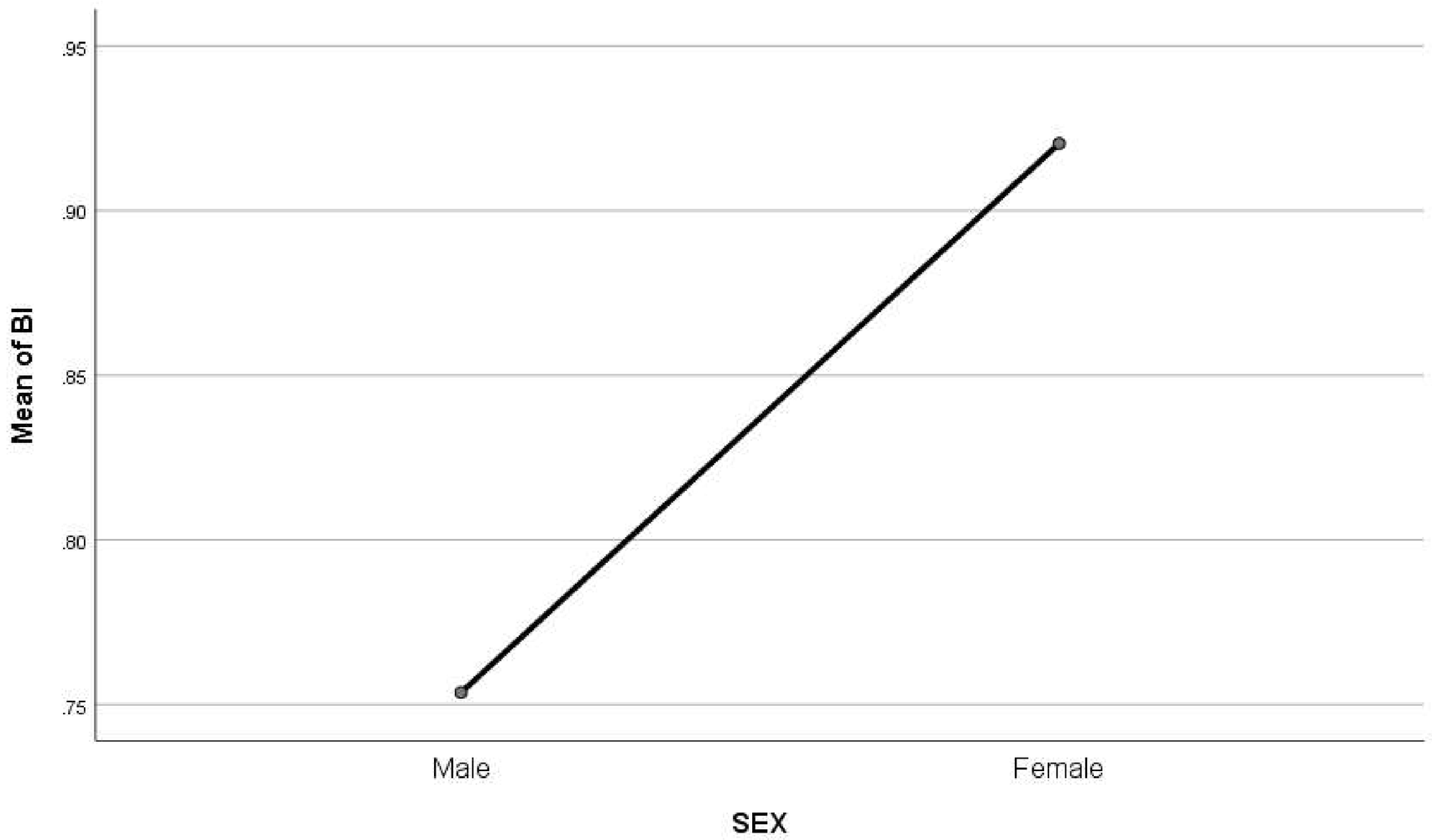


Figure 27

Mean Plot of Behavioral Intention



In accordance with the study that conducted by Shikangalah (2019), it discovered that the adolescents' intention to perform PEB are substantially influenced by the SN. The research finding of this context implies that the high school students' BI are determined by their peers and others' perceptions. Similarly, normative influences are also critical determinants of students' BI (Deshiana et al., 2022). Following to the TPB (Ajzen, 1991), PBC was also identified as an urgent factor in this study. Individuals who think that they have the skills to perform PEB in relation to climate change context are more likely to do the PEB implementation (Koul et al., 2021).

Another construct that is significant difference is BI. The substantial differences in BI indicate that demographic factors significantly influence the probability of

students' BI to engage in PEB (Lehnert et al., 2020). Additionally, females are more likely to exhibit higher SN, PBC, and BI than their male counterparts. This may be due to female socialization that focus on nurturing and caring. Desy et al. (2011) discovered that women view environmental dangers as more serious dan are more worried about environmental issues than men. Females may feel more social pressure and control over their PEB actions.

The lack of significant PEB differences shows a mismatch between high school students' BI and PEB, regardless the gender differences in SN, PBC, and BI. Showing the value-action gap in environmental behavior, where situational and structural impediments prevent students from acting on their explicit goals (Karami et al., 2017). Socioeconomic factors, resources availability, and institutional support can affect their PEB participation (Eze, 2020). Moreover, the results regarding the negligible gender differences in ATT toward climate change may be attributed to the general high level of environmental awareness among young people. In comparison to older generations, studies have shown that younger generations are generally more aware and concerned about climate change, irrespective of gender (Deshiana et al., 2022).

For the purpose to resolve these findings in a comprehensive manner, it is indespensible to implement multifaceted interventions that not only improve ATT and PEB but also reduce the obstacles to converting BI into actions. Educational programs should prioritize the enhancement of PBC by offering students practical knowledge and resources that facilitate the adoption of PEB. Additionally, the impact of SN on BI can be amplified by the cultivation of supportive social norms through community

engagement and peer-led initiatives. Addressing the barriers that hinder the translation of intentions into actions is essential for fostering a more sustainable and environmentally responsible youth population.

4.3.2 School Type Differences in ATT, SN, PBC, BI, and PEB

The ANOVA results indicate that there is a significant difference in attitudes ATT towards climate change between students from senior high schools and vocational high schools. However, there are no significant differences in SN, PBC, BI, and PEB. The ATT's F-value is 13.279, with a significance (p-value) of 0.000, indicating a significant difference in ATT towards climate change between students from senior high schools and vocational high schools. In contrast, the SN's F-value is 1.408, with a significance (p-value) of 0.236, indicating no significant difference in SN related to climate change between these groups. Similarly, the PBC's F-value is 0.123, with a significance (p-value) of 0.725, showing no significant difference in PBC. The BI's F-value is 0.337, with a significance (p-value) of 0.562, also indicating no significant difference in BI towards climate change. Finally, the PEB's F-value is 0.014, with a significance (p-value) of 0.907, indicating no significant difference in PEB between students from senior high schools and vocational high schools.

Table 4.3.2

ANOVA Test Result of School Type

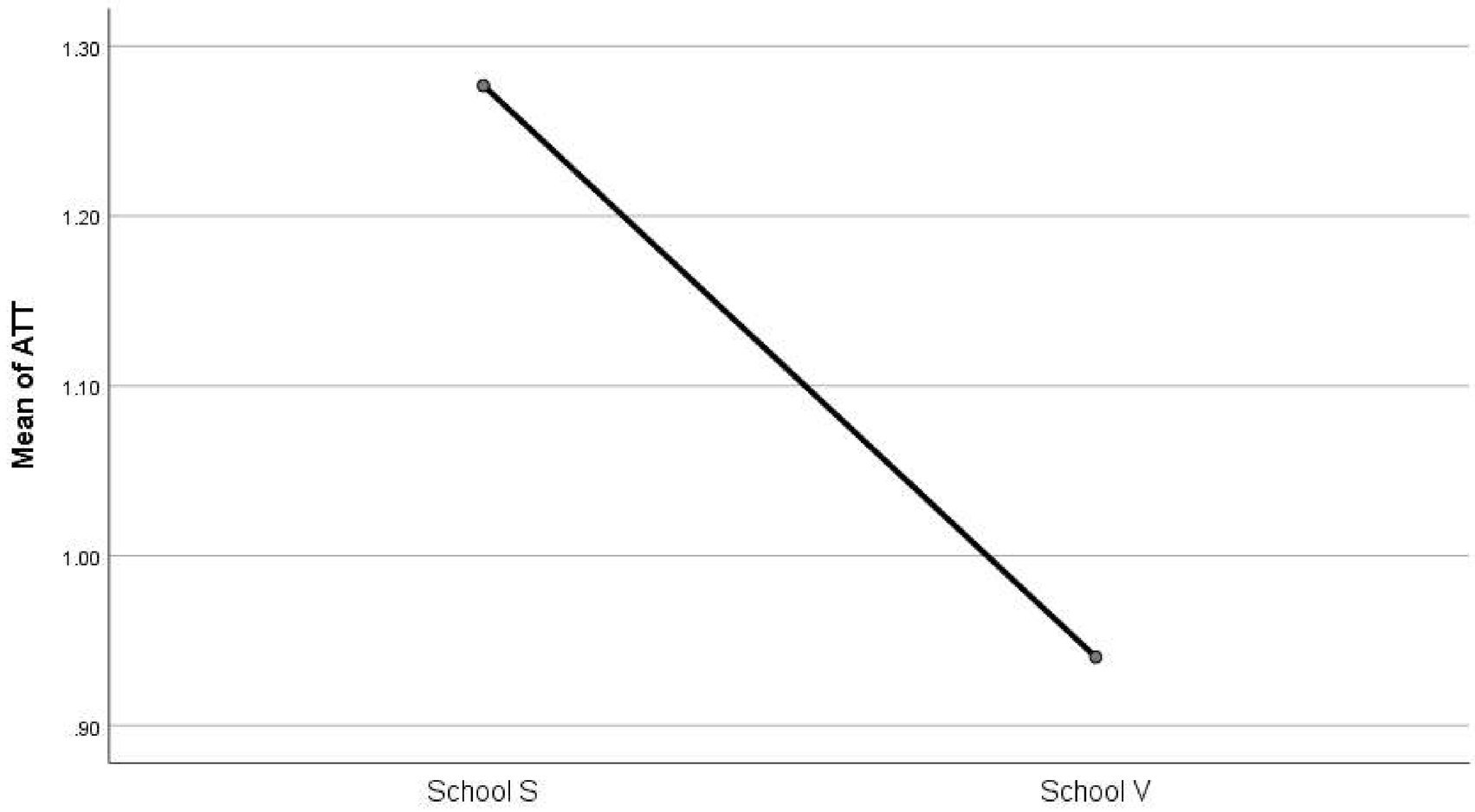
		Sum of Squares	df	Mean Square	F	Sig.
ATT	Between Groups	30.938	1	30.938	13.279	.000
	Within Groups	3107.967	1334	2.330		
	Total	3138.905	1335			
SN	Between Groups	4.502	1	4.502	1.408	.236
	Within Groups	4266.121	1334	3.198		
	Total	4270.623	1335			
PBC	Between Groups	.779	1	.779	.123	.725
	Within Groups	8423.591	1334	6.315		
	Total	8424.370	1335			
BI	Between Groups	.658	1	.658	.337	.562
	Within Groups	2607.472	1334	1.955		
	Total	2608.130	1335			
PEB	Between Groups	.038	1	.038	.014	.907
	Within Groups	3735.517	1334	2.800		
	Total	3735.555	1335			

The divergence in opinions about climate change indicates that the educational setting and curriculum in senior and vocational high schools have an influence on students' ATT. Recent study validates this claim, demonstrating that environmental education has a substantial impact on pupils' ATT regarding climate change. According to Deshiana et al. (2022), they discovered that most of senior high school students in South Sumatra, namely 95.7%, had a favorable disposition towards the efforts to alleviate climate change. Meanwhile, a study conducted by Azeiteiro et al. (2018) in Portugal, revealed that many Portuguese high school students acknowledge the occurrence of climate change and attribute it to human actions. However, in a study conducted by Taskin (2009), it was discovered that high school students who participated in more extensive environmental education programs exhibited more

favorable ATT towards the environment. Desabayla & Gueta (2023) explained that the exposure of high school pupils to environmental education has a substantial impact on the formation of their environmental attitudes.

Figure 28

Mean Plot of Attitude



The absence of significant differences in SN suggests that high school students in both types of schools experiencing similar social impacts on PEB. As what has been found by Shealy et al. (2019) educational culture had a significant impact on the formation of climate change ATT among first-year college students in the USA. It implies that, regardless of the types of school, the larger social environment may have a stronger influence in shaping students' SN.

Similarly, the two groups did not exhibit significant variation in PBC. According to the TPB (Ajzen, 1991), individual experiences and self-efficacy have a significant impact on PBC, rather than solely relying on the educational environment.

Wu & Otsuka (2021) found a week correlation between Shanghai high school students' behavior and their knowledge on climate change. It can be interpreted that such thoughts about one's own efficacy, may be more important. PBC is less sensitive to outside factor like school type. It is largely corelated with personal efficacy (Bamberg & Möser, 2007).

The finding also reveals that there were no significant variations in BI between the two groups. This suggests that the BI to engage in PEB is evenly distributed among both groups. Kaiser et al. (2005) propose that BI are typically influenced by a combination of ATT, SN, and PBC, rather than being entirely determined by the type of educational institution. Students who had a slightly good attitude toward eco-friendly behavior did not always lead to the PEB practices (Dopelt et al., 2020).

Factors other than school type might shaped the lack of substantial differences in PEB. Kollmuss and Agyeman (2002) emphasized the disparity between environmental attitudes and behaviors, noting that several obstacles, such as situational and psychological factors, can hinder the changing of ATT to PEB. Besides that, inclusive, comprehensive, and locally focused educational approaches may influence students' ATT and PEB among the Czech Republic, Portugal, and the UK (Kroufek and Nepraš, 2023). On the other hand, for the context of Czech, the students tend to doubt the effectiveness of measures to reduce global warming and less likely to fight for PEB (Lehnert et al., 2020).

Although the types of school have an impact on ATT regarding climate change context, the study suggest that it does not have statistically significant differences on

SN, PBC, BI, and PEB. The ATT difference indicates that the effort to transform knowledge into practical action, is not an easy job to handle. There are psychological barriers that may slow down the PEB practices (Gifford et al., 2011). Thus, educational stakeholders must focus on evaluating the high school students' self-efficacy and offer them a proper chance to involve in the good practice of PEB. In addition, creating a nurturing social atmosphere through peer-led initiatives and community engagement can enhance personal beliefs and promote environmentally friendly actions (Eze, 2020; Wodika & Middleton, 2020).

4.3.3 Differential Item Functioning Analysis

The goal of DIF analysis is to investigate whether there are significant gender and school types of differences in response to items across five constructs: ATT, SN, PBC, BI, and PEB. The DIF analysis was conducted by utilizing Winsteps Software version 3.73, followed by the procedures of Rasch Model measurement (Boone, 2014). It was conducted to examine potential item bias between female and male and senior high school and vocational high school students' respondents. There are three indicators to determine the presence of significant DIF among the constructs, those are the DIF contrast, Welch t-test, and Mantel-Haenszel.

The DIF contrast measures the difference in item difficulty between groups, with a positive value indicating the item is harder for the focal group (e.g., females), and a negative value indicating it is easier. DIF contrast values greater than 0.5 or less than -0.5 are considered significant. The Welch t-test evaluates the statistical significance of the difference in item difficulty between groups, with significant values

being greater than 2 or less than -2. The Mantel-Haenszel probability assesses the odds of different groups correctly answering an item, with a value below 0.05 indicating significance. An item is considered to have significant DIF if it violates all three criteria cumulatively.

The DIF analysis results for each construct, summarized in the Winsteps Version 3.73 output table 30 (Item: DIF, between/within), were further confirmed by several person DIF plots. The analysis showed that none of the items across the five constructs—ATT, SN, PBC, BI, and PEB—exhibited significant DIF based on the DIF contrast, Welch t-test, and Mantel-Haenszel probability (Zwick et al., 1999). A detailed output table is attached in the appendix.

According to Boone (2014), the absence of significant DIF suggests that the constructs measure the same underlying traits for different groups without bias. These findings are consistent with previous research in educational measurement, which has used similar methodologies to ensure the fairness of test items across diverse populations (Linacre, 2002). When DIF analysis shows no significant differences, it supports the validity and reliability of the constructs in measuring intended outcomes across various demographic groups. Our analysis similarly confirms that all five constructs measure the same underlying traits for both female and male senior high school and vocational high school students without bias.

The lack of DIF across gender and school types indicates that these constructs can be confidently used to measure variables such as attitudes, norms, control perceptions, intentions, and behaviors in a fair and unbiased manner. These results

align with previous studies emphasizing the importance of unbiased measurement tools in educational research (Cohen & Bolt, 2007). Therefore, the constructs of ATT, SN, PBC, BI, and PEB can be reliably used to assess these variables across both genders and different school types. Two DIF Plots below confirmed the fairness and unbiasedness of the constructs.

Figure 29

Attitude DIF Plot of Gender

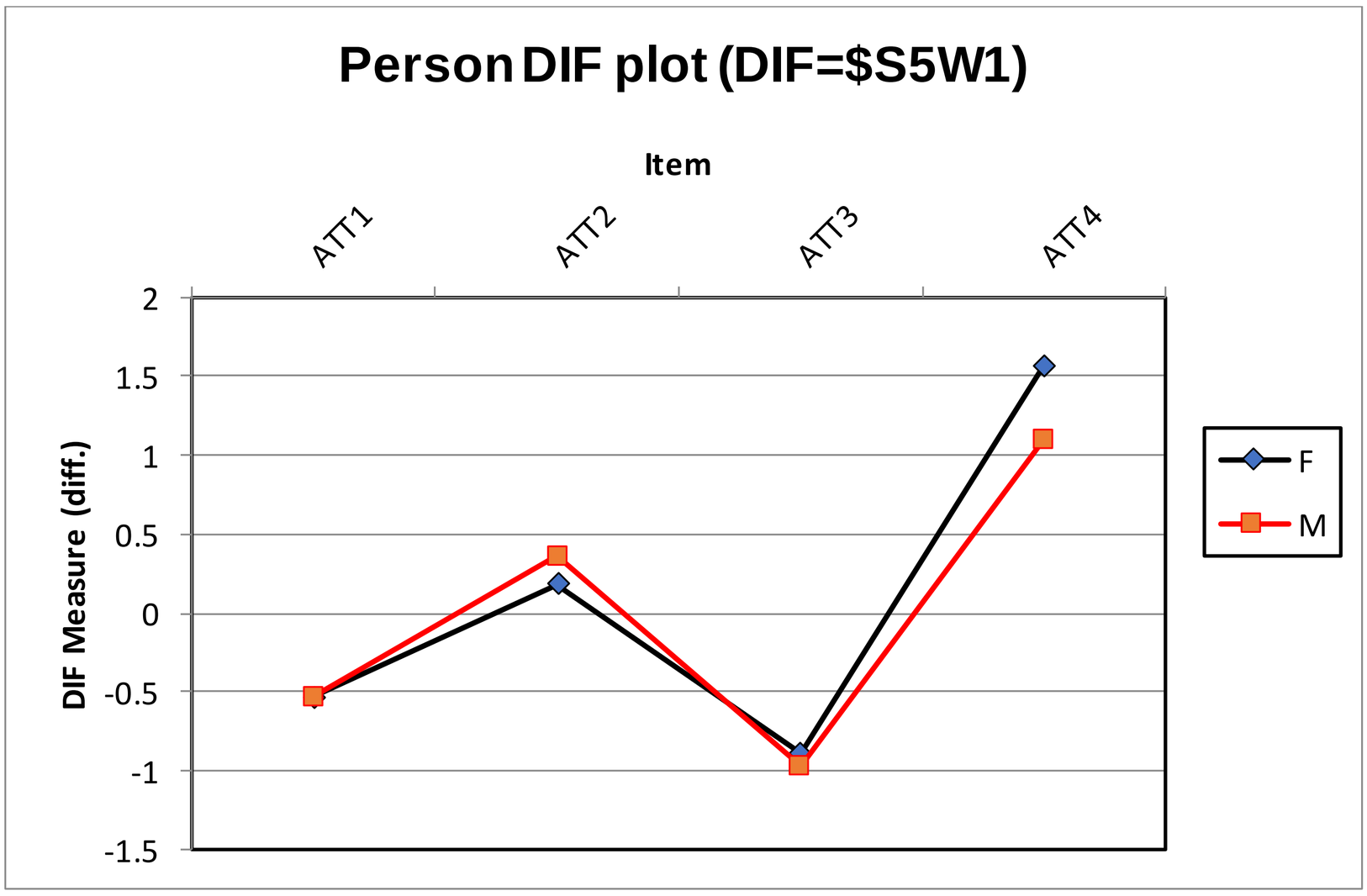
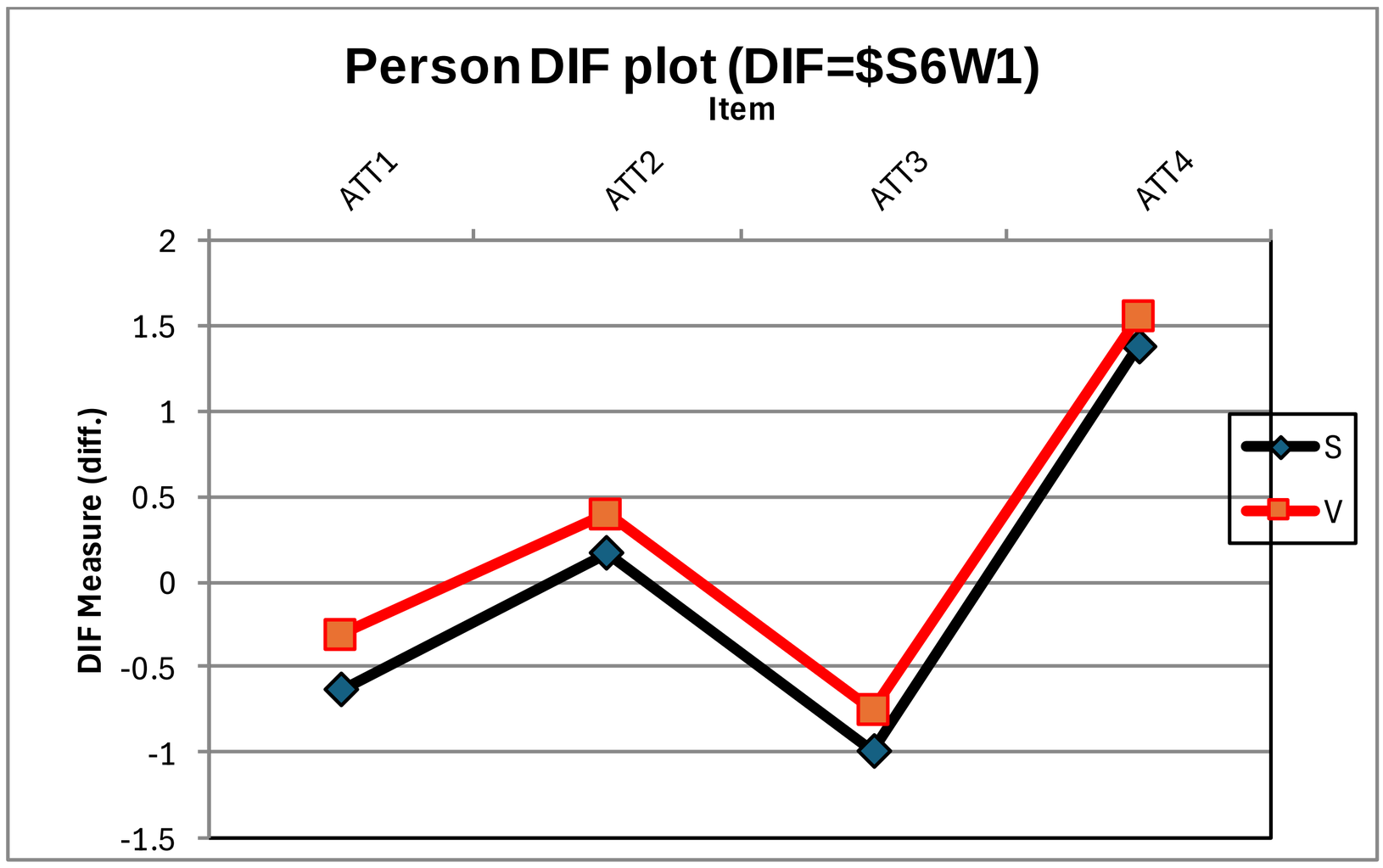


Figure 30

Attitude DIF Plot of School Type



4.4 The relationship between attitude, subjective norm, perceived behavioral control, behavioral intention, and pro-environmental behavior towards climate change among high school students

The correlation table provided shows the relationships between five variables: ATT, SN, PBC, BI, and PEB among high school students. All the correlations are significant at the 0.01 level (2-tailed), as indicated by the ** symbol. This means that there are statistically significant relationships between all pairs of variables.

Table 4.4

Correlation Test Result

		ATT	SN	PBC	BI	PEB
ATT	Pearson Correlation	1	.474**	.459**	.289**	.264**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	1336	1336	1336	1336	1336
SN	Pearson Correlation	.474**	1	.612**	.548**	.496**

	Sig. (2-tailed)	.000		.000	.000	.000
	N	1336	1336	1336	1336	1336
PBC	Pearson Correlation	.459**	.612**	1	.570**	.529**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	1336	1336	1336	1336	1336
BI	Pearson Correlation	.289**	.548**	.570**	1	.533**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	1336	1336	1336	1336	1336
PEB	Pearson Correlation	.264**	.496**	.529**	.533**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	1336	1336	1336	1336	1336

**. Correlation is significant at the 0.01 level (2-tailed).

Referring to the correlation table above, the researcher may easily interpret the given data. The key findings highlight significant relationships between various factors influencing high school students' pro-environmental behaviors. ATT shows a moderate positive correlation with SN (r = .474), PBC (r = .459), BI (r = .289), and PEB (r = .264). It suggests that students with a positive ATT towards climate change are more likely to feel social pressure and feel in control, thereby intending to engage in BI and performing them (PEB). Research consistently supports the significant influence of ATT on PEB. By way of illustration, Vicente-Molina et al. (2013) emphasized the worth of environmental knowledge in shaping attitudes and behaviors, suggesting that educational interventions can significantly enhance PEB.

SN exhibits a significant positive link with PBC (r = .612) and BI (r = .548), as well as a modest correlation PEB (r = .496). Students who have higher level of social pressure experiences possesses a greater sense of capability to engage in PEB since they are confident with their self-efficacy. Then as a result, they have stronger BI to

perform eco-friendly behaviors into practice in the daily lives. Previously comprehensive studies undertaken by Fornara et al. (2016), Galván-Mendoza et al. (2018), and Ates (2020) have proven that SN play a major role in influencing individuals' environmental behaviors.

Besides, PBC has a substantial positive correlation with BI (r = .570) and a moderate positive correlation with PEB (r = .529). It is quite strong in saying that high school students in Klaten Regency, Central Java Province, Indonesia are more inclined to have the BI to take part in environmentally friendly actions. Because they perceive themselves as having proper agency in carrying out the PEB practices. Referring to De Leeuw et al. (2015), individuals who have high confidence toward their abilities to do specific behaviors are more willing to engage in PEB. Similarly, Zhang et al. (2017) and Effendi et al. (2020) underlined that PBC has a critical role in promoting PEB. Further, the association between BI and PEB is moderate to significant (r = .533), indicating that students who have the intention to participate in PEB are more likely to practice these actions (Klöckner, 2013; Hagger et al., 2024). The mutuality between ATT, SN, PBC, and BI in forecasting PEB has been extensively demonstrated by Ates (2020). As well, it is consistent with the TPB (Ajzen, 1991).

Therefore, environmental-related knowledge is quite powerful in influencing PEB. Vicente-Molina et al. (2013) clearly discovered that both objective and subjective knowledge have a significant impact on PEB in students from various nations. Reflecting what have been found from the context of the study, the finding implies that education may play a crucial and urgent role in fostering environmental consciousness

and encouraging environmentally friendly acts toward high school students' or beyond. Furthermore, Karimi et al. (2021) discovered that having knowledge about the environment, in combination of using media, potentially increases the likelihood of embracing PEB and practicing in the daily basis. That's why consuming mass media or social media providing accurate information related to environmental problems in general and climate change problems in specific, is also considered alternative important way.

Besides that, eco-friendly decision is also affected by the gender differences. Research-based data informed that females tend to exhibit a higher propensity for participating in environmentally friendly actions compared to males. It is possibly because the female students demonstrate greater levels of PEB, such as recycling and energy conservation, in comparison to male (Meyer, 2016). Consequently, his research implies the necessity of specific measures or educational pedagogy to involve male students in PEB daily practices.

On the other hand, the study conducted by Runhaar et al. (2019) discovered, schools that provided clear environmental signals, such as environmental programs and easily accessible recycling bins, had pupils who were more likely to engage in PEB. In addition, personal experiences and role models have a substantial impact on environmental sensitivity. Yet, Sivek (2002) found that the amount of time spent outside and the presence of positive role models, such as approachable instructors, have a substantial influence on the level of environmental sensitivity exhibited by high school pupils.

The evidence above substantiates the hypothesis that ATT, SN, and PBC have an impact on students' BI to participate in PEB, which subsequently influence their actual real-world behaviors. These findings indicate that interventions targeting the improvement of PEB in high school students should prioritize the enhancement of ATT, utilization of SN, and empowerment of students' perceived control over their actions. The reported correlation data indicates statistically significant associations between ATT, SN, PBC, BI, and PEB among high school students. Every connection is statistically significant at the 0.01 level (two-tailed), suggesting strong links between the variables.

4.5 The strength contribution of attitude, subjective norm, perceived behavioral control, and behavioral intention to pro-environmental behavior toward climate change among high school students

The study explores the relationships among three independent variables (ATT, SN, PBC), one mediator variable (BI), and one dependent variable (PEB). The aim is to determine how these factors influence PEB and identify any mediating effects of BI. The analysis was conducted using the PROCESS macro model 4 v4.2 in IBM SPSS version 26 to assess the direct and indirect effects of the independent and dependent variables with BI serving as a mediator.

Table 4.5

Regression Analysis Using PROCESS Macro Hayes

Predictor	B	SE	t	p	95% CI for B
Mediator (BI)					
Constant	-0.180	0.048	-3.766	<.001	[-0.274, -0.086]
SN	0.260	0.022	11.832	<.001	[0.217, 0.303]

Predictor	B	SE	t	p	95% CI for B
ATT	-0.042	0.023	-1.847	0.065	[-0.087, 0.003]
PBC	0.216	0.015	13.899	<.001	[0.185, 0.246]
Dependent Variable (PEB)					
Constant	0.485	0.058	8.353	<.001	[0.371, 0.599]
SN	0.182	0.028	6.500	<.001	[0.127, 0.236]
BI	0.343	0.033	10.360	<.001	[0.278, 0.408]
ATT	-0.033	0.028	-1.199	0.231	[-0.087, 0.021]
PBC	0.174	0.020	8.672	<.001	[0.135, 0.213]
Total Effect Model (PEB)					
Constant	0.423	0.060	7.052	<.001	[0.305, 0.541]
SN	0.271	0.028	9.808	<.001	[0.217, 0.325]
ATT	-0.048	0.029	-1.660	0.097	[-0.104, 0.009]
PBC	0.248	0.020	12.727	<.001	[0.210, 0.286]
Total, Direct, and Indirect Effects of SN on PEB					
Total Effect	0.271	0.028	9.808	<.001	[0.217, 0.325]
Direct Effect	0.182	0.028	6.500	<.001	[0.127, 0.236]
Indirect Effect (via BI)	0.089	0.014			[0.063, 0.117]
Total, Direct, and Indirect Effects of ATT on PEB					
Total Effect	-0.048	0.029	-1.660	0.097	[-0.104, 0.009]
Direct Effect	-0.033	0.028	-1.199	0.231	[-0.087, 0.021]
Indirect Effect (via BI)	-0.015	0.008			[-0.032, 0.002]
Total, Direct, and Indirect Effects of PBC on PEB					
Total Effect	0.248	0.020	12.727	<.001	[0.210, 0.286]
Direct Effect	0.174	0.020	8.672	<.001	[0.135, 0.213]
Indirect Effect (via BI)	0.074	0.009			[0.057, 0.091]

Note: B = unstandardized regression coefficient; SE = standard error; t = t-value; p = p-value; CI = confidence interval.

The model explains 39% of the variance in BI, with an R^2 value of 0.3900. The overall model is statistically significant, as indicated by F (3, 1332) = 283.91 and a p-value less than 0.0001. In terms of coefficients, the ATT coefficient is -0.0422, which is not significant (p = 0.0650). This suggests that ATT does not have a significant effect on BI. On the other hand, the SN coefficient is 0.2602 and is highly significant (p < 0.0001), indicating that higher SN are associated with higher BI. Similarly, the PBC coefficient is 0.2157, also highly significant (p < 0.0001), implying that higher PBC is associated with higher BI.

The standardized coefficients for ATT, SN, and PBC are -0.0463, 0.3329, and 0.3876, respectively, reinforcing the finding that both SN and PBC have significant positive effects on BI. Specifically, as SN and PBC increase, individuals' BI to engage in PEB also increase. However, ATT does not have a significant effect on BI, suggesting that individuals' ATT towards the environment do not directly influence their intention to engage in PEBs.

The model explains 37.92% of the variance in PEB, with an R^2 value of 0.3792. The overall model is significant, as indicated by F (4, 1331) = 203.26 and a p-value less than 0.0001. In terms of coefficients, ATT has a coefficient of -0.0331, which is not significant (p = 0.2309), indicating that ATT does not have a direct effect on pro-environmental behavior. However, BI has a coefficient of 0.3429, which is highly significant (p < 0.0001), meaning that higher BI is associated with higher PEB. Similarly, SN has a coefficient of 0.1815, which is also highly significant (p < 0.0001), indicating that higher SN are associated with higher PEB. PBC has a coefficient of

0.1739, highly significant ($p < 0.0001$), suggesting that higher PBC is linked to higher PEB.

The standardized coefficients are as follows: ATT (-0.0303), BI (0.2865), SN (0.1940), and PBC (0.2612). These results imply that BI, SN, and PBC have significant positive effects on PEB. Specifically, individuals with higher intentions to engage in PEB, who feel social pressure to do so, and who believe they have control over these behaviors are more likely to take part in PEB. Conversely, ATT does not have a significant direct effect on PEB, suggesting that individuals' attitudes towards the environment do not directly influence their actual PEB.

The total effect of ATT on PEB is -0.0476, which is not significant ($p = 0.0973$). The confidence interval ranges from -0.1038 to 0.0087, including zero, indicating no significant total effect. Similarly, the direct effect of ATT on PEB is -0.0331, which is also not significant ($p = 0.2309$). The confidence interval ranges from -0.0873 to 0.0211, including zero, indicating no significant direct effect. The indirect effect of ATT on PEB through BI is -0.0145. The bootstrapped confidence interval ranges from -0.0332 to 0.0018, including zero, indicating no significant indirect effect (Hayes, 2022, p. 98-103). These results indicate that ATT does not have a significant total, direct, or indirect effect on PEB. This suggests that individuals' ATT towards the environment do not significantly influence their actual PEB, either directly or through their BI.

The considerable positive correlation between SN and BI ($\beta = 0.3329$, $p < 0.001$) and between SN and PEB ($\beta = 0.1940$, $p < 0.001$) indicates that students are

affected by social pressures and the expectations of important individuals when it comes to engaging in PEB. A meta-analysis study conducted by Morren & Grinstein (2016) provided confirmation that variables from the TPB, including PBC and SN, are important indicators of BI. It is suitable with De Leeuw at al. (2015), Ho et al. (2015), Masud et al. (2016), and Zhang et al. (2018) research papers that emphasized the significance of SN in BI. Thereby, an intervention that seeks for improving PEB in high school students should adequately utilize social norms and peer pressures to establish a conducive environment for PEB practice.

PBC and BI ($\beta = 0.3876$, $p < 0.001$) have a strong positive correlation and between PBC and PEB ($\beta = 0.2612$, $p < 0.001$) highlights the significance of students' perceptions of their capability to engage in PEB. Individuals who perceive a higher level of control over their behavior are more likely to engage in environmentally friendly actions (Effendi et al., 2020; Correia et al., 2021; Karimi & Mohammadimehr, 2022; and Hagger et al., 2022). PEB can be achieved by implementing educational programs and providing practical support to enhance students' perceived control (Phang & Ilham, 2023).

Furthermore, the SN and PBC constructs are statistically significant mediated by the BI variable which is in line with the planned behavior theory (Ajzen, 1991). The notable pathway from BI to PEB (with a β coefficient of 0.2865 and a p-value less than 0.001) emphasizes the important role of the BI construct in converting SN and PBC into tangible or concrete daily actions. This mediation effect is in accordance with the results of other recent studies that have used the TPB in their environmental research

contexts. Masud et al. (2016), Liao et al. (2016), Butt et al. (2019), El-Deeb et al. (2020), La Barbera & Ajzen (2020) have shown that intentions play a significant role in determining PEB.

Hence, employing goal setting and commitment as the research-based interventions might successfully enhance high school students' inclination towards PEB, leading them to increase the engagement in PEB. As what has been stressed by Ho et al. (2015, It is essential to acknowledge that mere intentions may not always result in action, especially when faced with institutional obstacles or conflicting motivations. That's why the transformation of students' eco-friendly character must be interfere directly by the educational institutions by designing all-inclusive school programs.

Surprisingly, the ATT construct in the context of this study did not have a significant impact in predicting PEB, either directly or indirectly through the mediating variable BI. The insignificant direct effect of the ATT is (β = -0.0303, p = 0.2309) and the insignificant indirect effect through the mediating variable of BI. Similarly, the high school students' ATT to climate change do not have a substantial impact on determining PEB through the mediating variable BI. Wan et al. (2014), Hasan et al. (2015), Siswono et al. (2020), and Tamar et al. (2021) conducted studies that show the significance of SN and PBC in influencing the BI and PEB of students. The absence of a substantial impact of ATT on PEB, as demonstrated in this study, is also acknowledged in another investigation. Wijaya and Kokchang (2023) discovered that

ATT had no significant impact on PEB toward Generation Z's endorsement of Indonesia's energy transition.

The research discovery challenges the previous studies that indicates a positive link between good attitude toward environmental issues and higher level of PEB (Kollmuss & Agyeman, 2002; Oreg & Katz-Gerro, 2006). However, the more current research conducted by Gkargkavouzi et al. (2019) and Geiger et al. (2018) align with the finding of this study, particularly when SN and PBC are involved. One reason could be that while students might have positive feelings about climate change, but unfortunately, the ATT itself is not enough to drive or to transform into an action unless it is supported by reinforcing SN and PBC.

The crucial roles of SN and PBC emphasize the urgency for educational stakeholders to build students' positive ATT and strengthen the high school students' SN and PBC. Therefore, leveraging SN and creating collective norms and peer-led activities are the educational campaigns and initiatives that should be focused on to encourage environmentally friendly actions. Thus, ensuring these standards are internalized rather than merely followed due to social pressure is crucial (Fang, 2021). Furthermore, the necessary resources, the skills training, and the sufficient opportunities for students to practice their PEB must be properly provided by the educational stakeholders in charge in any school types and levels regardless the students' gender. At the same time, it is quite crucial to recognize the external barriers that might hinder the students' ability to involve themselves in such actions (Karimi et al., 2021).

CHAPTER 5
CONCLUSION

The conclusion chapter is divided into three sub-chapters, the summary of findings, the recommendations, and the limitations of the study. Numerous beneficial insights have been provided by this research which explores high school students' ATT, SN, PBC, BI, and PEB about climate change in Klaten Regency, Central Java Province, Indonesia. The finding emphasizes the urgency of transforming CCE through incorporating climate change topics into the national educational curriculum to enhance students' comprehension and involvement regarding climate-related eco-friendly behavior.

5.1 Summary of Findings

High school students' ATT, SN, PBC, BI, and PEB regarding climate change in Klaten Regency, Central Java Province has been explored in this study. The first profound exploration was conducted by using the Rasch Model Measurement in Winsteps Software version 3.73. As the researcher analyzed how students responded to different items and how challenging they found the items according to them. The findings showed that students concluded the statement, "I am willing to pay a certain amount to reduce the impact of climate change," as the most difficult item to agree on it. This is poor indication because it shows that they are reluctant to make financial sacrifices and have limited personal experience with the serious consequences of climate change (Graham et al., 2019; Koul et al., 2024). Conversely, another tough statement for them to agree was, "The current global warming is a natural occurrence,

not a result of human activities." Again, it was terrible one because certainly it suggested that high school students have a limited understanding about the causes of climate change (Chang & Pascua, 2016).

When it comes to SN, the most challenging item for the high school students was the statement, "I engage in conversation about climate change with peers or family." It highlights that the discussions about climate-related problems are infrequent. It is likely due to the insufficient understanding and awareness on the problems; thus, students have trouble to relate (Feierabend et al., 2012; Azeiteiro et al., 2018). On the other hand, the easiest item was, "I expect others to act," showing that students tend to rely on others to take responsibility for climate action (Busch et al., 2019). The expectation that others would act was also the easiest item associated with PBC, indicating a diffusion of responsibility (Chang et al., 2016; Shealy et al., 2019).

The statement, "I am willing to change my lifestyle to combat climate change," was the hardest for students in terms of BI, reflecting their hesitation to adopt eco-friendly lifestyles (Herman, 2015). However, students found it easier to agree with items related to collective action. The most challenging environmentally friendly behavior was, "I utilize public transportation," showing resistance to changing transportation habits. Students also struggled with reducing waste and cutting power consumption (Bofferding & Kloser, 2015).

The demographic data analysis revealed that female students generally showed higher levels of all the constructs: ATT, SN, PBC, BI, and PEB toward climate change compared to male students. Taking one example, female students displayed higher

level of SN. It probably indicates that they felt more social pressure and encouragement to engage in climate change actions. Furthermore, there were also notable differences among students from different types of school, senior high school and vocational high school. A study by Gniewosz and Noack (2008) found that senior high school students had higher levels of constructs than vocational high school students, suggesting that educational environment significantly influences these factors. Overall, both gender and school type substantially impact students' ATT, SN, PBC, BI, and PEB regarding climate change.

Further ANOVA analysis of students from different school types revealed noticeable differences in ATT, with senior high school students showing more favorable ATT toward climate change, implying the potential influence of the educational setting. However, there were no significant differences in SN, PBC, BI, and PEB among the groups. A review of DIF found no statistically significant differences based on gender or school type, recommending the constructs tested were consistent and impartial across various demographic groups (Boone, 2014).

Afterwards, the study also investigated the relationship among ATT, SN, PBC, BI, and PEB. The correlation test finding illustrated positive associations among all these variables. In detail, ATT showed a moderate correlation with SN and PBC, and low correlation with BI and PEB. SN had strong associations with PBC and BI, and a moderate association with PEB. Similarly, the PBC was highly connected with BI and modestly correlated with PEB. The stud by Wu & Otsuka (2021) found significant and positive relationships between BI and PEB. These results suggest that students with

favorable views about climate change are more likely to be influenced by social norms, feel a sense of control, and be willing to engage in and carry out environmentally friendly actions, aligning with the Theory of Planned Behavior (Ajzen, 1991).

The study showed that SN and PBC strongly predicted BI, with standardized coefficients of 0.3329 and 0.3867, respectively ($p < 0.0001$). It implies that external influences and a sense of control significantly impact students' motivation to participate in environmentally friendly behaviors. There was also a strong relationship between BI and PEB, with standardized coefficient of 0.2865, which was statistically significant at $p < 0.001$. Surprisingly, ATT did not have a notable direct or indirect impact on PEB, illustrating that social norms and perceived control play a more crucial role in motivating ecological actions. The model accounted for 39% of the variability in BI and 37.92% of the variability in PEB, emphasizing the significant influence of SN and PBC on students' PEB (Ignell et al., 2018).

5.2 Recommendation

To promote PEB among high school students and beyond, the researcher through this study recommends several strategies for educational stakeholders such as the educational policy maker, educational institutional directors, the school principal, educators, and/ or educational practitioners. First, integrating climate change topics across various subjects can help students understanding its importance. Second, adopting gender-sensitive approaches and making environmental education mandatory at all levels of schooling. Lastly, providing resources and professional development for

teachers is crucial, along with creating supportive environments that encourage student participation in sustainability activities.

Those three strategies above can help educational institutions nurture environmentally conscious individuals dedicated to mitigating climate change (Kim, 2020; Cordero et al., 2020). The study highlights the need for comprehensive CCE that not only imparts knowledge but also fosters social norms and boosts students' self-efficacy. By addressing these factors, educational programs can effectively promote PEB and contribute to broader efforts to combat climate change.

5.3 Limitation

As is common with research, there must be limitations. At least it indicates two things, the researcher limitation to explore the topic and the width topic that must be covered by himself. Thus, to take the highest possible benefits for the sake of educational field practices, further intense research is highly necessary to be conducted by other researchers to answer other factors that may affect PEB, like environmental knowledge, awareness and personal beliefs, to gain a deeper understanding of the underlying mechanisms about climate change. Investigating these relationships in different contexts and among various demographics will also enhance the generalizability of the findings. Moreover, conducting experimental studies could provide more definitive evidence on causal relationships and the effectiveness of interventions (Chang et al., 2022).

REFERENCES

A new green learning agenda: Approaches to quality education for climate action | Brookings. (2022, March 9). Brookings. https://www.brookings.edu/articles/a-new-green-learning-agenda-approaches-to-quality-education-for-climate-action/

Adger, W. N., Butler, C., & Walker-Springett, K. (2017). Moral reasoning in adaptation to climate change. *Environmental Politics*, *26*(3), 371-390, DOI: 10.1080/09644016.2017.1287624

Adyasari, D., Pratama, M. A., Teguh, N. A., Sabdaningsih, A., Kusumaningtyas, M. A., & Dimova, N. (2021). Anthropogenic impact on Indonesian coastal water and ecosystems: Current status and future opportunities. *Marine Pollution Bulletin*, 171, 112689. https://doi.org/10.1016/j.marpolbul.2021.112689

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1. Journal of applied social psychology, 32(4), 665-683. https://doi.org/10.1111/j.1559-1816.2002.tb00236.x

Ajzen, I. (2005). *Attitudes, personality, and behavior* (2nd ed.). New York: Open University Press.

Anderson, A. (2012). Climate Change Education for Mitigation and Adaptation. *Journal of Education for Sustainable Development*, *6*(2), 191-206. https://doi.org/10.1177/0973408212475199

Armstrong, A. K., Krasny, M. E., & Schuldt, J. P. (2018). Climate change attitudes and knowledge. In *Communicating Climate Change: A Guide for Educators* (pp. 21–24). Cornell University Press. http://www.jstor.org/stable/10.7591/j.ctv941wjn.6

Ates, H. (2020). Merging Theory of Planned Behavior and Value Identity Personal norm model to explain pro-environmental behaviors. *Sustainable Production and Consumption*, 24, 169-180. https://doi.org/10.1016/j.spc.2020.07.006.

Axon, S. (2020). The socio-cultural dimensions of community-based sustainability: Implications for transformational change. *Journal of Cleaner Production*, 266, 121933. https://doi.org/10.1016/j.jclepro.2020.121933

Azeiteiro, U., Bacelar-Nicolau, P., Santos, P., & Bacelar-Nicolau, L. (2018). Assessing high school student perceptions and comprehension of climate change. *Environmental Education Research*, 25(5), 21-34. https://doi.org/10.1007/978-3-319-70479-1_2

Babbie, E. R. (2020). *The practice of social research*. Cengage Au.

Bailey, A.J., Wills, C.M. & Mitchem, J. Attitudes towards climate change and scientific stories. *J Environ Stud Sci* 12, 714–726 (2022). https://doi.org/10.1007/s13412-022-00770-0

Bailey, C. J. (2016). *US climate change policy*. Routledge.

Bain, P., Hornsey, M., Bongiorno, R. et al. Promoting pro-environmental action in climate change deniers. *Nature Clim Change* 2, 600–603 (2012). https://doi.org/10.1038/nclimate1532

Ballantyne, R., & Packer, J. (2009). Introducing a fifth pedagogy: Experience-based strategies for facilitating learning in natural environments. *Environmental education research*, *15*(2), 243-262. https://doi.org/10.1080/13504620802711282

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of environmental psychology*, *27*(1), 14-25. DOI:10.1016/j.jenvp.2006.12.002

Bandura, A. (2000). Self-efficacy: The foundation of agency. Control of human behavior, mental processes, and consciousness: Essays in honor of the 60th birthday of August Flammer, 16.

Barbera, F., & Ajzen, I. (2020). Control interactions in the theory of planned behavior: rethinking the role of subjective norm. *Europe's Journal of Psychology*, 16, 401 - 417. https://doi.org/10.5964/ejop.v16i3.2056.

Barrett, E. W., & Landsberg, H. E. (1975). Inadvertent weather and climate modification. *C R C Critical Reviews in Environmental Control*, *6*(1), 15–90. https://doi.org/10.1080/10643387509381634

Bates, A. E., Cooke, R. S., Duncan, M. I., Edgar, G. J., Bruno, J. F., Benedetti-Cecchi, L., ... & Stuart-Smith, R. D. (2019). Climate resilience in marine protected areas and the 'Protection Paradox'. *Biological Conservation*, *236*, 305-314. https://doi.org/10.1016/j.biocon.2019.05.005

Binder, M., Blankenberg, AK. & Welsch, H. Pro-environmental norms, green lifestyles, and subjective well-being: panel evidence from the uk. *Soc Indic Res* 152, 1029–1060 (2020). https://doi.org/10.1007/s11205-020-02426-4

Bissinger, K., & Bogner, F. (2018). Environmental literacy in practice: education on tropical rainforests and climate change. *Environment, Development and Sustainability*, 20, 2079-2094. https://doi.org/10.1007/s10668-017-9978-9.

Boca, G. D., & Saraçlı, S. (2019, March 14). Environmental Education and Student's Perception, for Sustainability. *Sustainability*. https://doi.org/10.3390/su11061553

Bofferding, L., & Kloser, M. (2015). Middle and high school students' conceptions of climate change mitigation and adaptation strategies. *Environmental Education Research*, 21, 275 - 294. https://doi.org/10.1080/13504622.2014.888401.

Boone, W. J., Staver, J. R., & Yale, M. S. (2014). *Rasch Analysis in the Human Sciences*. Springer.

Boyes, E., & Stanisstreet, M. (2012). Environmental education for behavior change: which actions should be targeted? *International Journal of Science Education*, 34, 1591 - 1614. https://doi.org/10.1080/09500693.2011.584079.

Braßler, M., & Sprenger, S. (2021). Fostering sustainability knowledge, attitudes, and behaviors through a tutor-supported interdisciplinary course in education for sustainable development. *Sustainability*, 13(6), 3494. https://doi.org/10.3390/su13063494

Braus, J., & Wood, D. (1993). Environmental education in the schools: creating a program that works! (Vol. 2). *North American Association for Environmental Education*.

Breunig, M., Murtell, J., Russell, C., & Howard, R. (2014). The impact of integrated environmental studies programs: are students motivated to act pro-environmentally? *Environmental Education Research*, 20, 372 - 386. https://doi.org/10.1080/13504622.2013.807326.

Brody, S. D., Zahran, S., Vedlitz, A., & Grover, H. (2008). Examining the relationship between physical vulnerability and public perceptions of global climate change in the United States. *Environment and Behavior*, 40(1), 72-95. https://doi.org/10.1177/0013916506298800

Broecker, W. S. (1975). Climatic change: are we on the brink of a pronounced global warming? *Science*, *189*(4201), 460-463. https://doi.org/10.1126/science.189.4201.460

Bryman, A. (2016). *Social research methods*. Oxford University Press.

Busch, K., Ardoin, N., Gruehn, D., & Stevenson, K. (2019). Exploring a theoretical model of climate change action for youth. *International Journal of Science Education*, 41, 2389 - 2409. https://doi.org/10.1080/09500693.2019.1680903.

Butt, A., Hussain, M., Butt, H., Ahmed, A., Yousaf, B., & Azfar, A. (2019). Pro-environmental behaviors and ecological responsibilities: an evaluation of pakistani university students' behavioral intentions towards climate change. *International Journal of Sciences: Basic and Applied Research*, 45, 129-153.

Camilli, G., & Shepard, L. A. (1994). *Methods for Identifying Biased Test Items*. Sage Publications.

Carrico, A.R. The promise of private-sphere pro-environmental behavior as climate action. *Curr Clim Change Rep* **8**, 125–133 (2022). https://doi.org/10.1007/s40641-022-00188-4

Carrus, G., Passafaro, P., & Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology*, 28, 51-62. https://doi.org/10.1016/J.JENVP.2007.09.003.

Carter, R.L., Simmons, B. (2010). The history and philosophy of environmental education. In: Bodzin, A., Shiner Klein, B., Weaver, S. (eds) The inclusion of environmental education in science teacher education. *Springer*, Dordrecht. https://doi.org/10.1007/978-90-481-9222-9_1

Casinader, N., & Kidman, G. (2018). Fieldwork, sustainability, and environmental education: the centrality of geographical inquiry. *Australian Journal of Environmental Education*, 34(1), 1-17. https://doi:10.1017/aee.2018.12

Chambers, A. W. (2024). Empowering voices: an overview of self-advocacy. *The Palgrave Encyclopedia of Disability*, 1-9.

Chang, C., & Pascua, L. (2016). Singapore students' misconceptions of climate change. *International Research in Geographical and Environmental Education*, 25, 84 - 96. https://doi.org/10.1080/10382046.2015.1106206.

Chang, H. Y., Binali, T., Liang, J. C., Chiou, G. L., Cheng, K. H., Lee, S. W. Y., & Tsai, C. C. (2022). Ten years of augmented reality in education: A meta-analysis of (quasi-) experimental studies to investigate the impact. *Computers & Education*, *191*, 104641. https://doi.org/10.1016/j.compedu.2022.104641

Chang, J., Kim, S., Shim, J., & Ma, D. (2016). Who is responsible for climate change? attribution of responsibility, news media, and south koreans' perceived risk of climate change. *Mass Communication and Society*, 19, 566 - 584. https://doi.org/10.1080/15205436.2016.1180395.

Chang, M.-Y., Kuo, H.-Y., & Chen, H.-S. (2022). perception of climate change and pro-environmental behavioral intentions of forest recreation area users—a case of Taiwan. *Forests*. https://doi.org/10.3390/f13091476

Chankrajang, T., & Muttarak, R. (2017). Green returns to education: do schooling contribute to pro-environmental behaviors? evidence from

Thailand. *Ecological Economics*, 131, 434-448. https://doi.org/10.1016/J.ECOLECON.2016.09.015.

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research*, 13(4), 437-452. https://doi.org/10.1080/13504620701581539

Chawla, L., & Derr, V. (2012). The development of conservation behaviors in childhood and youth. https://doi.org/10.1093/oxfordhb/9780199733026.013.0028

Chen, M. F., & Tung, P. J. (2014). Developing an extended theory of planned behavior model to predict consumers' intention to visit green hotels. *International Journal of Hospitality Management*, *36*, 221-230. https://doi.org/10.1016/j.ijhm.2013.09.006

Cho, R. (2023, February 17). *Climate Education in the U.S.: Where It Stands, and Why It Matters*. State of the Planet. https://news.climate.columbia.edu/2023/02/09/climate-education-in-the-u-s-where-it-stands-and-why-it-matters/

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science*, *12*(4), 105-109. https://doi.org/10.1111/1467-8721.01242

Cleveland, M., Robertson, J. L., & Volk, V. (2020). Helping or hindering: Environmental locus of control, subjective enablers and constraints, and

pro-environmental behaviors. *Journal of Cleaner Production*, 249, 119394. https://doi.org/10.1016/j.jclepro.2019.119394

Cohen, A., & Bolt, D. (2005). A mixture model analysis of differential item functioning. *Journal of Educational Measurement*, 42, 133-148. https://doi.org/10.1111/J.1745-3984.2005.00007.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education*.

Cohen, S. J., & Waddell, M. W. (2009). *Climate change in the 21st century*. McGill-Queen's Press-MQUP.

Collado, S., Staats, H., & Sancho, P. (2019). Normative influences on adolescents' self-reported pro-environmental behaviors: The role of parents and friends. *Environment and Behavior*, 51(3), 288-314. https://doi.org/10.1177/0013916517744591

Conner, M., & Norman, P. (2015). *Predicting and changing health behavior: Research and practice with social cognition models*. McGraw-hill education (UK).

Constantino, S. M., Sparkman, G., Kraft-Todd, G. T., Bicchieri, C., Centola, D., Shell-Duncan, B., Vogt, S., & Weber, E. U. (2022). Scaling up change: a critical review and practical guide to harnessing social norms for climate action. *Psychological Science in the Public Interest*, 23(2), 50-97. https://doi.org/10.1177/15291006221105279

Cordero EC, Centeno D, Todd AM (2020) The role of climate change education on individual lifetime carbon emissions. *PLoS ONE* 15(2): e0206266. https://doi.org/10.1371/journal.pone.0206266

Corner, A., Roberts, O., Chiari, S., Völler, S., Mayrhuber, E. S., Mandl, S., & Monson, K. (2015). How do young people engage with climate change? The role of knowledge, values, message framing, and trusted communicators. *Wiley Interdisciplinary Reviews: Climate Change*, 6(5), 523-534.c https://doi.org/10.1002/wcc.353

Corpuz, A. M., San Andres, T. C., & Lagasca, J. M. (2022). Integration of environmental education (EE) in teacher education programs: Toward sustainable curriculum greening. *Problems of Education in the 21st Century*, *80*(1), 119. https://doi.org/10.33225/pec/22.80.119

Correia, E., Sousa, S., Viseu, C. and Leite, J. (2022), "Using the theory of planned behavior to understand the students' pro-environmental behavior: a case-study in a Portuguese HEI", *International Journal of Sustainability in Higher Education*, Vol. 23 No. 5, pp. 1070-1089. https://doi.org/10.1108/IJSHE-05-2021-0201

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approach*. Sage publications.

Darmawan, M. D., & Dagamac, N. H. (2021). Situation of Environmental Education in Senior High School Programs in Indonesia: Perspectives from the Teachers

of Palembang. *Interdisciplinary Journal of Environmental and Science Education*, *17*(3), e2241. https://doi.org/10.21601/ijese/9605

De Clippele, L. H., Díaz, L. A., Andradi-Brown, D. A., Lazuardi, M. E., Iqbal, M., Zainudin, I. M., ... & Hennige, S. J. (2023). Evaluating annual severe coral bleaching risk for marine protected areas across Indonesia. *Marine policy*, 148, 105428. https://doi.org/10.1016/j.marpol.2022.105428

De Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. *Journal of Environmental Psychology*, *42*, 128-138. https://doi.org/10.1016 The conclusion chapter is divided into three sub-chapters, the summary of findings, the recommendations, and the limitations of the study. Numerous beneficial insights have been provided by this research which explores high school students' ATT, SN, PBC, BI, and PEB about climate change in Klaten Regency, Central Java Province, Indonesia. /j.jenvp.2015.03.005

Desabayla, R., & Gueta, N. (2023). The climate change awareness among senior high school students in Sorsogon province, Philippines. *European Journal of Theoretical and Applied Sciences*. https://doi.org/10.59324/ejtas.2023.1(2).09.

Deshiana, A., Sriyanti, I., & Ismet, I. (2022). High School Students Awareness and Attitudes Toward Climate Change. *Berkala Ilmiah Pendidikan Fisika*. https://doi.org/10.20527/bipf.v10i3.14001.

Desy, E., Peterson, S., & Brockman, V. (2011). Gender differences in science-related attitudes and interests among middle school and high school students. *Science Educator*, 20, 23-30.

Dewi, C. K. (2017). Hubungan perubahan iklim dengan produksi tembakau dan tingkat kerentanan penghidupan petani di kabupaten Klaten.

Dewi, W., & SawitriDian, R. (2018). Undergraduate students' pro-environmental behavior in daily practice., 31, 09025. https://doi.org/10.1051/E3SCONF/20183109025.

Dhakal, R., Adhikari, C., Karki, P., Neupane, N., Bhandari, P., Gurung, A., ... & Subedi, G. (2023). Attitude sustains longer than subjective norm and perceived behavioral control: Results of breast cancer screening educational intervention. *Plos one*, 18(2), e0281184. https://doi.org/10.1371/journal.pone.0281184

Díaz, M. F., Charry, A., Sellitti, S., Ruzzante, M., Enciso, K., & Burkart, S. (2020). Psychological factors influencing pro-environmental behavior in developing countries: Evidence from Colombian and Nicaraguan students. *Frontiers in Psychology*, *11*, 580730. https://doi.org/10.3389/fpsyg.2020.580730

Djalante, R., & Garschagen, M. (2017). A review of disaster trend and disaster risk governance in Indonesia: 1900–2015. Disaster Risk Reduction in Indonesia: Progress, Challenges, and Issues, 21-56. https://doi.org/10.1007/978-3-319-54466-3_2

Djalante, R., & Thomalla, F. (2012). Disaster risk reduction and climate change adaptation in Indonesia: Institutional challenges and opportunities for integration. *International Journal of Disaster Resilience in the Built Environment,* 3(2), 166-180. https://doi.org/10.1108/17595901211245260

Djuwita, Ratna and Benyamin, Aditya (2019) "Teaching Pro-Environmental Behavior: A Challenge in Indonesian Schools," *Psychological Research on Urban Society*: Vol. 2: No. 1, Article 9. DOI: https://doi.org/10.7454/proust.v2i1.48

Dopelt, K., Davidovitch, N., Loren, O., & Gapich, G. (2020). Does climate change matter to us? Knowledge, attitudes, and environmental behavior. *European Journal of Public Health*, 30. https://doi.org/10.1093/eurpub/ckaa166.079.

Dunlap, R. E., sparLiere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of Social Issues*, *56*(3), 425-442. https://doi.org/10.1111/0022-4537.00176

Effendi, M. I., Sugandini, D., Sukarno, A., Kundarto, M., & Arundati, R. (2020). The theory of planned behavior and pro-environmental behavior among students. *Journal of Environmental Management and Tourism*, *11*(1), 35-43. https://doi.org/10.14505//jemt.v11.1(41).05

Egashira, M., Son, D., & Ema, A. (2021). Serious game for change in behavioral intention toward lifestyle-related diseases: experimental study with structural

equation modeling using the theory of planned behavior. *JMIR Serious Games*, 10. https://doi.org/10.2196/28982.

Eilam, E. (2023). Teaching climate change in primary schools: An interdisciplinary approach - Edited by: Anne M. Dolan, England, U.K.: Taylor & Francis, 2022. *Australian Journal of Environmental Education*, 39(1), 125-127. http://doi:10.1017/aee.2022.28

El-Deeb, S., Correia, M., & Richter, C. (2021). A fuzzy set analysis of the determinants of intention to adapt and pro-environmental behavior. *International Journal of Sociology and Social Policy*, *41*(7/8), 786-804. https://doi.org/10.1108/IJSSP-03-2020-0058

Epstein, J. L., Sanders, M. G., Sheldon, S. B., Simon, B. S., Salinas, K. C., Jansorn, N. R., ... & Williams, K. J. (2018). *School, family, and community partnerships: Your handbook for action*. Corwin Press.

Ermolaeva, P. (2010). College students' green culture: Reflecting on the ideal types of environmental awareness and behavior practices. Raziskave in Razprave, 3(3), 49–73.

Ernst, J., Blood, N., & Beery, T. (2017). Environmental action and student environmental leaders: exploring the influence of environmental attitudes, locus of control, and sense of personal responsibility. *Environmental Education Research*, 23, 149 - 175. https://doi.org/10.1080/13504622.2015.1068278.

Eyring, V., N.P. Gillett, K.M. Achuta Rao, R. Barimalala, M. Barreiro Parrillo, N. Bellouin, C. Cassou, P.J. Durack, Y. Kosaka, S. McGregor, S. Min, O. Morgenstern, and Y. Sun, 2021: Human Influence on the Climate System. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 423–552, doi: 10.1017/9781009157896.005.

Eze, E. (2020). Sociographic analysis of climate change awareness and pro-environmental behaviour of secondary school teachers and students in Nsukka Local Government Area of Enugu State, Nigeria. *International Research in Geographical and Environmental Education*, 29, 105 - 89. https://doi.org/10.1080/10382046.2019.1657683.

Fang, S. C. (2021). The pro-environmental behavior patterns of college students adapting to climate change. *Journal of Baltic Science Education*, *20*(5), 700-715.

Fang, WT., Hassan, A., LePage, B.A. (2023). Research Methods for Environmental Education. In: The Living Environmental Education. Sustainable Development

Goals Series. *Springer*, Singapore. https://doi.org/10.1007/978-981-19-4234-1_3

Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social norms and pro-environmental behavior: A review of the evidence. *Ecological Economics*, *140*, 1-13. https://doi.org/10.1016/j.ecolecon.2017.04.017

Farrukh, M., Raza, A., Mansoor, A., Khan, M.S., and Lee, J.W.C. (2023), "Trends and patterns in pro-environmental behaviour research: a bibliometric review and research agenda", *Benchmarking: An International Journal*, Vol. 30 No. 3, pp. 681-696. https://doi.org/10.1108/BIJ-10-2020-0521

Feierabend, T., Stuckey, M., Nienaber, S., & Eilks, I. (2012). Two approaches for analyzing students' competence of 'evaluation' in group discussions about climate change. *International journal of environmental and science education*, 7, 581-598.

Fielding, K. S., & Head, B. W. (2012). Determinants of young Australians' environmental actions: The role of responsibility attributions, locus of control, knowledge and attitudes. *Environmental Education Research*, *18*(2), 171-186. https://doi.org/10.1080/13504622.2011.592936

Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. Psychology press.

Fitriana, D. E. N., Miyarsah, M., & Rusdi, R. (2019). The analysis of proenvironmental behavior (PEB) through personality at senior high school students. *Indonesian*

Journal of Science and Education, *3*(1), 48-52. DOI: https://doi.org/10.22437/bio.v5i1.6277

Flora, J., Saphir, M., Lappé, M., Roser-Renouf, C., Maibach, E., & Leiserowitz, A. (2014). Evaluation of a national high school entertainment education program: The Alliance for Climate Education. Climatic Change, 127(3), 419-434. https://doi.org/10.1007/s10584-014-1274-1

Fornara, F., Pattitoni, P., Mura, M., & Strazzera, E. (2016). Predicting intention to improve household energy efficiency: The role of value-belief-norm theory, normative and informational influence, and specific attitude. *Journal of Environmental Psychology*, *45*, 1-10. https://doi.org/10.1016/j.jenvp.2015.11.001

Fraenkel, J., Wallen, N., & Hyun, H. (2018). *How to design and evaluate research in education (10th) ed.)*. McGraw-Hill.

Galván-Mendoza, O., González-Rosales, V. M., Leyva-Hernández, S. N., Arango-Ramírez, P. M., & Velasco-Aulcy, L. (2022). Environmental knowledge perceived behavioral control, and employee green behavior in female employees of small and medium enterprises in Ensenada, Baja California. *Frontiers in Psychology*, *13*, 1082306. https://doi.org/10.3389/fpsyg.2022.1082306

Gan, C. C. R., Oktari, R. S., Nguyen, H. X., Yuan, L., Yu, X., Alisha, K. C., ... & Chu, C. (2021). A scoping review of climate-related disasters in China,

Indonesia and Vietnam: Disasters, health impacts, vulnerable populations and adaptation measures. *International Journal of Disaster Risk Reduction*, 66, 102608. https://doi.org/10.1016/j.ijdrr.2021.102608

Gärling, T., Fujii, S., Garling, A., & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of pro-environmental behavior intention. *Journal of Environmental Psychology*, 23(1), 1–9. https://doi.org/10.1016/S0272-4944(02)00081-6

Geiger, N., Swim, J., & Fraser, J. (2017). Creating a climate for change: Interventions, efficacy and public discussion about climate change. *Journal of Environmental Psychology*, 51, 104-116. https://doi.org/10.1016/J.JENVP.2017.03.010.

Geiger, S. M., Fischer, D., & Schrader, U. (2018). Measuring what matters in sustainable consumption: An integrative framework for the selection of relevant behaviors. *Sustainable development*, *26*(1), 18-33. https://doi.org/10.1002/sd.1688

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American psychologist*, *66*(4), 290.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology*, 49(3), 141-157. https://doi.org/10.1002/ijop.12034

Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: drivers, responses, barriers, and interventions. *Wiley*

Interdisciplinary Reviews: Climate Change, 2(6), 801-827. https://doi.org/10.1002/wcc.143

Gkargkavouzi, A., Halkos, G., & Matsiori, S. (2019). How do motives and knowledge relate to intention to perform environmental behavior? Assessing the mediating role of constraints. *Ecological Economics*, *165*, 106394. https://doi.org/10.1016/j.ecolecon.2019.106394

Gniewosz, B., & Noack, P. (2008). Classroom climate indicators and attitudes towards foreigners. *Journal of Adolescence*, 31(5), 609-624. https://doi.org/10.1016/j.adolescence.2007.10.006

Gould, R. K., Shrum, T. R., Harrington, D. R., & Iglesias, V. (2024). Experience with extreme weather events increases willingness-to-pay for climate mitigation policy. *Global Environmental Change*, 102795. https://doi.org/10.1016/j.gloenvcha.2023.102795

Graham, H., Bell, S., Hanley, N., Jarvis, S., & White, P. (2019). Willingness to pay for policies to reduce future deaths from climate change: evidence from a British survey. *Public Health*, 174, 110-117. https://doi.org/10.1016/j.puhe.2019.06.001.

Greggor, A.L., Blumstein, D.T., Wong, B.B.M. *et al.* Using animal behavior in conservation management: a series of systematic reviews and maps. *Environ Evid* **8** (Suppl 1), 23 (2019). https://doi.org/10.1186/s13750-019-0164-4

Hagger, M. S., & Hamilton, K. (2024). Longitudinal tests of the theory of planned behaviour: a meta-analysis. *European Review of Social Psychology*, *35*(1), 198-254. https://doi.org/10.1080/10463283.2023.2225897

Hagger, M., Cheung, M., Ajzen, I., & Hamilton, K. (2022). Perceived behavioral control moderating effects in the theory of planned behavior: A meta-analysis. *Health Psychology: Official Journal of The Division Of Health Psychology, American Psychological Association*. https://doi.org/10.1037/hea0001153.

Halady, I. R., & Rao, P. H. (2010). Does awareness to climate change lead to behavioral change? *International Journal of Climate Change Strategies and Management, 2*(1), 6-22. https://doi.org/10.1108/17568691011020229

Hall, A. (2022). That fine rain that soaks you through. Exploring the role of weather lore, cultural identity, and community memory in shaping attitudes to climate change. *Frontiers in Climate*, 4, 808609. https://doi.org/10.3389/fclim.2022.808609

Halley, C. (2024). How 19th Century Scientists Predicted Global Warming. *JSTOR Daily*. https://daily.jstor.org/how-19th-century-scientists-predicted-global-warming/

Hamilton, L. C. (2011). Education, politics and opinions about climate change evidence for interaction effects. *Climatic Change*, 104(2), 231-242. https://doi.org/10.1007/s10584-010-9957-8

Han, H. L., & Ahn, S. W. (2020, May 18). Youth mobilization to stop global climate change: narratives and impact. *Sustainability*. https://doi.org/10.3390/su12104127

Handayani, Kamia, Tatiana Filatova, and Yoram Krozer. "The vulnerability of the power sector to climate variability and change: Evidence from Indonesia." *Energies* 12.19 (2019): 3640. https://doi.org/10.3390/en12193640

Handayani, W., Ariescy, R. R., Cahya, F. A., Yusnindi, S. I., & Sulistyo, D. A. (2021). Literature review: environmental awareness and pro-environmental behavior. *Nusantara Science and Technology Proceedings*, 170-173. https://doi.org/10.11594/nstp.2021.0925

Hansen, J., Ruedy, R., Sato, M., & Lo, K. (2010). Global surface temperature change. *Reviews of Geophysics*, 48(4). https://doi.org/10.1029/2010RG000345

Hargis, K., McKenzie, M., & LeVert-Chiasson, I. (2021). A Whole Institution Approach to Climate Change Education: Preparing School Systems to Be Climate Proactive. In R. Iyengar & C. T. Kwauk (Eds.), Curriculum and Learning for Climate Action: Toward an SDG 4.7 Roadmap for Systems Change (pp. 43–66). Brill. http://www.jstor.org/stable/10.1163/j.ctv29sfv6v.10

Harland, P., Staats, H., & Wilke, H. A. (1999). Explaining pro-environmental intention and behavior by personal norms and the Theory of Planned Behavior 1.

Journal of Applied Social Psychology, 29(12), 2505-2528. https://doi.org/10.1111/j.1559-1816.1999.tb00123.x

Hasan, S. N. M. S., Harun, R., & Hock, L. K. (2015). Application of theory of planned behavior in measuring the behavior to reduce plastic consumption among students at University Putra Malaysia, Malaysia. *Procedia Environmental Sciences*, *30*, 195-200. https://doi.org/10.1016/j.proenv.2015.10.035

Herman, B. (2015). The influence of global warming science views and sociocultural factors on willingness to mitigate global warming. *Science Education*, 99, 1-38. https://doi.org/10.1002/SCE.21136.

Hidayah, N., & Agustin, R. (2017). Assessing high school students' pro-environmental behavior. *Journal of Physics: Conference Series*, 895. https://doi.org/10.1088/1742-6596/895/1/012002.

Ho, S., Liao, Y., & Rosenthal, S. (2015). Applying the theory of planned behavior and media dependency theory: predictors of public pro-environmental behavioral intentions in Singapore. *Environmental Communication*, 9, 77 - 99. https://doi.org/10.1080/17524032.2014.932819.

Ho, S.S., Goh TJ, Chuah ASF (2022) Perceived behavioral control as a moderator: Scientists' attitude, norms, and willingness to engage the public. *PLoS ONE* 17(10): e0275643. https://doi.org/10.1371/journal.pone.0275643

Hoffmann, R., & Muttarak, R. (2020). Greening through schooling: understanding the link between education and pro-environmental behavior in the

Philippines. *Environmental Research Letters*, 15. https://doi.org/10.1088/1748-9326/ab5ea0.

Howarth, C., Waterson, B., & McDonald, M. (2009, January). Public understanding of climate change and the gaps between knowledge, attitudes, and travel behavior. *In Transportation Research Board 88th Annual Meeting. Washington DC*. https://doi.org/10.1007/s13412-022-00770-0

Hulme, M., Barrow, E., Arnell, N. *et al.* Relative impacts of human-induced climate change and natural climate variability. *Nature* 397, 688–691 (1999). https://doi.org/10.1038/17789

Ignell, C., Davies, P., & Lundholm, C. (2018). A longitudinal study of upper secondary school students' values and beliefs regarding policy responses to climate change. *Environmental Education Research*, 25(5), 615-632. https://doi.org/10.1080/13504622.2018.1523369

Intergovernmental Panel on Climate Change. (2021). Climate Change 2021: The Physical Science Basis. https://www.ipcc.ch/report/ar6/wg1/

Iwata, O. (2004). Some psychological correlates of environmentally responsible behavior. *Social Behavior and Personality*, 32(8), 703–713. https://doi.org/10.2224/sbp.2004.32.8.703

Iyengar, R., Shin, H. Community-based programs to tackle environmental education and COVID-19: A case study from Millburn, New Jersey. *Prospects* 51, 643–653 (2022). https://doi.org/10.1007/s11125-020-09467-0

Jakučionytė-Skodienė, M., Dagiliūtė, R., & Liobikienė, G. (2020). Do general pro-environmental behavior, attitude, and knowledge contribute to energy savings and climate change mitigation in the residential sector? *Energy*, 193, 116784. https://doi.org/10.1016/j.energy.2019.116784

Janmaimool, P. (2017). Application of protection motivation theory to investigate sustainable waste management behaviors. *Sustainability*, *9*(7), 1079.

Jensen, B. (2002). Knowledge, action and pro-environmental behavior. *Environmental Education Research*, 8, 325 - 334. https://doi.org/10.1080/1350462022014547 4.

Johanson, G. (1997). Differential item functioning in attitude assessment. *American Journal of Evaluation*. https://doi.org/10.1177/109821409701800204.

Jones, F. (2023, February 9). *5 Interactive Climate Change Education Tools to Wow Your Students*. #ALTC Blog. https://altc.alt.ac.uk/blog/2023/02/5-interactive-climate-change-education-tools-to-wow-your-students/

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of Applied Social Psychology*, 33(3), 586–603. https://doi.org/10.1111/j.1559-1816.2003.tb01914.x

Kalafatis, S. E., Neosh, J., Libarkin, J. C., Whyte, K. P., & Caldwell, C. (2019). Experiential learning processes informing climate change decision support.

Weather, Climate, and Society, 11(3), 681–694. https://www.jstor.org/stable/26753235

Kan, M.P.H., Fabrigar, L.R. (2017). Theory of Planned Behavior. In: Zeigler-Hill, V., Shackelford, T. (eds) Encyclopedia of Personality and Individual Differences. Springer, Cham. https://doi.org/10.1007/978-3-319-28099-8_1191-1

Karami, S., Shobeiri, S., & Jafari, H. (2017). Assessment of knowledge, attitudes, and practices (KAP) towards climate change education (CCE) among lower secondary teachers in Tehran, Iran. *International Journal of Climate Change Strategies and Management*, 9, 402-415. https://doi.org/10.1108/IJCCSM-04-2016-0043.

Karimi, S., & Mohammadimehr, S. (2022). Socio-psychological antecedents of pro-environmental intentions and behaviors among Iranian rural women: An integrative framework., 10. https://doi.org/10.3389/fenvs.2022.979728.

Karimi, S., Liobikienė, G., Saadi, H., & Sepahvand, F. (2021). The influence of media usage on iranian students' pro-environmental behaviors: An application of the extended theory of planned behavior. *Sustainability*, *13*(15), 8299. https://doi.org/10.3390/su13158299

Kelly, O., Illingworth, S., Butera, F., Dawson, V., White, P., Blaise, M., ... & Cowman, S. (2022). Education in a warming world: Trends, opportunities, and pitfalls for institutes of higher education. *Frontiers in Sustainability*, 3, 920375. https://doi.org/10.3389/frsus.2022.920375

Kibue, G. W., Pan, G., Joseph, S., Xiaoyu, L., Jufeng, Z., Zhang, X., & Li, L. (2015). More than two decades of climate change alarm: Farmers knowledge, attitudes and perceptions. *African Journal of Agricultural Research*, 10(27), 2617-2625. https://doi.org/10.5897/AJAR2013.8350

Kim, M. J., & Hall, C. M. (2019). Can climate change awareness predict pro-environmental practices in restaurants? Comparing high and low dining expenditure. *Sustainability*, 11(23), 6777. https://doi.org/10.3390/su11236777

Kim, M. S., Kim, J., & Thapa, B. (2018). Influence of environmental knowledge on affect, nature affiliation and pro-environmental behaviors among tourists. *Sustainability*, *10*(9), 3109. https://doi.org/10.3390/su10093109

Kim, Y., Tanaka, K., & Matsuoka, S. (2020). Environmental and economic effectiveness of the Kyoto Protocol. *Plos one*, 15(7), e0236299. https://doi.org/10.1371/journal.pone.0236299

Kleinertz, K. (2023, June 5). Using Place-Based Learning to Teach Middle School Students About Climate Change. *Edutopia*. https://www.edutopia.org/article/place-based-learning-climate-change.

Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global environmental change*, *23*(5), 1028-1038. https://doi.org/10.1016/j.gloenvcha.2013.05.014

Kolenatý, M., Kroufek, R., & Činčera, J. (2022). What triggers climate action: The impact of a climate change education program on students' climate literacy and their willingness to act. *Sustainability*, 14(16), 10365. https://doi.org/10.3390/su141610365

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, *8*(3)., https://doi.org/10.1080/1350462022014540 1

Koul, R., McLure, F., & Fraser, B. (2021). Gender differences in classroom emotional climate and attitudes among students undertaking integrated STEM projects: a Rasch analysis. *Research in Science & Technological Education*, 41, 1051 - 1071. https://doi.org/10.1080/02635143.2021.1981852.

Kricsfalusy, V., George, C., & Reed, M. G. (2018). Integrating problem-and project-based learning opportunities: Assessing outcomes of a field course in environment and sustainability. *Environmental Education Research*, 24(4), 593-610. https://doi.org/10.1080/13504622.2016.1269874

Kyselá, E., Ščasný, M., & Zvěřinová, I. (2019). Attitudes toward climate change mitigation policies: a review of measures and a construct of policy attitudes. *Climate Policy*, 19(7), 878-892. https://doi.org/10.1080/14693062.2019.1611534

Laner, M. (2018). "It's Not Easy Being Green": Predictors of Pro-Environmental Behaviors Among College Students.

https://scholarship.rollins.edu/honors/59?utm_source=scholarship.rollins.edu%2Fhonors%2F59&utm_medium=PDF&utm_campaign=PDFCoverPages

Lawrence Neuman, W. (2014). Social research methods: Qualitative and quantitative approaches.

Lee, S. T. T., & Sihombing, G. (2023, December 7). *Jakarta, Indonesia's Capital, Is Sinking into the Sea. Can It Be Saved?* Bloomberg.com. https://www.bloomberg.com/features/2023-jakarta-sinking salim/#:~:text=But%20no%20place%20compares%20to,hold%20back%20the%20Java%20Sea.

Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C. Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature Climate Change*, *5*(11), 1014-1020. https://doi.org/10.1038/nclimate2728

Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. *Journal of Environmental Psychology*, 42, 128-138. https://doi.org/10.1016/J.JENVP.2015.03.005.

Lehnert, M., Fiedor, D., Frajer, J., Hercik, J., & Jurek, M. (2020). Czech students and mitigation of global warming: beliefs and willingness to take

action. *Environmental Education Research*, 26, 864 - 889. https://doi.org/10.1080/13504622.2019.1694140.

Leuzinger, S., Borrelle, S. B., & Jarvis, R. M. (2019, November 27). *Improving Climate-Change Literacy and Science Communication Through Smart Device Apps*. Frontiers in Education. https://doi.org/10.3389/feduc.2019.00138

Liao, Y., Ho, S., & Yang, X. (2016). Motivators of pro-environmental behavior. *Science Communication*, 38, 51 - 73. https://doi.org/10.1177/1075547015616256.

Lin, Y., Liu, G., Chang, C., Lin, C., Huang, C., Chen, L., & Yeh, T. (2021). Perceived behavioral control as a mediator between attitudes and intentions toward marine responsible environmental behavior. *Water*. https://doi.org/10.3390/W13050580.

Linacre, J. M. (2002). Optimizing rating scale category effectiveness. *Journal of Applied Measurement*, 3(1), 85-106.

Lindwall, C. (2022). What are the effects of climate change. *Erişim Adresi: https://www.nrdc.org/stories/what-are-effects-climate-changeweather*

Lineman M, Do Y, Kim JY, Joo G-J (2015). Talking about climate change and global warming. *PLoS ONE* 10(9): e0138996. https://doi.org/10.1371/journal.pone.0138996

Lisboa, P. V., Gómez-Román, C., Guntín, L., & Monteiro, A. P. (2024). Pro-environmental behavior, personality, and emotional intelligence in adolescents:

a systematic review. *Frontiers in Psychology*, *15*, 1323098. https://doi.org/10.3389/fpsyg.2024.1323098

Lu, H., Zhang, W., Diao, B., Liu, Y., Chen, H., Long, R., & Cai, S. (2021). The progress and trend of pro-environmental behavior research: a bibliometrics-based visualization analysis. *Current Psychology*, 1-21. https://doi.org/10.1007/s12144-021-01809-1

Lucarelli, C., Mazzoli, C., & Severini, S. (2020). Applying the theory of planned behavior to examine pro-environmental behavior: The moderating effect of COVID-19 beliefs. *Sustainability*, *12*(24), 10556. https://doi.org/10.3390/su122410556

Macovei, O. I. (2015). Applying the theory of planned behavior in predicting pro-environmental behavior: The case of energy conservation. *Acta Universitatis Danubius. Œconomica*, *11*(4), 15-32.

Maiella, R., La Malva, P., Marchetti, D., Pomarico, E., Di Crosta, A., Palumbo, R., ... & Verrocchio, M. C. (2020). The psychological distance and climate change: A systematic review on the mitigation and adaptation behaviors. *Frontiers in Psychology*, 11, 568899. https://doi.org/10.3389/fpsyg.2020.568899

Marfai, M. A., & King, L. (2008). Potential vulnerability implications of coastal inundation due to sea level rise for the coastal zone of Semarang city,

Indonesia. Environmental Geology, 54, 1235-1245. https://doi.org/10.1007/s00254-007-0906-4

Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., & Shukla, P. R. (2022). *Global Warming of 1.5 C: IPCC special report on impacts of global warming of 1.5 C above pre-industrial levels in context of strengthening response to climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press.

Masud, M. M., Al-Amin, A. Q., Junsheng, H., Ahmed, F., Yahaya, S. R., Akhtar, R., & Banna, H. (2016). Climate change issue and theory of planned behaviour: Relationship by empirical evidence. *Journal of Cleaner Production*, *113*, 613-623. https://doi.org/10.1016/j.jclepro.2015.11.080

Masud, M.M., Akhtar, R., Afroz, R. *et al.* Pro-environmental behavior and public understanding of climate change. *Mitig Adapt Strateg Glob Change* 20, 591–600 (2015). https://doi.org/10.1007/s11027-013-9509-4

Mbah, M. F., Shingruf, A., & Molthan-Hill, P. (2022). Policies and practices of climate change education in South Asia: towards a support framework for an impactful climate change adaptation. *Climate Action*, 1(1), 1-18. https://doi.org/10.1007/s44168-022-00028-z

McCrea, E. J. (2006). The Roots of Environmental Education: How the Past Supports the Future. *Environmental Education and Training Partnership* (EETAP).

McCright, A. M. (2010). The effects of gender on climate change knowledge and concern in the American public. *Population and environment*, *32*, 66-87. https://doi.org/10.1007/s11111-010-0113-1

McCright, A. M., & Xiao, C. (2014). Gender and environmental concern: Insights from recent work and for future research. *Society & Natural Resources*, *27*(10), 1109-1113. https://doi.org/10.1080/08941920.2014.918235

McGuire, N. M. (2015). Environmental education and behavioral change: An identity-based environmental education model. *International Journal of Environmental and Science Education*, *10*(5), 695-715. doi: 10.12973/ijese.2015.261a

McNeill, K. L., & Vaughn, M. (2012). Urban high school students' critical science agency: conceptual understandings and environmental actions around climate change. *Research in Science Education*, 42(2), 373-399. https://doi.org/10.1007/s11165-010-9202-5

Meyer, A. (2016). Heterogeneity in the preferences and pro-environmental behavior of college students: the effects of years on campus, demographics, and external factors. *Journal of Cleaner Production*, 112, 3451-3463. https://doi.org/10.1016/J.JCLEPRO.2015.10.133.

Miftakhudin, S. (2021). Strategi penanganan banjir rob kota pekalongan. *Jurnal Litbang Kota Pekalongan*, 19(1). https://doi.org/10.54911/litbang.v20i.142

Mitchell, J. F., Lowe, J., Wood, R. A., & Vellinga, M. (2006). Extreme events due to human-induced climate change. *Philosophical Transactions of the Royal*

Society A: Mathematical, Physical and Engineering Sciences, *364*(1845), 2117-2133. http://doi.org/10.1098/rsta.2006.1816

Mochizuki, Y., & Bryan, A. (2015). Climate change education in the context of education for sustainable development: rationale and principles. *Journal of Education for Sustainable Development*, *9*(1), 4-26. https://doi.org/10.1177/0973408215569109

Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2019). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research*, 25(6), 791-812. https://doi.org/10.1080/13504622.2017.1360842

Morano, M. (2018). *The politically incorrect guide to climate change*. Simon and Schuster.

Morren, M. H., & Grinstein, A. (2016). Explaining environmental behavior across borders: A meta-analysis. *Journal of Environmental Psychology*, 47, 91-106. https://doi.org/10.1016/j.jenvp.2016.05.003

Morton, S., Pencheon, D., & Squires, N. (2017). Sustainable Development Goals (SDGs), and their implementation: A national global framework for health, development and equity needs a systems approach at every level. *British medical bulletin*, *124*(1), 81-90.

Moser, S. C. (2010). Communicating climate change: history, challenges, process and future directions. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(1), 31-53. https://doi.org/10.1002/wcc.11

Mullenbach, L., & Green, G. (2018). Can environmental education increase student-athletes' environmental behaviors? *Environmental Education Research*, 24, 427 - 444. https://doi.org/10.1080/13504622.2016.1241218.

Mustangin, M. (2017). Perubahan iklim dan aksi menghadapi dampaknya: Ditinjau dari peran serta perempuan Desa Pagerwangi. *Jurnal Pendidikan Dan Pemberdayaan Masyarakat*, *4*(1), 80. http://dx.doi.org/10.21831/jppm.v4i1.13051

Muzakki, A., Rizky, A. C., & Nafisah, A. S. (2022, December). Analisis banjir rob dan penanggulangannya di kota semarang. *In Indonesian Conference of Maritime* (Vol. 1, No. 1, pp. 13-25).

National Aeronautics and Space Administration. (2020). Climate Change: How Do We Know? https://climate.nasa.gov/evidence/

National Research Council. 1979. *Carbon Dioxide and Climate: A Scientific Assessment*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12181.

Naylor, R. L., Battisti, D. S., Vimont, D. J., Falcon, W. P., & Burke, M. B. (2007). Assessing risks of climate variability and climate change for Indonesian

rice agriculture. *Proceedings of the National Academy of Sciences*, 104(19), 7752-7757. https://doi.org/10.1073/pnas.0701825104

Nguyen, Q. A., Hens, L., Nguyen, N., MacAlister, C., & Lebel, L. (2020). Explaining intentions by vietnamese schoolchildren to adopt pro-environmental behaviors in response to climate change using theories of persuasive communication. *Environmental Management*, 66(5), 845-857. https://doi.org/10.1007/s00267-020-01334-0

Nguyen, Q., Hens, L., MacAlister, C., Johnson, L., Lebel, B., Tan, S., Nguyen, H., Nguyen, T., & Lebel, L. (2018). theory of reasoned action as a framework for communicating climate risk: a case study of schoolchildren in the Mekong delta in Vietnam. *Sustainability*. https://doi.org/10.3390/SU10062019.

Nilsson, A., von Borgstede, C., & Biel, A. (2004). Willingness to accept climate change strategies: The effect of values and norms. Journal Of Environmental Psychology, 24(3), 267-277. https://doi.org/10.1016/j.jenvp.2004.06.002

Nugroho, A. W. (2020, April). What students know about climate change? a case study of high school students in Samboja, Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 487, No. 1, p. 012001). IOP Publishing. **DOI** 10.1088/1755-1315/487/1/012001

Nyborg, K., Anderies, J. M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., ... & De Zeeuw, A. (2016). Social norms as solutions. *Science*, *354*(6308), 42-43. DOI:10.1126/science.aaf8317

Nzengya, D., & Rutere, F. (2020). Primary Versus High School Students' Environmental Attitudes and Pro-environmental Behavior: The Case of Embu County, Kenya. *African Handbook of Climate Change Adaptation*. https://doi.org/10.1007/978-3-030-42091-8_134-1.

Obergassel, W., Arens, C., Hermwille, L., Kreibich, N., Mersmann, F., Ott, H. E., & Wang-Helmreich, H. (2015). Phoenix from the ashes: an analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change; part 1.

O'Brien, W., & Sarkis, J. (2014). The potential of community-based sustainability projects for deep learning initiatives. *Journal Of Cleaner Production*, 62, 48-61. https://doi.org/10.1016/j.jclepro.2013.07.001

Odou, P., & Schill, M. (2020). How anticipated emotions shape behavioral intentions to fight climate change. *Journal of Business Research*, 121, 243-253. https://doi.org/10.1016/j.jbusres.2020.08.047

Ofori, B. Y., Ameade, E. P., Ohemeng, F., Musah, Y., Quartey, J. K., & Owusu, E. H. (2023). Climate change knowledge, attitude and perception of undergraduate students in Ghana. *PLOS Climate*, *2*(6), e0000215. https://doi.org/10.1371/journal.pclm.0000215

Ojala, M. (2012). Hope and Climate Change: The Importance of Hope for Environmental Engagement Among Young People. *Environmental Education Research*, 18(5), 625-642. https://doi.org/10.1080/13504622.2011.637157

Ojala, M. (2015). Hope in the face of climate change: Associations with environmental engagement and student well-being. *International Journal of Environmental and Science Education*, 10(5), 1125-1139. https://doi.org/10.12973/ijese.2015.288a

Ojala, M., & Bengtsson, H. (2019). Young people's coping strategies concerning climate change: Relations to perceived communication with parents and friends and proenvironmental behavior. *Environment and behavior*, *51*(8), 907-935. https://doi.org/10.1177/0013916518763894

O'neill, S., & Nicholson-Cole, S. (2009). "Fear won't do it" promoting positive engagement with climate change through visual and iconic representations. *Science communication*, 30(3), 355-379. https://doi.org/10.1177/1075547008329201

Oppenheimer, M., Glavovic, B., Hinkel, J., Van de Wal, R., Magnan, A. K., Abd-Elgawad, A., ... & Sebesvari, Z. (2019). Sea level rise and implications for low lying islands, coasts, and communities.

Phang, G., & Ilham, Z. (2023). Theory of planned behavior to understand pro-environmental behavior among University Malaya students. *AIMS Environmental Science*, *10*(5). DOI: 10.3934/environsci.2023038

Pooley, J., & O'Connor, M. (2000). Environmental Education and Attitudes. *Environment and Behavior*, 32, 711 - 723. https://doi.org/10.1177/0013916500325007.

Posada, D. (2022). Climate Change Education at First Sustainable Public School: Case Study. In: Leal Filho, W., Aguilar-Rivera, N., Borsari, B., R. B. de Brito, P., Andrade Guerra, B. (eds) SDGs in the Americas and Caribbean Region. Implementing the UN Sustainable Development Goals – Regional Perspectives. Springer, Cham. https://doi.org/10.1007/978-3-030-91188-1_53-1

Poškus, M.S. Investigating pro-Environmental Behaviors of Lithuanian University Students. *Curr Psychol* 37, 225–233 (2018). https://doi.org/10.1007/s12144-016-9506-3

Post, E., Alley, R. B., Christensen, T. R., Macias-Fauria, M., Forbes, B. C., Gooseff, M. N., ... & Liston, G. E. (2019). The polar regions in a 2°C warmer world. *Science Advances*, 5(12), eaaw9883. https://doi.org/10.1126/sciadv.aaw9883

Pramudianto, A. (2016). Dari Kyoto Protocol 1997 Ke Paris Agreement 2015: Dinamika Diplomasi Perubahan Iklim Global Dan Asean Menuju 2020. *Global: Jurnal Politik Internasional*, 18(1), 76-94. DOI: 10.7454/global.v18i1.119

Prastono, A. N. (2019). *Kerentanan Masyarakat Terhadap Perubahan Iklim Dan Adaptasinya Pada Sektor Sumberdaya Air Di Kabupaten Klaten* (Doctoral dissertation, Universitas Gadjah Mada).

Priya, K., & Thenmozhi, S. (2021, June 30). Study on self-efficacy and pro-environmental behavior among school students. *International Journal of Indian Psychology*. https://doi.org/10.25215/0902.184

Pruneau, D., Doyon, A., Langis, J., Vasseur, L., Martin, G., Ouellet, E., & Boudreau, G. (2006). The process of change experimented by teachers and students when voluntarily trying environmental behaviors. *Applied Environmental Education & Communication*, 5, 33 - 40. https://doi.org/10.1080/15330150500452349.

Raisya, H., & Djuwita, R. (2018). Does green curriculum have an impact on pro-environmental behavior? a comparative study with middle schools. https://doi.org/10.5220/0008590504310440.

Ramadani L, Khanal S, Boeckmann M (2023) Climate change and health in school-based education: A scoping review protocol. *PLoS ONE* 18(3): e0282431. https://doi.org/10.1371/journal.pone.0282431

Ratinen, I. (2021). Students' knowledge of climate change, mitigation and adaptation in the context of constructive hope. *Education Sciences*, *11*(3), 103. https://doi.org/10.3390/educsci11030103

Redman, E. (2013). Advancing educational pedagogy for sustainability: Developing and implementing programs to transform behaviors.

Redman, E., & Larson, K. (2011). Educating for sustainability: Competencies & practices for transformative action.

Rees, J. H., & Bamberg, S. (2014). Climate protection needs societal change: Determinants of intention to participate in collective climate action. *European Journal of Social Psychology*, 44(5), 466-473. https://doi.org/10.1002/ejsp.2032

Reid, A (2019) Climate change education and research: possibilities and potentials versus problems and perils, *Environmental Education Research*, 25:6, 767-790, DOI: 10.1080/13504622.2019.1664075

Rhodes, R., & Courneya, K. (2005). Threshold assessment of attitude, subjective norm, and perceived behavioral control for predicting exercise intention and behavior. *Psychology of Sport and Exercise*, 6, 349-361. https://doi.org/10.1016/J.PSYCHSPORT.2004.04.002.

Rousell, D., & Cutter-Mackenzie-Knowles, A. (2020). A systematic review of climate change education: Giving children and young people a 'voice 'and a 'hand' in redressing climate change. *Children's Geographies*, *18*(2), 191-208, DOI: 10.1080/14733285.2019.1614532

Runhaar, P., Wagenaar, K., Wesselink, R., & Runhaar, H. (2019). Encouraging Students' Pro-Environmental Behavior: Examining the Interplay Between Student Characteristics and the Situational Strength of Schools. *Journal of Education for Sustainable Development*, 13, 45 - 66. https://doi.org/10.1177/0973408219840544.

Sambrook, K., Konstantinidis, E., Russell, S., & Okan, Y. (2021). The role of personal experience and prior beliefs in shaping climate change perceptions: a narrative review. *Frontiers In Psychology*, 12, 669911. https://doi.org/10.3389/fpsyg.2021.669911

Saracevic, S., & Schlegelmilch, B. B. (2021). The impact of social norms on pro-environmental behavior: a systematic literature review of the role of culture and self- construal. *Sustainability*, 13(9), 5156. https://doi.org/10.3390/su13095156

Saulick, P., Bekaroo, G., Bokhoree, C. et al. Investigating pro-environmental behavior among students: towards an integrated framework based on the transtheoretical model of behavior change. *Environ Dev Sustain* (2023). https://doi.org/10.1007/s10668-023-02985-9

Schlesinger, M., Kheshgi, H., Smith, J., De la Chesnaye, F., Reilly, J., Wilson, T., & Kolstad, C. (Eds.). (2007). *Human-Induced Climate Change: An Interdisciplinary Assessment*. Cambridge: Cambridge University Press. https://doi:10.1017/CBO9780511619472

Schusler, T.M., Krasny, M.E. (2008). Youth Participation in Local Environmental Action: An Avenue for Science and Civic Learning. In: Reid, A., Jensen, B.B., Nikel, J., Simovska, V. (eds) Participation and Learning. *Springer*, Dordrecht. https://doi.org/10.1007/978-1-4020-6416-6_17

Setyaningrum, I. N., & Banowati, E. (2020). Pengaruh faktor geografis terhadap perubahan produktivitas jenis padi di Kecamatan Delanggu Kabupaten Klaten. *Geo-Image Journal*, *9*(2), 114-120. https://doi.org/10.15294/geoimage.v9i2.39681

Shealy, T., Klotz, L., Godwin, A., Hazari, Z., Potvin, G., Barclay, N., & Cribbs, J. (2019). High school experiences and climate change beliefs of first year college students in the United States. *Environmental Education Research*, 25, 925 - 935. https://doi.org/10.1080/13504622.2017.1293009.

Sheeran, P. (2002). Intention—behavior relations: a conceptual and empirical review. *European Review of Social Psychology*, *12*(1), 1-36. https://doi.org/10.1080/14792772143000003

Shephard, K., Mann, S., Smith, N., & Deaker, L. (2009). Benchmarking the environmental values and attitudes of students in New Zealand's post-compulsory education. *Environmental Education Research*, *15*(5), 571-587. https://doi.org/10.1080/13504620903050523

Shikangalah, R. (2019). Gendered attitudes toward climate change among geography students at University Namibia. *Humanities and social sciences*, 061-079.

Si, H., Shi, J. G., Tang, D., Wen, S., Miao, W., & Duan, K. (2019). Application of the theory of planned behavior in environmental science: a comprehensive bibliometric analysis. International Journal of Environmental Research And Public Health, 16(15), 2788. https://doi.org/10.3390/ijerph16152788

Sinatra, G., Kardash, C., Taasoobshirazi, G., & Lombardi, D. (2012). Promoting attitude change and expressed willingness to take action toward climate change in college students. *Instructional Science*, 40, 1-17. https://doi.org/10.1007/S11251-011-9166-5.

Siswono, A., Syaufina, L., & Rushayati, S. (2020). Correlation Study of Environmental Knowledge, Attitudes, Subjective Norms and Perceptions of Behavior Control on Students' Environmental Care Behavior. *SEJ (Science Education Journal)*. https://doi.org/10.21070/sej.v4i1.669.

Sivek, D. (2002). Environmental Sensitivity among Wisconsin High School Students. *Environmental Education Research*, 8, 155 - 170. https://doi.org/10.1080/1350462022012822O.

Smith, J. R., & Louis, W. R. (2008). Do as we say and as we do: The interplay of descriptive and injunctive group norms in the attitude–behavior relationship. *British Journal of Social Psychology*, *47*(4), 647-666. https://doi.org/10.1348/014466607X269748

Smith, K. R., & Katz, R. W. (2013). US Billion-dollar weather and climate disasters: data sources, trends, accuracy, and biases. *Natural Hazards*, 67(2), 387-410. https://doi.org/10.1007/s11069-013-0566-5

Sofiyan, S., Aksa, F. I., & Saiman, S. (2019, October). An analysis climate change of the curriculum in Indonesia. In *Journal of Physics: Conference Series* (Vol.

1321, No. 2, p. 022121). IOP Publishing. doi:10.1088/1742-6596/1321/2/022121

Sörlin, S., Lane, M. Historicizing climate change—engaging new approaches to climate and history. *Climatic Change* **151**, 1–13 (2018). https://doi.org/10.1007/s10584-018-2285-0

Sparkman Gregg, Howe Lauren, Walton Greg. How social norms are often a barrier to addressing climate change but can be part of the solution. *Behavioral Public Policy*. 2021;5(4):528-555. http://doi:10.1017/bpp.2020.42

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behavior: An integrative review and research agenda. *Journal of environmental psychology*, *29*(3), 309-317. https://doi.org/10.1016/j.jenvp.2008.10.004

Steinmetz, H., Knappstein, M., Ajzen, I., Schmidt, P., & Kabst, R. (2016). How effective are behavior change interventions based on the theory of planned behavior? *Zeitschrift für Psychologie*. https://doi.org/10.1027/2151-2604/a000255

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407-424. https://doi.org/10.1111/0022-4537.00175

Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American Psychologist*, 66(4), 303. https://psycnet.apa.org/doi/10.1037/a0023235

Stevenson, R.B., Nicholls, J. & Whitehouse, H. What is climate change education? *Curric Perspect* 37, 67–71 (2017). https://doi.org/10.1007/s41297-017-0015-9

Stone, Sherril M. "observational learning". Encyclopedia Britannica, 7 Jul. 2017, https://www.britannica.com/science/observational-learning. Accessed 20 November 2023.

Stringer, L. C., Dyer, J. C., Reed, M. S., Dougill, A. J., Twyman, C., & Mkwambisi, D. (2009). Adaptations to climate change, drought, and desertification: local insights to enhance policy in southern Africa. *Environmental science & policy*, *12*(7), 748-765. https://doi.org/10.1016/j.envsci.2009.04.002

Sugandini, Dyah and Rahatmawati, Istiana and Arundati, Rahajeng, Environmental attitude on the adoption decision mangrove conservation: an empirical study on communities in special region of Yogyakarta, Indonesia (November 1, 2017). *Review of Integrative Business and Economics Research (RIBER)*, Vol 7 Issue 1, Available at SSRN: https://ssrn.com/abstract=3063374

Sumastuti, E., & Pradono, N. S. (2016). Dampak perubahan iklim pada tanaman padi di Jawa Tengah. *Journal of Economic Education*, *5*(1), 31-38.

Sumintono, B., & Widhiarso, W. (2014). *Aplikasi model Rasch untuk penelitian ilmu-ilmu sosial (edisi revisi)*. Trim Komunikata Publishing House.

Suntornsan, S., Chudech, S., & Janmaimool, P. (2022). The role of the theory of planned behavior in explaining the energy-saving behaviors of high school

students with physical impairments. *Behavioral Sciences*, 12(9), 334. https://doi.org/10.3390/bs12090334

Swaim, J. A., Maloni, M. J., Napshin, S. A., & Henley, A. B. (2014). Influences on student intention and behavior toward environmental sustainability. *Journal of Business Ethics*, 124(3), 465-484. https://doi.org/10.1007/s10551-013-1883-z

Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., ... & Weber, E. (2009). *Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges. A report by the American Psychological Association's task force on the interface between psychology and global climate change.* American Psychological Association, Washington.

Takshe, A.A., Hennawi, M., Jebril, S. et al. Investigating determinants of pro-environmental behaviors amongst UAE university students through Q-methodology. *Discov Sustain* 4, 38 (2023). https://doi.org/10.1007/s43621-023-00156-4

Tam, K. P., & Chan, H. W. (2017). Environmental concern has a weaker association with pro-environmental behavior in some societies than others: A cross-cultural psychology perspective. *Journal of Environmental Psychology*, *53*, 213-223. https://doi.org/10.1016/j.jenvp.2017.09.001

Tamar, M., Arfah, T., Halim, I., Karimah, P., &, T. (2021). Role of knowledge, subjective norms, perceived behavior control, and attitudes in predict pro-

environmental behavior. *Green Medical Journal*. https://doi.org/10.33096/gmj.v3i3.88.

Tamar, M., Wirawan, H., Arfah, T., & Putri, R. P. S. (2021). Predicting pro-environmental behaviours: the role of environmental values, attitudes and knowledge. *Management of Environmental Quality: An International Journal*, 32(2), 328-343. https://doi.org/10.1108/MEQ-12-2019-0264

Tana, K., & Decano, D. (2021). School Climate and the Work Attitude of Senior High School Teachers of Panabo City Division. *International Journal of Research and Innovation in Social Science*. https://doi.org/10.47772/ijriss.2021.51017.

Taskin, O. (2009). The Environmental Attitudes of Turkish Senior High School Students in the Context of Postmaterialism and the New Environmental Paradigm. *International Journal of Science Education*, 31, 481 - 502. https://doi.org/10.1080/09500690701691689.

Tasquier, G., & Pongiglione, F. (2017). The influence of causal knowledge on the willingness to change attitude towards climate change: results from an empirical study. *International Journal of Science Education*, 39(13), 1846-1868. https://doi.org/10.1080/09500693.2017.1355078

Tian, H., & Liu, X. (2022). Pro-environmental behavior research: Theoretical progress and future directions. *International Journal of Environmental Research and Public Health*, 19(11), 6721. https://doi.org/10.3390/ijerph19116721

Tindall, D. B., Davies, S., & Mauboules, C. (2003). Activism and conservation behavior in an environmental movement: The contradictory effects of gender. *Society & Natural Resources*, *16*(10), 909-932. https://doi.org/10.1080/716100620

Tucholska, K., Gulla, B., & Ziernicka-Wojtaszek, A. (2024). Climate change beliefs, emotions, and pro-environmental behaviors among adults: The role of core personality traits and the time perspective. *Plos one*, *19*(4), e0300246. https://doi.org/10.1371/journal.pone.0300246

Udall, A. M., De Groot, J. I., De Jong, S. B., & Shankar, A. (2021). How I see me—A meta-analysis investigating the association between identities and pro-environmental behavior. *Frontiers in Psychology*, *12*, 582421. https://doi.org/10.3389/fpsyg.2021.582421

United Nations. (2019). The Special Report on the Ocean and Cryosphere in a Changing Climate. https://www.un.org/en/climatechange/reports

United Nations. Documentation, Reference, & Terminology Section. (1992). Environment and Development (Vol. 2). UN.

Uzoaru, O. C., & Ijah, C. N. (2021). Community based environmental education a strategy for mitigating impacts of climate change on livelihood of riverine communities in rivers state. *Int. J. Weather. Clim. Change Conserv*. Res, 7, 45-54.

Vagias, Wade M. (2006). *Likert-type scale response anchors. Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management*. Clemson University.

Valentín, B., Abreu, D., Ramírez, O., Bynoe, P., Ferguson, T., Simmons, D., ... & Pritchard, M. (2015). *Not just hot air: Putting climate change education into practice.*

Vaughter, P. (2016). *Climate Change Education: From critical thinking to critical action.*

Venghaus, S., Henseleit, M. & Belka, M. The impact of climate change awareness on behavioral changes in Germany: changing minds or changing behavior? *Energ Sustain Soc* 12, 8 (2022). https://doi.org/10.1186/s13705-022-00334-8

Vergura, D. T., Zerbini, C., Luceri, B., & Palladino, R. (2023). Investigating sustainable consumption behaviors: a bibliometric analysis. *British Food Journal*, *125*(13), 253-276. https://doi.org/10.1108/BFJ-06-2022-0491

Vicente-Molina, M., Fernández-Sainz, A., & Izagirre-Olaizola, J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *Journal of Cleaner Production*, 61, 130-138. https://doi.org/10.1016/J.JCLEPRO.2013.05.015.

Vieira J, Castro SL, Souza AS (2023) Psychological barriers moderate the attitude-behavior gap for climate change. *PLoS ONE* 18(7): e0287404. https://doi.org/10.1371/journal.pone.0287404

Wachholz, S., Artz, N., & Chene, D. (2014). Warming to the idea: university students' knowledge and attitudes about climate change. *International Journal of Sustainability in Higher Education*, 15(2), 128-141. https://doi.org/10.1108/IJSHE-03-2012-0025

Wan, C., Shen, G. Q., & Yu, A. (2014). The role of perceived effectiveness of policy measures in predicting recycling behavior in Hong Kong. *Resources, Conservation and Recycling*, *83*, 141-151. https://doi.org/10.1016/j.resconrec.2013.12.009

Wang, K., & Zhang, L. (2021). The impact of ecological civilization theory on university students' pro-environmental behavior: an application of knowledge-attitude-practice theoretical model. *Frontiers in Psychology*, *12*, 681409. https://doi.org/10.3389/fpsyg.2021.681409

Wang, Q., Kou, Z., Sun, X., Wang, S., Wang, X., Jing, H., & Lin, P. (2022). Predictive analysis of the pro-environmental behavior of college students using a decision-tree model. *International Journal of Environmental Research and Public Health*, *19*(15), 9407. https://doi.org/10.3390/ijerph19159407

Wang, Z., Zhang, B., & Li, G. (2014). Determinants of energy-saving behavioral intention among residents in Beijing: Extending the theory of planned

behavior. *Journal of Renewable and Sustainable Energy*, 6(5). https://doi.org/10.1063/1.4898363

Weart, S. (2008). Timeline (Milestones). In *the Discovery of Global Warming*. [Online] American Institute of Physics website.

Weiss, E. B. (1992). United Nations conference on environment and development. International Legal Materials, 31(4), 814–817. http://www.jstor.org/stable/20693712

Wheeler, T., & von Braun, J. (2013). Climate change impacts on global food security. *Science*, 341(6145), 508-513. https://doi.org/10.1126/science.1239402

Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology*, *29*(1), 13-23. https://doi.org/10.1016/j.jenvp.2008.05.003Get rights and content

Whitmarsh, L. E., Haggar, P., & Thomas, M. (2018). Waste reduction behaviors at home, at work, and on holiday: What influences behavioral consistency across contexts? *Frontiers in Psychology*, *9*, 417854. https://doi.org/10.3389/fpsyg.2018.02447

Widayani, S., Yunita, F., & Moordiani, R. (2021). Efektivitas Training of Trainer Pertanian Cerdas Iklim Bagi Penyuluh Pertanian pada Masa Pandemi Covid 19 Provinsi Jawa Tengah (Doctoral dissertation, Sebelas Maret University).

Wijaya, D. I., & Kokchang, P. (2023). Factors influencing generation z's pro-environmental behavior towards indonesia's energy transition. *Sustainability*, *15*(18), 13485. https://doi.org/10.3390/su151813485

Wodika, A., & Middleton, W. (2020). Climate change advocacy: exploring links between student empowerment and civic engagement. *International Journal of Sustainability in Higher Education*, 21, 1209-1231. https://doi.org/10.1108/ijshe-03-2020-0091.

World Bank. 2018. Carbon Markets Under the Kyoto Protocol: Lessons Learned for Building an International Carbon Market Under the Paris Agreement. © World Bank, Washington, DC. http://hdl.handle.net/10986/31210 License: CC BY 3.0 IGO

Wu, J., & Otsuka, Y. (2021). Exploring the climate literacy of high school students for better climate change education. *International Journal of Global Warming*. https://doi.org/10.1504/IJGW.2021.10035006.

Wu, L., Zhu, Y., & Zhai, J. (2022). Understanding waste management behavior among university students in China: environmental knowledge, personal norms, and the theory of planned behavior. *Frontiers in Psychology*, *12*, 771723. https://doi.org/10.3389/fpsyg.2021.771723

Xu, Y., Du, J., Khan, M. A. S., Jin, S., Altaf, M., Anwar, F., & Sharif, I. (2022). Effects of subjective norms and environmental mechanism on green purchase behavior:

An extended model of theory of planned behavior. *Frontiers in Environmental Science*, 10, 779629. https://doi.org/10.3389/fenvs.2022.779629

Yang, J., Zou, L., Lin, T., Wu, Y., & Wang, H. (2014). Public willingness to pay for CO2 mitigation and the determinants under climate change: a case study of Suzhou, China. *Journal of Environmental Management*, 146, 1-8. https://doi.org/10.1016/j.jenvman.2014.07.015.

Yli-Panula, E., Jeronen, E., Koskinen, S., & Mäki, S. (2022). Finnish University Students' views on climate change education and their own ability to act as climate educators. *Education Sciences*, 12(3), 169. https://doi.org/10.3390/educsci12030169

Yokoyama, A., Matsuyuki, M., Antokida, Y., Fitrinitia, I. S., Tanaka, S., & Ariyoshi, R. (2023). Assessing the impacts of climate-induced resettlement on livelihood vulnerability: A case study in Jakarta Special Province, Indonesia. *International Journal of Disaster Risk Reduction*, 96, 103946. https://doi.org/10.1016/j.ijdrr.2023.103946

Yu, T., & Yu, T. (2017). The moderating effects of students' personality traits on pro-environmental behavioral intentions in response to climate change. *International Journal of Environmental Research and Public Health*, 14. https://doi.org/10.3390/ijerph14121472.

Yu, T., Yu, T., & Chao, C. (2017). Understanding Taiwanese undergraduate students' pro-environmental behavioral intention towards green products in the fight

against climate change. *Journal of Cleaner Production*, 161, 390-402. https://doi.org/10.1016/J.JCLEPRO.2017.05.115.

Yuan, X., Yu, L., Wu, H., She, H., Luo, J., & Li, X. (2022). Sustainable development goals (SDGs) priorities of senior high school students and global public: Recommendations for implementing education for sustainable development (ESD). *Education Research International, 2022*,. https://doi.org/10.1155/2022/2555168

Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., & Guillaumie, L. (2020). Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling*, *155*, 104660. https://doi.org/10.1016/j.resconrec.2019.104660

Zelezny, L. C., Chua, P. P., & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56(3), 443-457. https://doi.org/10.1111/0022-4537.00177

Zhang, L., Fan, Y., Zhang, W., & Zhang, S. (2019). Extending the theory of planned behavior to explain the effects of cognitive factors across different kinds of green products. *Sustainability*, 11(15), 4222. https://doi.org/10.3390/su11154222

Zhang, X., Geng, G., & Sun, P. (2017). Determinants and implications of citizens' environmental complaint in China: Integrating theory of planned behavior and

norm activation model. *Journal of Cleaner Production*, *166*, 148-156. https://doi.org/10.1016/j.jclepro.2017.08.020

Zhang, Y., Moyle, B., & Jin, X. (2018). Fostering visitors' pro-environmental behaviour in an urban park. *Asia Pacific Journal of Tourism Research*, 23, 691 - 702. https://doi.org/10.1080/10941665.2018.1487457.

Zwick, R., Thayer, D. T., & Lewis, C. (1999). An empirical Bayes approach to Mantel-Haenszel DIF analysis. *Journal of Educational Measurement*, *36*(1), 1-28. https://doi.org/10.1111/j.1745-3984.1999.tb00543.x

APPENDICES

Appendix A: Research Instruments in Indonesian

Assalamu'alaikum Warahmatullahi Wabarakatuh,

Perkenalkan, saya Irkham Zamzuri, mahasiswa S2 Ilmu Pendidikan di Universitas Islam Internasional Indonesia. Saya sedang melakukan penelitian untuk tesis yang berjudul "SIKAP, NORMA SUBJEKTIF, PERSEPSI KONTROL PERILAKU, DAN NIAT BERPERILAKU SISWA TERHADAP PERUBAHAN IKLIM TERKAIT DENGAN PERILAKU PRO LINGKUNGAN DI KABUPATEN KLATEN INDONESIA."

Penelitian ini bertujuan untuk memahami pengaruh pendidikan perubahan iklim terhadap perilaku pro-lingkungan siswa SMA. Partisipasi Anda dalam mengisi kuisioner ini sangat berharga dan akan membantu pengumpulan data yang diperlukan. Semua data yang Anda berikan akan dijaga kerahasiaannya dan hanya digunakan untuk tujuan akademis.

Dengan mengisi kuesioner penilitain ini berarti anda bersedia dengan sukarela tanpa ada paksaan dari siapapun untuk menjadi responden penelitian ini. Dengan demikian segala bentuk identitas diri anda, akan sangat dirahasikan dengan penuh kehati-hatian.

Terima kasih atas perhatian dan partisipasinya.

Wassalamu'alaikum Warahmatullahi Wabarakatuh.

Hormat saya,

Irkham Zamzuri

Mahasiswa S2 Ilmu Pendidikan

Universitas Islam Internasional Indonesia

Bagian A: Informasi Demografis

Petunjuk: Mohon berikan beberapa informasi dasar tentang diri Anda. Semua jawaban akan dijaga kerahasiaannya.

Nama Lengkap

Umur

Kelas

Jenis Kelamin

Asal Sekolah

Bagian B: Sikap Terhadap Perubahan Iklim

Petunjuk: Mohon tunjukkan tingkat kesetujuan Anda terhadap pernyataan-pernyataan berikut ini dengan menggunakan skala 4 poin sebagai berikut:

1 = Sangat Tidak Setuju,

2 = Tidak Setuju,

3 = Setuju, dan

4 = Sangat Setuju.

1. Lingkungan hidup di Indonesia dalam bahaya karena perubahan iklim global. (Favorable)
2. Pemanasan global terjadi secara alami dan bukan karena perbuatan manusia. (Unfavorable)
3. Perubahan iklim akan merusak lingkungan alam dan kehidupan satwa liar di Indonesia. (Favorable)
4. Saya bersedia membayar sejumlah uang untuk mengurangi dampak perubahan iklim.(Favorable)

Bagian C: Norma Subyektif Terhadap Perubahan Iklim

Petunjuk: Mohon tunjukkan tingkat kesetujuan Anda terhadap pernyataan-pernyataan berikut ini dengan menggunakan skala 4 poin sebagai berikut:

1 = Sangat Tidak Setuju,

2 = Tidak Setuju,

3 = Setuju, dan

4 = Sangat Setuju.

1. Keluarga atau teman sebaya saya sering mendiskusikan perubahan iklim atau pemanasan global.(Favorable)
2. Saya akan merasa bersalah jika perubahan iklim berdampak negatif di Indonesia. (Favorable)
3. Masyarakat harus melakukan segala cara untuk mengurangi dampak perubahan iklim di Indonesia. (Favorable)
4. Saya merasa berkewajiban secara pribadi untuk membantu mengurangi dampak perubahan iklim di Indonesia. (Favorable)
5. Saya merasa adaptasi menjadi hal yang perlu dilakukan oleh kita semua. (Favorable)

Bagian D: Persepsi Kontrol Perilaku terhadap Perubahan Iklim

Petunjuk: Mohon tunjukkan tingkat kesetujuan Anda terhadap pernyataan-pernyataan berikut ini dengan menggunakan skala 4 poin sebagai berikut:

1 = Sangat Tidak Setuju,

2 = Tidak Setuju,

3 = Setuju, dan

4 = Sangat Setuju.

1. Jika semua orang mengambil tindakan, kita dapat mengurangi dampak perubahan iklim di Indonesia. (Favorable)
2. Saya memiliki kemampuan untuk mengurangi dampak perubahan iklim di Indonesia. (Favorable)

3. Saya yakin bahwa saya dapat berkontribusi untuk mengurangi dampak perubahan iklim. (Favorable)

4. Saya dapat berkontribusi untuk mengurangi emisi CO2 melalui adaptasi. (Favorable)

5. Saya mampu berkontribusi dalam mengurangi emisi gas rumah kaca melalui adaptasi. (Favorable)

Bagian E: Niat Berperilaku untuk Mempromosikan Kesadaran Akan Perubahan Iklim

Petunjuk: Mohon tunjukkan tingkat kesetujuan Anda terhadap pernyataan-pernyataan berikut ini dengan menggunakan skala 4 poin sebagai berikut:

1 = Sangat Tidak Setuju,

2 = Tidak Setuju,

3 = Setuju, dan

4 = Sangat Setuju.

1. Saya bersedia mengubah gaya hidup saya untuk mengurangi pemanasan global dan perubahan iklim. (Favorable)

2. Saya bersedia menerapkan metode pro-lingkungan kepada teman-teman saya. (Favorable)

3. Saya bertanggung jawab untuk mengajak tetangga saya untuk mengurangi perubahan iklim. (Favorable)

4. Saya telah melakukan upaya besar untuk mengurangi perubahan iklim tahun lalu. (Favorable)

5. Saya bersedia menerapkan metode pro-lingkungan untuk keluarga saya. (Favorable)

6. Saya akan melakukan segala sesuatu yang dapat mengurangi dampak perubahan iklim. (Favorable)

Bagian F: Perilaku Pro-Lingkungan

Petunjuk: Mohon tunjukkan tingkat kesetujuan Anda terhadap pernyataan-pernyataan berikut ini dengan menggunakan skala 5 poin sebagai berikut:

1 = Sangat Tidak Setuju,

2 = Tidak Setuju,

3 = Netral,

4 = Setuju, dan

5 = Sangat Setuju.

1. Mengganti kendaraan pribadi yang lebih hemat bahan bakar (mobil/motor/kendaraan listrik). (Favorable)
2. Saya menggunakan transportasi umum. (Favorable)
3. Saya mencoba mendaur ulang sebanyak mungkin. (Favorable)
4. Saya mengurangi jumlah sampah yang saya hasilkan. (Favorable)
5. Saya memasang bola lampu hemat energi. (Favorable)
6. Saya mematikan lampu/kipas angin/AC/peralatan listrik lainnya ketika tidak digunakan. (Favorable)

Appendix B: Research Instruments in English

Assalamu'alaikum Warahmatullahi Wabarakatuh,

Let me introduce myself, I am Irkham Zamzuri, a master's student in Education at the International Islamic University of Indonesia. I am conducting research for a thesis entitled " **HIGH SCHOOL STUDENTS' ATTITUDE, SUBJECTIVE NORM, PERCEIVED BEHAVIORAL CONTROL, AND BEHAVIORAL INTENTION TOWARD CLIMATE CHANGE IN RELATION TO PRO-ENVIRONMENTAL BEHAVIOR IN KLATEN REGENCY INDONESIA."**

This research aims to understand the influence of climate change education on high school students' pro-environmental behavior. Your participation in filling out this questionnaire is very valuable and will help collect the necessary data. All data you provide will be kept confidential and only used for academic purposes.

By filling out this research questionnaire, it means that you are willing to voluntarily, without any coercion from anyone, become a respondent of this research. Thus, all forms of your identity will be kept very confidential with great care.

Thank you for your attention and participation.

Wassalamualaikum warahmatullahi wabarakatuh.

Regard,

Irkham Zamzuri

Master of Education Science students

Indonesian International Islamic University

Part A: Demographic Information

Instructions: Please provide some basic information about yourself. All answers will be kept confidential.

Full name

Age

Class

Gender

School

Part B: Attitudes Towards Climate Change

Instruction to follow: Please show the level of your agreement through the following statements. There are 4-points Likert rating scale:

1 = Strongly Disagree,

2 = Disagree,

3 = Agree, and

4 = Strongly Agree.

1. The environmental condition in Indonesia is in danger because of global warming and climate change. (Favorable)
2. Global warming and climate change occur naturally, and they are not caused by human actions. (Unfavorable)
3. Global warming and climate change will damage the natural environment and wildlife in Indonesia. (Favorable)
4. I am willing to pay a certain amount of money to reduce the impact of climate change. (Favorable)

Part C: Subjective Norms Regarding Climate Change

Instruction to follow: Please show the level of your agreement through the following statements. There are 4-points Likert rating scale:

1 = Strongly Disagree,

2 = Disagree,

3 = Agree, and

4 = Strongly Agree.

1. My family or peers often discuss climate change or global warming. (Favorable)
2. I will feel guilty if climate change has a negative impact on Indonesia. (Favorable)
3. Society must do everything that they can do to reduce the impact of global warming and climate change in Indonesia. (Favorable)
4. I feel personally obligate to help people in reducing the impact of global warming and climate change in Indonesia. (Favorable)
5. I feel that adaptation is something that we all need to perform. (Favorable)

Part D: Perceived Behavioral Control of Climate Change

Instruction to follow: Please show the level of your agreement through the following statements. There are 4-points Likert rating scale:

1 = Strongly Disagree,

2 = Disagree,

3 = Agree, and

4 = Strongly Agree.

1. If everyone acts, we can reduce the effects of global warming and climate change in Indonesia. (Favorable)
2. I can reduce the effects of global warming and climate change in Indonesia. (Favorable)
3. I believe that I can contribute to reduce the effects of global warming and climate change.
4. I can participate in reducing CO_2 emissions through proper adaptation. (Favorable)

5. I can participate in reducing greenhouse gas (GHG) emissions through proper adaptation. (Favorable)

Part E: Behavioral Intentions to Promote Awareness of Climate Change

Instruction to follow: Please show the level of your agreement through the following statements. There are 4-points Likert rating scale:

1 = Strongly Disagree,

2 = Disagree,

3 = Agree, and

4 = Strongly Agree.

1. I am willing to change my lifestyle to reduce global warming and climate change. (Favorable)
2. I willing to apply eco-friendly methods to my friends. (Favorable)
3. I have responsibility to encourage my neighbors to reduce global warming and climate change. (Favorable)
4. I have made great efforts to reduce global warming and climate change in the last year. (Favorable)
5. I am willing to implement eco-friendly methods for my family. (Favorable)
6. I will do everything that I can reduce the impact of global warming and climate change. (Favorable)

Part F: Pro-Environmental Behavior

Instruction to follow: Please show the level of your agreement through the following statements. There are 4-points Likert rating scale:

1 = Strongly Disagree,

2 = Disagree,

3 = Neutral,

4 = Agree, and

5 = Strongly Agree.

1. Replace private mode of transportation with more fuel-efficient ones. (Favorable)
2. I use public transportation. (Favorable)
3. I try to recycle as much as possible. (Favorable)
4. I reduce the amount of waste that I produce. (Favorable)
5. I installed energy-saving light bulbs. (Favorable)
6. I turn off the lights/fan/AC/other electrical equipment when not in use. (Favorable)

Appendix C: Research Permits

Research Permit from Faculty of Education UIII to Schools

Universitas
Islam Internasional
Indonesia

Kementerian Agama Republik Indonesia
Universitas Islam Internasional Indonesia
Jalan Raya Bogor KM. 33.5
Cisalak, Sukmajaya, Depok, Jawa Barat 16416
secretariat@uiii.ac.id
www.uiii.ac.id

Nomor : 174/Dek.FIP/UIII/UM.02/5/2024 Depok, 5 Juni 2024
Lampiran : -
Hal : Permohonan Izin Penelitian

Kepada Yth.
Kepala Sekolah SMAN 3 Klaten
Di tempat

Assalamu'alaikum Wr. Wb.,

Dengan ini kami menyatakan bahwa mahasiswa di bawah ini:

Nama	: Irkham Zamzuri
NIM	: 04212210013
Fakultas	: Fakultas Ilmu Pendidikan
Program Studi	: Magister Ilmu Pendidikan

sedang melakukan penelitian untuk tesis dengan rincian sebagai berikut:

Judul Tesis	: Pendidikan Perubahan Iklim untuk Mendorong Perlaku Pro-Lingkungan di Kalangan Siswa SMA di Kabupaten Klaten: Sikap, Norma Subjektif, dan Persepsi Kontrol Perilaku
Lokasi Penelitian	[redacted]
Waktu Penelitian	

Kami memohon bantuan Ibu/Bapak untuk memberikan izin penelitian kepada mahasiswa tersebut. Data penelitian hanya akan digunakan untuk tujuan akademis dan tidak akan digunakan untuk tujuan lain.

Demikian kami sampaikan, atas perhatian dan kerja sama Ibu/Bapak kami ucapkan terima kasih.

Wassalamu'alaikum Wr. Wb.,

Hormat kami,
Dekan Fakultas Ilmu Pendidikan

Universitas Islam Internasional Indonesia | Faculty of Education

Prof. Nina Nurmila, PhD

Research Permit from Faculty of Education to Region V Education District Office of Central Java Province

Universitas Islam Internasional Indonesia

Kementerian Agama Republik Indonesia
Universitas Islam Internasional Indonesia
Jalan Raya Bogor KM. 33.5
Cisalak, Sukmajaya, Depok, Jawa Barat 16416
secretariat@uiii.ac.id
www.uiii.ac.id

Nomor : 184/Dek.FIP/UIII/UM.02/6/2024 Depok, 7 Juni 2024
Lampiran : -
Hal : Permohonan Izin Penelitian

Kepada Yth.
Kepala Cabang Dinas Pendidikan Wilayah 5 Jawa Tengah

Assalamu'alaikum Wr. Wb.,

Dengan ini kami menyatakan bahwa mahasiswa di bawah ini:

Nama	: Irkham Zamzuri
NIM	: 04212210013
Fakultas	: Fakultas Ilmu Pendidikan
Program Studi	: Magister Ilmu Pendidikan

sedang melakukan penelitian untuk tesis dengan rincian sebagai berikut:

Judul Tesis	: Pendidikan Perubahan Iklim untuk Mendorong Perlaku Pro-Lingkungan di Kalangan Siswa SMA di Kabupaten Klaten: Sikap, Norma Subjektif, dan Persepsi Kontrol Perilaku
Lokasi Penelitian	[redacted]
Waktu Penelitian	

Kami memohon bantuan Ibu/Bapak untuk memberikan izin penelitian kepada mahasiswa tersebut. Data penelitian hanya akan digunakan untuk tujuan akademis dan tidak akan digunakan untuk tujuan lain.

Demikian kami sampaikan, atas perhatian dan kerja sama Ibu/Bapak kami ucapkan terima kasih.

Wassalamu'alaikum Wr. Wb.,

Hormat kami,
Dekan Fakultas Ilmu Pendidikan

Universitas Islam Internasional Indonesia | Faculty of Education

Prof. Nina Nurmila, PhD

Research Permit from Region V Education District Office of Central Java Province

PEMERINTAH PROVINSI JAWA TENGAH
DINAS PENDIDIKAN DAN KEBUDAYAAN
CABANG DINAS PENDIDIKAN WILAYAH V
Jalan Terate No.49 Boyolali 57316, Telepon 02763280475 Email : cabdisdikwil5@gmail.com

Boyolali, 07 Juni 2024

Nomor : 421.7/2901
Sifat : Biasa
Lampiran : -
Perihal : Izin Penelitian

Kepada

Yth. Dekan Fakultas Ilmu Pendidikan
Universitas Islam International
Indonesia
di-
Tempat

Berdasarkan surat Saudari perihal Permohonan Izin Tesis No. 184/Dek.FIP/UIII/UM.02/6/2024, Kepala Cabang Dinas Pendidikan Wilayah V pada Dinas Pendidikan Dan Kebudayaan Provinsi Jawa Tengah :

MENGIZINKAN

Kepada :
Nama : **Irkham Zamzuri**
NIM : 04212210013
Program Studi : Magister Ilmu Pendidikan

Untuk :

1. Mengadakan penelitian/riset/Observasi dalam rangka Penyusunan Tesis dengan Judul "Pendidikan Perubahan Iklim untuk Mendorong Perlaku Pro-Lingkungan Dikalangan Siswa SMA di kabupaten Klaten: Sikap;Norma Subyektif, dan Persepsi Kontrol Perilaku."dilaksanakan di:
   Lokasi Penelitian [redacted]
   Waktu
2. Segera menghadap kepala Sekolah yang bersangkutan untuk koordinasi dan melaporkan jadwal pelaksanaan tesis;
3. Setelah selesai melaksanakan Penelitian wajib membuat laporan yang ditujukan kepada Kepala Cabang Dinas Pendidikan Wilayah V Provinsi Jawa Tengah;
4. Tidak diperkenankan menyebarluaskan hasil penelitian di luar kepentingan akademis.

Demikian untuk digunakan sebagaimana mestinya.

KEPALA CABANG DINAS PENDIDIKAN
WILAYAH V,

PEMPROV JATENG
CABANG DINAS PENDIDIKAN WILAYAH V
DISDIKBUD

AGUNG WIDAYANTO, S.Pd, M.Pd
Pembina Tingkat I
NIP. 19710713 199802 1 002

Tembusan :
1. Kepala Dinas Pendidikan Dan Kebudayaan Provinsi Jawa Tengah;
2. Korwas Wilayah Klaten;
3. Kepala SMA N tsb;
4. Sdr. Irkham Zamzuri.

Appendix D: Winsteps 3.73 Output Tables of Pilot Testing

First Data Set of Pilot Testing

Output Table 3.1 Sum Statistic of ATT, SN, & PBC

3.1 Sum Statistic ATT SN PBC.txt - Notepad

File Edit Format View Help

TABLE 3.1 E:\PERSIAPAN UIII\Environmental Educat ZOU260WS.TXTo May 28 10:12 2024it Thesis
INPUT: 203 Person 26 Item REPORTED: 203 Person 14 Item 5 CATS WINSTEPS 3.73

SUMMARY OF 203 MEASURED Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	54.0	14.0	1.45	.40	1.04	-.2	1.03	-.2
S.D.	6.1	.0	1.01	.08	.88	1.7	.88	1.7
MAX.	69.0	14.0	5.40	1.04	5.72	6.5	5.91	6.7
MIN.	32.0	14.0	-1.31	.33	.16	-3.5	.15	-3.6

REAL RMSE .47 TRUE SD .90 SEPARATION 1.91 Person RELIABILITY .79
MODEL RMSE .41 TRUE SD .93 SEPARATION 2.24 Person RELIABILITY .83
S.E. OF Person MEAN = .07

Person RAW SCORE-TO-MEASURE CORRELATION = .98
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .81

SUMMARY OF 14 MEASURED Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	782.4	203.0	.00	.10	1.02	-.2	1.03	-.1
S.D.	89.6	.0	.93	.01	.41	3.6	.46	3.7
MAX.	916.0	203.0	1.68	.12	2.21	9.1	2.38	9.8
MIN.	606.0	203.0	-1.56	.09	.55	-5.3	.55	-5.2

REAL RMSE .11 TRUE SD .93 SEPARATION 8.28 Item RELIABILITY .99
MODEL RMSE .10 TRUE SD .93 SEPARATION 8.87 Item RELIABILITY .99
S.E. OF Item MEAN = .26

Output Table 10 Item Fit Order of ATT, SN, & PBC

10 Item Fit Order ATT SN PBC.txt - Notepad

File Edit Format View Help

TABLE 10.1 E:\PERSIAPAN UIII\Environmental Educa ZOU260WS.TXTr May 28 10:12 2024mit Thesis
INPUT: 203 Person 26 Item REPORTED: 203 Person 14 Item 5 CATS WINSTEPS 3.73

Person: REAL SEP.: 1.91 REL.: .79 ... Item: REAL SEP.: 8.28 REL.: .99

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
2	780	203	.10	.10	2.21	9.1	2.38	9.8	A .27	.53	39.9	52.2	ATT2
3	836	203	-.51	.11	1.60	5.4	1.61	4.9	B .39	.50	51.2	53.6	ATT3
9	867	203	-.88	.11	1.02	.3	1.20	1.7	C .42	.48	57.1	55.7	SN5
5	640	203	1.41	.09	1.12	1.2	1.14	1.3	D .42	.58	47.8	51.0	SN1
4	606	203	1.68	.09	1.11	1.1	1.13	1.3	E .47	.59	46.3	49.3	ATT4
1	849	203	-.66	.11	1.05	.5	1.06	.5	F .53	.49	65.5	54.3	ATT1
6	746	203	.44	.10	.92	-.8	.92	-.8	G .55	.55	58.6	52.1	SN2
7	916	203	-1.56	.12	.89	-1.1	.75	-1.9	g .57	.42	67.5	62.9	SN3
8	846	203	-.62	.11	.84	-1.7	.79	-2.1	f .63	.49	65.5	54.3	SN4
10	899	203	-1.30	.12	.83	-1.8	.75	-2.1	e .60	.44	65.5	60.3	PBC1
11	697	203	.91	.10	.74	-2.7	.73	-2.8	d .64	.56	65.0	52.8	PBC2
13	748	203	.42	.10	.71	-3.0	.71	-3.1	c .66	.55	65.5	52.0	PBC4
14	749	203	.41	.10	.66	-3.7	.70	-3.2	b .66	.55	63.5	52.3	PBC5
12	775	203	.15	.10	.55	-5.3	.55	-5.2	a .69	.54	72.9	52.2	PBC3
MEAN	782.4	203.0	.00	.10	1.02	-.2	1.03	-.1			59.4	53.9	
S.D.	89.6	.0	.93	.01	.41	3.6	.46	3.7			9.3	3.5	

Output Table 23 Item Dimensionality

23 Item Dimensionality ATT SN PBC.txt - Notepad

File Edit Format View Help

TABLE 23.0 E:\PERSIAPAN UIII\Environmental Educa ZOU260WS.TXTr May 28 10:12 2024mit Thesis
INPUT: 203 Person 26 Item REPORTED: 203 Person 14 Item 5 CATS WINSTEPS 3.73

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

	-- Empirical --		Modeled
Total raw variance in observations =	25.2	100.0%	100.0%
Raw variance explained by measures =	11.2	44.4%	45.6%
Raw variance explained by persons =	3.9	15.6%	16.1%
Raw Variance explained by items =	7.2	28.8%	29.5%
Raw unexplained variance (total) =	14.0	55.6% 100.0%	54.4%
Unexplned variance in 1st contrast =	2.4	9.5% 17.1%	
Unexplned variance in 2nd contrast =	1.8	7.0% 12.5%	
Unexplned variance in 3rd contrast =	1.5	6.0% 10.7%	
Unexplned variance in 4th contrast =	1.4	5.7% 10.3%	
Unexplned variance in 5th contrast =	1.1	4.3% 7.8%	

Second Data Set of Pilot Testing

Output Table 3.1 Sum Statistic of BI

SUMMARY OF 203 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	22.3	6.0	2.00	.77				
S.D.	3.4	.0	1.94	.22				
MAX.	30.0	6.0	7.60	1.93				
MIN.	12.0	6.0	-2.91	.59	.09	-2.7	.09	-2.6
REAL RMSE	.90	TRUE SD	1.72	SEPARATION	1.91	Person RELIABILITY		.78
MODEL RMSE	.81	TRUE SD	1.76	SEPARATION	2.19	Person RELIABILITY		.83
S.E. OF Person MEAN = .14								

Person RAW SCORE-TO-MEASURE CORRELATION = .99

CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .81

SUMMARY OF 6 MEASURED (NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	752.8	203.0	.00	.13	1.00	-.8	.99	-.9
S.D.	62.3	.0	1.00	.00	.53	4.6	.56	4.4
MAX.	800.0	203.0	2.01	.13	2.10	8.5	2.13	7.7
MIN.	627.0	203.0	-.76	.12	.63	-4.2	.62	-3.9
REAL RMSE	.14	TRUE SD	.99	SEPARATION	7.08	Item RELIABILITY		.98
MODEL RMSE	.13	TRUE SD	.99	SEPARATION	7.83	Item RELIABILITY		.98
S.E. OF Item MEAN = .45								

Output Table 10 Item Fit Order BI

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
15	800	203	-.76	.13	2.10	8.5	2.13	7.7	A .54	.69	53.8	63.6	BI1
18	627	203	2.01	.12	1.21	1.9	1.26	2.1	B .60	.75	58.4	63.8	BI4
17	720	203	.54	.13	.71	-3.0	.68	-3.2	C .80	.73	72.1	63.5	BI3
19	788	203	-.57	.13	.66	-3.8	.63	-3.9	c .80	.69	76.1	63.9	BI5
20	787	203	-.55	.13	.66	-3.9	.62	-3.9	b .79	.69	76.6	64.0	BI6
16	795	203	-.68	.13	.63	-4.2	.62	-3.9	a .77	.69	77.2	63.6	BI2
MEAN	752.8	203.0	.00	.13	1.00	-.8	.99	-.9			69.0	63.7	
S.D.	62.3	.0	1.00	.00	.53	4.6	.56	4.4			9.4	.2	

Output Table 23 Item Dimensionality

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

		-- Empirical --		Modeled
Total raw variance in observations	=	13.3	100.0%	100.0%
Raw variance explained by measures	=	7.3	54.9%	54.8%
Raw variance explained by persons	=	4.0	29.8%	29.8%
Raw Variance explained by items	=	3.3	25.1%	25.0%
Raw unexplained variance (total)	=	6.0	45.1%	100.0% 45.2%
Unexplned variance in 1st contrast	=	1.7	12.7%	28.1%
Unexplned variance in 2nd contrast	=	1.5	11.6%	25.6%
Unexplned variance in 3rd contrast	=	1.1	8.3%	18.4%
Unexplned variance in 4th contrast	=	.9	7.1%	15.8%
Unexplned variance in 5th contrast	=	.7	5.3%	11.8%

Third Data Set of Pilot Testing

Output Table 3.1 Sum Statistic of PEB

SUMMARY OF 203 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	21.9	6.0	1.52	.68				
S.D.	3.0	.0	1.42	.20				
MAX.	30.0	6.0	6.63	1.89				
MIN.	15.0	6.0	-1.20	.59	.05	-3.0	.05	-2.8
REAL RMSE	.78	TRUE SD	1.18	SEPARATION	1.51	Person RELIABILITY		.69
MODEL RMSE	.71	TRUE SD	1.23	SEPARATION	1.74	Person RELIABILITY		.75
S.E. OF Person MEAN = .10								

Person RAW SCORE-TO-MEASURE CORRELATION = .98

CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .68

SUMMARY OF 6 MEASURED (NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	741.7	203.0	.00	.11	1.02	-.1	.98	-.4
S.D.	101.7	.0	1.26	.01	.23	2.4	.20	2.1
MAX.	914.0	203.0	1.96	.13	1.28	2.5	1.27	2.4
MIN.	578.0	203.0	-2.21	.11	.65	-4.3	.64	-4.1
REAL RMSE	.12	TRUE SD	1.26	SEPARATION	10.58	Item RELIABILITY		.99
MODEL RMSE	.11	TRUE SD	1.26	SEPARATION	11.18	Item RELIABILITY		.99
S.E. OF Item MEAN = .56								

Output Table 10 Item Fit Order of PEB

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
22	578	203	1.96	.11	1.28	2.5	1.27	2.4	A	.54	.68	47.0	56.6	PEB2
26	914	203	-2.21	.13	1.26	2.4	1.06	.5	B	.49	.48	61.6	63.7	PEB6
25	720	203	.30	.11	1.11	1.1	1.09	.9	C	.65	.63	56.6	55.4	PEB5
21	713	203	.38	.11	.98	-.1	.99	-.1	c	.61	.63	61.1	56.7	PEB1
23	721	203	.29	.11	.82	-1.9	.81	-1.9	b	.69	.63	59.6	55.5	PEB3
24	804	203	-.71	.11	.65	-4.3	.64	-4.1	a	.69	.59	71.2	55.5	PEB4
MEAN	741.7	203.0	.00	.11	1.02	-.1	.98	-.4				59.5	57.2	
S.D.	101.7	.0	1.26	.01	.23	2.4	.20	2.1				7.2	2.9	

Output Table 23 Item Dimensionality of PEB

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

		-- Empirical --		Modeled
Total raw variance in observations	=	13.1	100.0%	100.0%
Raw variance explained by measures	=	7.1	54.1%	54.5%
Raw variance explained by persons	=	2.6	19.6%	19.7%
Raw Variance explained by items	=	4.5	34.5%	34.8%
Raw unexplained variance (total)	=	6.0	45.9% 100.0%	45.5%
Unexplned variance in 1st contrast	=	1.7	13.3% 28.9%	
Unexplned variance in 2nd contrast	=	1.2	9.4% 20.4%	
Unexplned variance in 3rd contrast	=	1.2	9.1% 19.9%	
Unexplned variance in 4th contrast	=	1.0	7.3% 15.9%	
Unexplned variance in 5th contrast	=	.9	6.8% 14.8%	

Appendix E: Winsteps 3.73 Output Table of Item Measure

Output Table 13 Item Measure of ATT

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
4	3333	1336	1.38	.04	1.09	2.5	1.19	4.5		.56	.68	60.1	57.0	ATT4	Very High
2	3923	1336	.18	.05	1.21	4.8	1.19	4.5		.65	.65	60.0	61.6	ATT2	High
1	4240	1336	-.58	.05	.76	-6.2	.73	-7.0		.68	.62	74.1	65.5	ATT1	Moderate
3	4387	1336	-.97	.05	.99	-.1	.91	-2.1		.70	.61	71.3	66.0	ATT3	Low
MEAN	3970.8	1336.0	.00	.05	1.02	.3	1.01	.0				66.4	62.5		
S.D.	404.6	.0	.90	.00	.16	4.1	.20	4.8				6.4	3.6		

Output Table 13 Item Measure of SN

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
5	3535	1336	1.96	.05	1.12	2.9	1.27	5.8	.55	.68	67.7	63.5	SN1	Very High
6	4024	1336	.63	.06	1.13	2.8	1.10	2.2	.67	.66	71.7	69.4	SN2	High
8	4348	1336	-.43	.06	.79	-5.2	.74	-6.2	.73	.65	75.5	71.2	SN4	Moderate
9	4403	1336	-.62	.06	1.08	1.8	1.05	1.0	.61	.64	71.6	72.0	SN5	
7	4660	1336	-1.55	.06	.99	-.3	.87	-2.4	.68	.60	78.6	72.2	SN3	Low
MEAN	4194.0	1336.0	.00	.06	1.02	.4	1.01	.1			73.0	69.6		
S.D.	386.7	.0	1.20	.00	.12	3.0	.19	4.1			3.7	3.2		

Output Table 13 Item Measure of PBC

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
11	3847	1336	1.23	.07	1.11	2.2	.96	-.6	.69	.75	77.9	78.3	PBC2	Very High
14	3993	1336	.55	.07	.78	-4.8	.65	-6.2	.78	.74	84.7	79.3	PBC5	High
13	3997	1336	.53	.07	.83	-3.5	.68	-5.6	.76	.74	83.6	79.4	PBC4	
12	4117	1336	-.06	.07	.79	-4.6	.63	-6.6	.76	.73	85.1	79.5	PBC3	Moderate
10	4574	1336	-2.25	.07	1.37	8.8	1.77	9.8	.66	.67	81.9	77.0	PBC1	Low
MEAN	4105.6	1336.0	.00	.07	.98	-.4	.94	-1.8			82.7	78.7		
S.D.	249.3	.0	1.20	.00	.23	5.3	.43	6.2			2.6	.9		

Output Table 13 Item Measure of BI

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
15	2389	1336	3.42	.05	2.01	9.9	2.67	9.9	.04	.56	45.8	61.1	BI1	Very High
18	3479	1336	.82	.05	.91	-2.4	.96	-1.0	.65	.57	64.8	64.7	BI4	High
17	3910	1336	-.43	.06	.84	-3.8	.79	-5.0	.73	.58	75.8	71.7	BI3	Moderate
16	4140	1336	-1.18	.06	.72	-7.1	.69	-7.7	.67	.58	81.5	72.8	BI2	
20	4173	1336	-1.29	.06	.80	-5.0	.75	-6.1	.72	.58	78.1	72.5	BI6	
19	4188	1336	-1.34	.06	.68	-8.5	.64	-9.4	.72	.58	81.4	72.3	BI5	
MEAN	3713.2	1336.0	.00	.06	.99	-2.8	1.08	-3.2			71.2	69.2		
S.D.	641.1	.0	1.70	.00	.46	6.0	.72	6.4			12.7	4.6		

Output Table 13 Item Measure of PEB

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item	
22	3383	1336	1.68	.05	1.23	5.8	1.48	9.9	.56	.66	61.8	60.2	PEB2	Very High
25	3838	1336	.56	.05	.90	-2.5	.91	-2.2	.69	.64	68.8	66.9	PEB5	High
23	3939	1336	.28	.05	.76	-6.0	.74	-6.5	.69	.63	76.7	68.2	PEB3	
21	3998	1336	.11	.05	1.15	3.4	1.14	3.0	.59	.63	67.7	69.1	PEB1	
24	4253	1336	-.67	.06	.68	-8.3	.66	-8.4	.67	.61	80.8	71.0	PEB4	Moderate
26	4647	1336	-1.96	.06	1.24	6.3	1.12	2.1	.54	.54	62.6	68.0	PEB6	Low
MEAN	4009.7	1336.0	.00	.05	.99	-.2	1.01	-.4			69.7	67.2		
S.D.	385.7	.0	1.12	.00	.22	5.7	.28	6.2			6.9	3.4		

Appendix F: Different Item Functioning (DIF)

Winsteps 3.73 Output Table 30 Item DIF of Gender

TABLE 30.1 C:\Users\Master\OneDrive\Desktop\Data ZOU194WS.TXTr Jun 19 8:23 2024
INPUT: 1336 Person 26 Item REPORTED: 1336 Person 26 Item 4 CATS WINSTEPS 3.73

DIF class specification is: DIF=$S5W1

Person CLASS	DIF MEASURE	DIF S.E.	Person CLASS	DIF MEASURE	DIF S.E.	DIF CONTRAST	DIF S.E.	JOINT t	JOINT d.f.	JOINT Prob.	Welch Mantel-Haenszel Chi-squ	Welch Mantel-Haenszel Prob.	Size CUMLOR	Item Number	Item Name
F	-.53	.06	M	-.53	.09	.00	.11	.00	976	1.000	.0133	.9081	.02	1	ATT1
F	.18	.06	M	.36	.08	-.18	.10	-1.76	987	.0793	.7653	.3817	-.10	2	ATT2
F	-.89	.06	M	-.97	.09	.08	.11	.71	973	.4755	.4497	.5025	.09	3	ATT3
F	1.57	.05	M	1.10	.08	.47	.09	5.13	955	.0000	16.5912	.0000	.49	4	ATT4
F	.96	.05	M	1.25	.08	-.29	.09	-3.14	990	.0017	16.9397	.0000	-.49	5	SN1
F	-.12	.06	M	.25	.08	-.37	.10	-3.61	993	.0003	7.0002	.0082	-.34	6	SN2
F	-1.62	.07	M	-1.81	.10	.19	.12	1.58	966	.1136	4.2150	.0401	.29	7	SN3
F	-.81	.06	M	-.81	.09	.00	.11	.00	975	1.000	.0012	.9725	-.01	8	SN4
F	-.96	.06	M	-.93	.09	-.03	.11	-.25	975	.8055	.0746	.7847	-.04	9	SN5
F	-1.48	.06	M	-1.34	.09	-.14	.11	-1.19	978	.2340	.5337	.4651	-.10	10	PBC1
F	.37	.06	M	.49	.08	-.12	.10	-1.19	985	.2342	1.9308	.1647	-.19	11	PBC2
F	-.22	.06	M	-.22	.09	.00	.11	.00	977	1.000	.0043	.9478	.01	12	PBC3
F	.04	.06	M	.12	.09	-.07	.10	-.70	982	.4814	.5472	.4595	-.11	13	PBC4
F	.06	.06	M	.12	.09	-.06	.10	-.57	981	.5684	.0740	.7856	-.04	14	PBC5
F	3.08	.05	M	2.93	.08	.14	.09	1.55	969	.1221	2.0178	.1555	.17	15	BI1
F	-.33	.06	M	-.18	.09	-.15	.11	-1.43	982	.1522	6.9069	.0086	-.42	16	BI2
F	.23	.06	M	.36	.08	-.14	.10	-1.33	985	.1854	2.1334	.1441	-.20	17	BI3
F	1.19	.05	M	1.11	.08	.08	.09	.88	972	.3807	.0905	.7636	.04	18	BI4
F	-.42	.06	M	-.36	.09	-.07	.11	-.61	979	.5438	.5822	.4455	-.12	19	BI5
F	-.40	.06	M	-.28	.09	-.13	.11	-1.17	981	.2421	1.7872	.1813	-.21	20	BI6
F	.00	.06	M	.20	.09	-.21	.10	-1.99	987	.0467	3.9606	.0466	-.24	21	PEB1
F	1.43	.05	M	1.14	.08	.29	.09	3.18	962	.0015	7.3309	.0068	.31	22	PEB2
F	.20	.06	M	.17	.09	.04	.10	.35	977	.7239	1.1976	.2738	.15	23	PEB3
F	-.49	.06	M	-.74	.09	.25	.11	2.27	970	.0236	6.1483	.0132	.36	24	PEB4
F	.50	.06	M	.29	.08	.21	.10	2.03	970	.0430	2.8916	.0890	.22	25	PEB5
F	-1.64	.07	M	-1.64	.10	.00	.12	.00	975	1.000	.0951	.7578	.04	26	PEB6

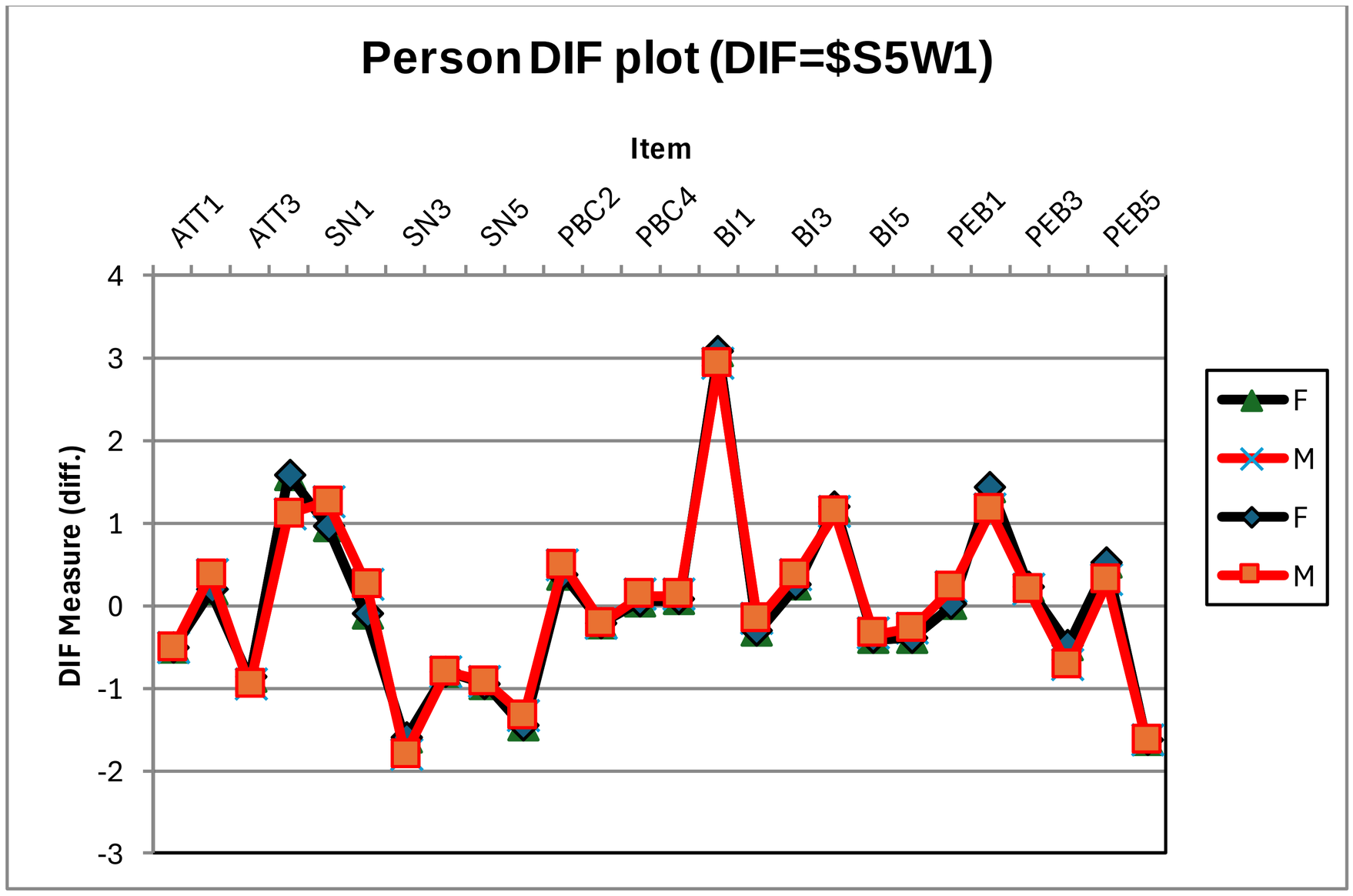
Winsteps 3.73 Output Table 30 Item DIF of School Types

TABLE 30.1 C:\Users\Master\OneDrive\Desktop\Data ZOU194WS.TXTr Jun 19 8:23 2024
INPUT: 1336 Person 26 Item REPORTED: 1336 Person 26 Item 4 CATS WINSTEPS 3.73

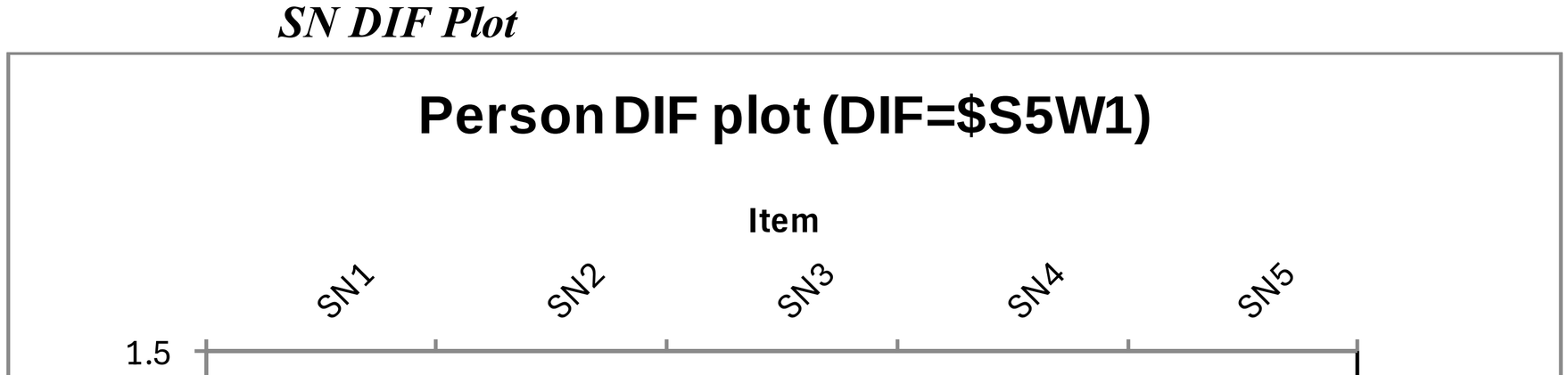
DIF class specification is: DIF=$S6W1

Person CLASS	DIF MEASURE	DIF S.E.		Person CLASS	DIF MEASURE	DIF S.E.	DIF CONTRAST	JOINT S.E.	t	Welch d.f.	Prob.	Mantel-Haenszel Chi-squ	Prob.	CUMLOR	Size Number	Item Name
S	-.63	.06	V	-.31	.09	-.32	.11	-2.85	887	.0045	7.2379	.0071	-.39		1	ATT1
S	.17	.06	V	.40	.09	-.22	.10	-2.11	891	.0350	2.7190	.0992	-.20		2	ATT2
S	-.99	.06	V	-.75	.10	-.24	.11	-2.15	885	.0319	3.1392	.0764	-.24		3	ATT3
S	1.38	.05	V	1.55	.08	-.17	.09	-1.82	892	.0696	2.2244	.1358	-.18		4	ATT4
S	1.02	.05	V	1.15	.08	-.13	.10	-1.34	891	.1804	1.8280	.1764	-.17		5	SN1
S	.00	.06	V	-.02	.09	.03	.11	.24	879	.8134	.4694	.4933	.10		6	SN2
S	-1.68	.06	V	-1.71	.10	.03	.12	.27	883	.7903	1.0200	.3125	.14		7	SN3
S	-.81	.06	V	-.81	.10	.00	.11	.00	880	1.000	.7466	.3876	.13		8	SN4
S	-.94	.06	V	-1.02	.10	.09	.11	.74	879	.4572	.5422	.4615	.10		9	SN5
S	-1.40	.06	V	-1.51	.10	.11	.12	.92	880	.3570	1.2590	.2618	.16		10	PBC1
S	.41	.06	V	.43	.09	-.02	.10	-.20	883	.8391	.4355	.5093	-.10		11	PBC2
S	-.22	.06	V	-.27	.09	.05	.11	.41	878	.6795	.6426	.4228	.13		12	PBC3
S	.07	.06	V	.07	.09	.00	.11	.00	880	1.000	.0657	.7978	-.04		13	PBC4
S	.12	.06	V	-.04	.09	.16	.11	1.48	874	.1396	2.8008	.0942	.28		14	PBC5
S	3.16	.05	V	2.72	.08	.44	.09	4.81	900	.0000	5.0359	.0248	.28		15	BI1
S	-.28	.06	V	-.25	.09	-.03	.11	-.26	881	.7933	.1639	.6856	-.07		16	BI2
S	.24	.06	V	.34	.09	-.10	.10	-.97	886	.3322	.9699	.3247	-.14		17	BI3
S	1.14	.05	V	1.21	.08	-.07	.09	-.71	888	.4761	1.8415	.1748	-.18		18	BI4
S	-.42	.06	V	-.35	.09	-.07	.11	-.61	881	.5443	.8379	.3600	-.16		19	BI5
S	-.36	.06	V	-.36	.09	.00	.11	.00	880	1.000	.1018	.7497	-.05		20	BI6
S	.07	.06	V	.09	.09	-.03	.11	-.26	882	.7939	.1396	.7086	-.05		21	PEB1
S	1.34	.05	V	1.36	.08	-.02	.09	-.22	887	.8276	.0498	.8234	.03		22	PEB2
S	.24	.06	V	.10	.09	.14	.11	1.31	875	.1890	3.6685	.0555	.28		23	PEB3
S	-.52	.06	V	-.69	.10	.17	.11	1.55	876	.1218	4.7038	.0301	.33		24	PEB4
S	.43	.06	V	.40	.09	.04	.10	.36	879	.7212	.8693	.3512	.12		25	PEB5
S	-1.59	.06	V	-1.78	.10	.19	.12	1.61	877	.1076	4.0093	.0452	.28		26	PEB6

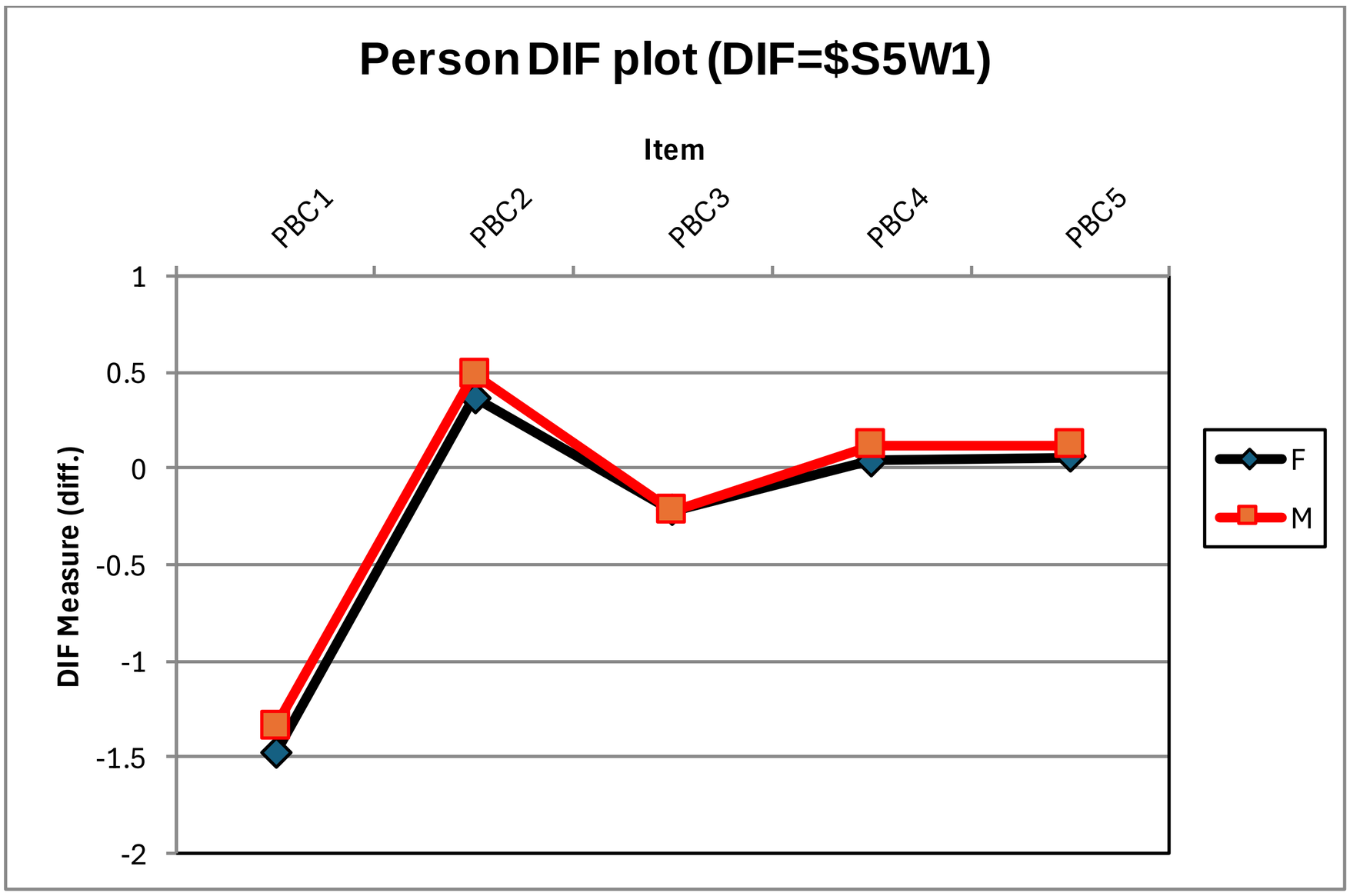
Gender DIF Plots



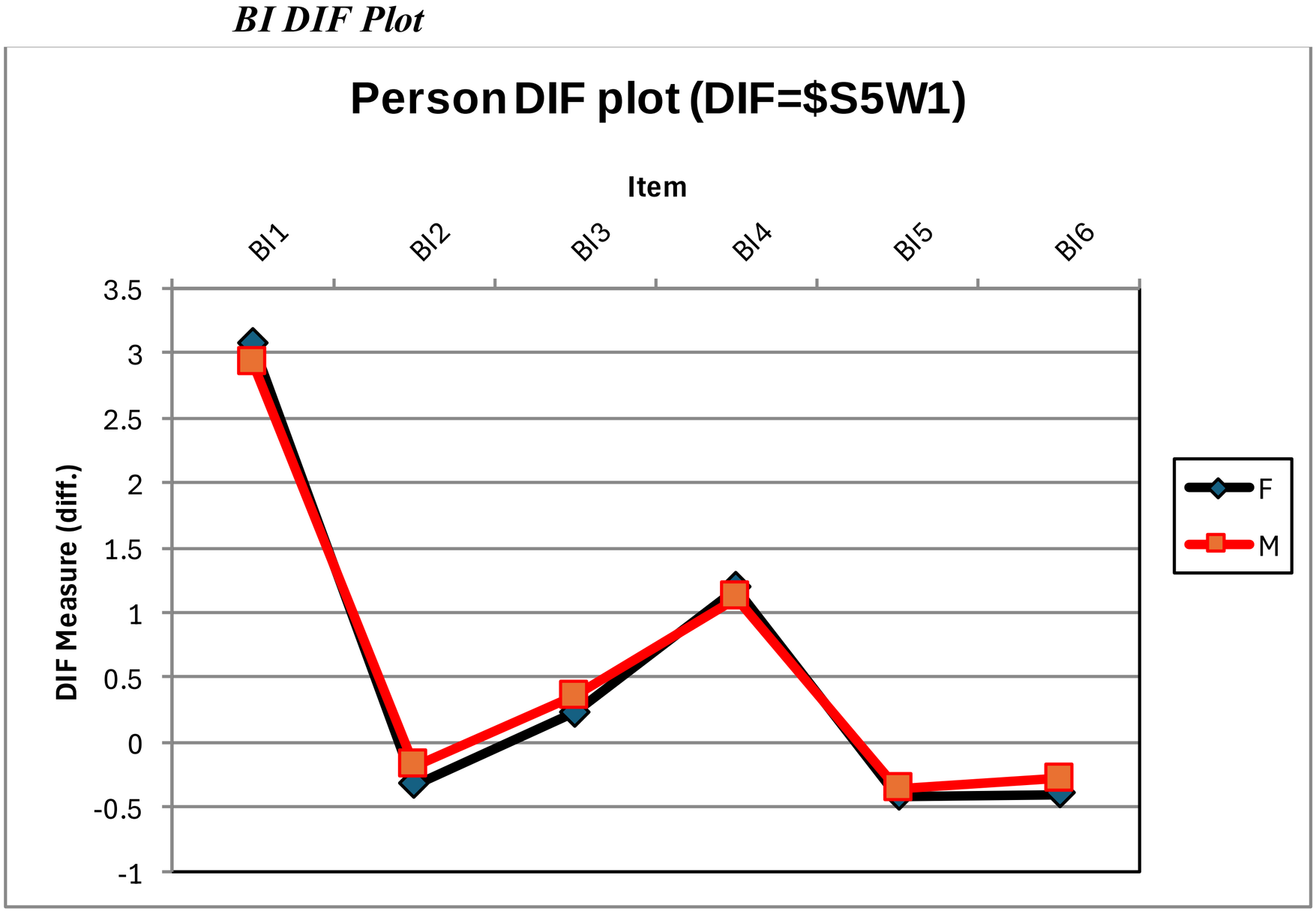
SN DIF Plot



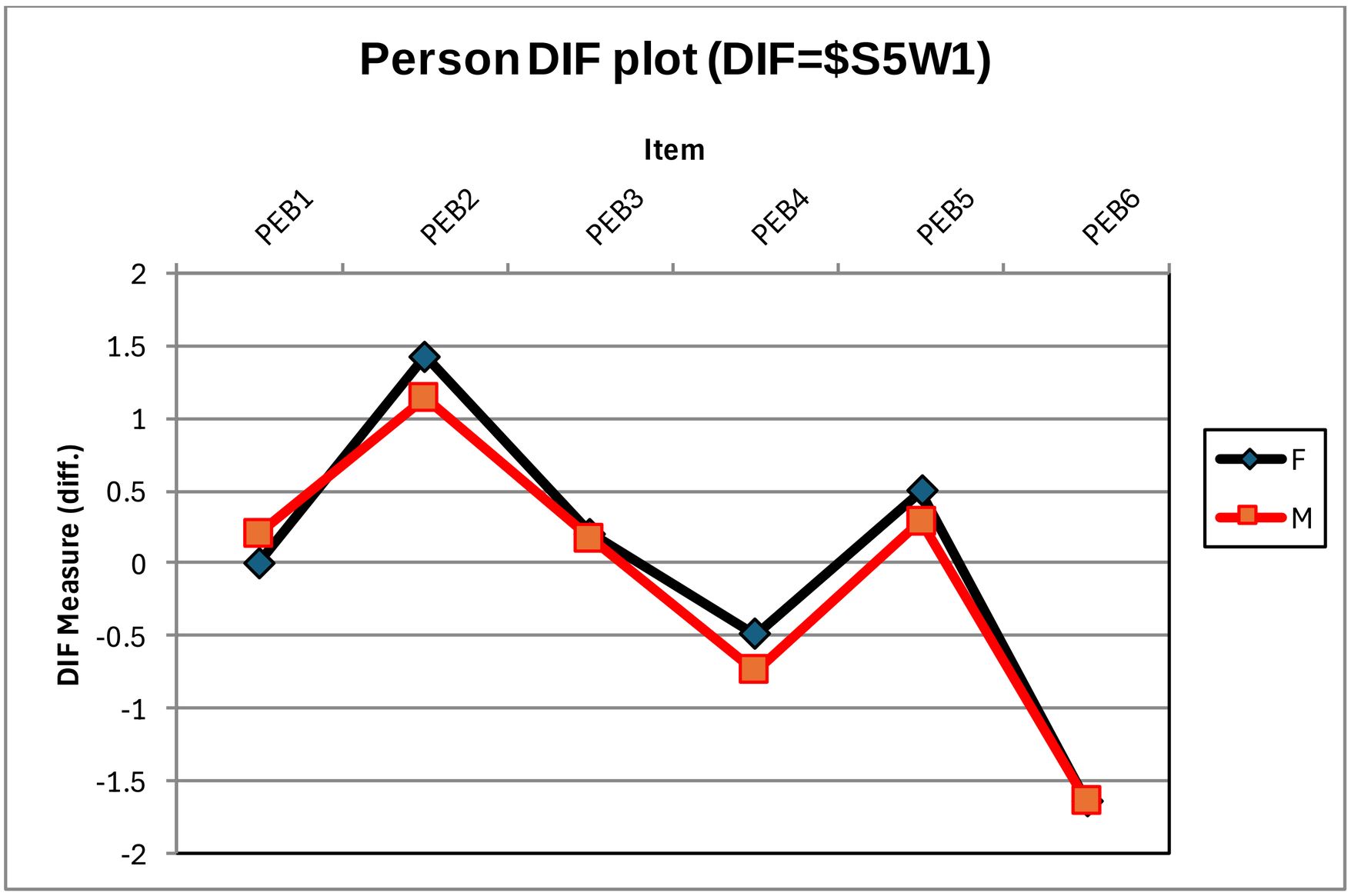
PBC DIF Plot



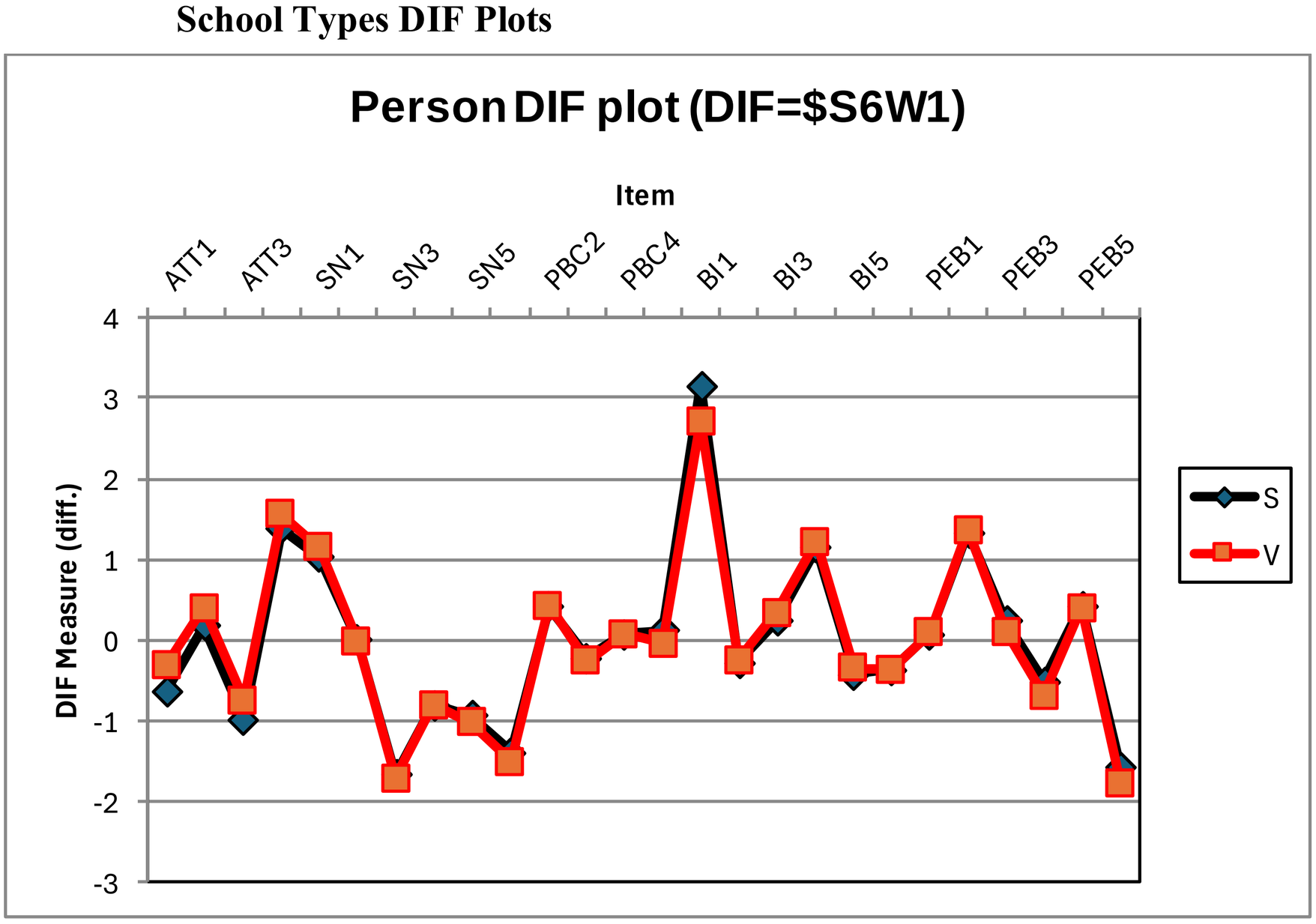
BI DIF Plot



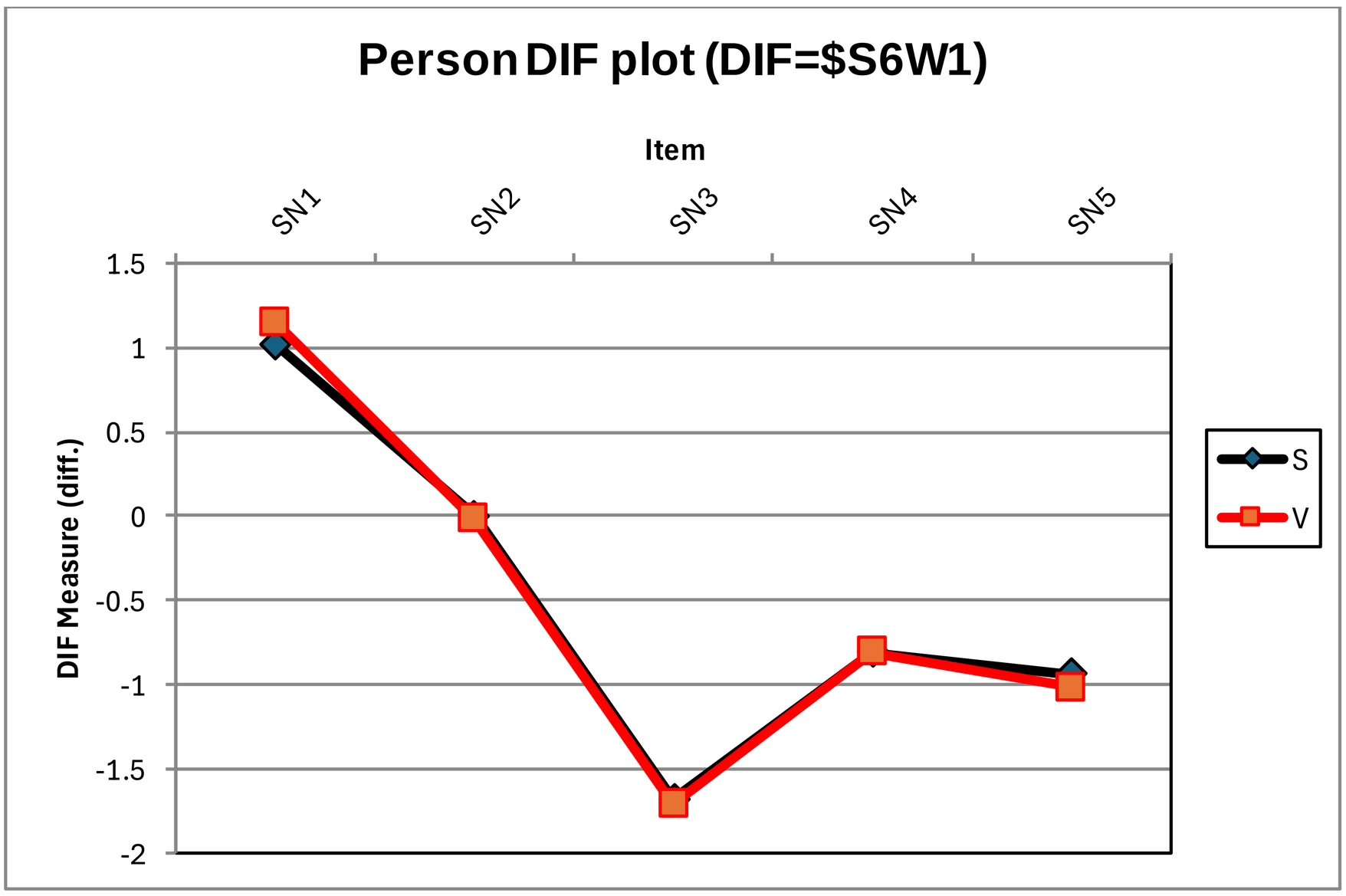
PEB DIF Plot



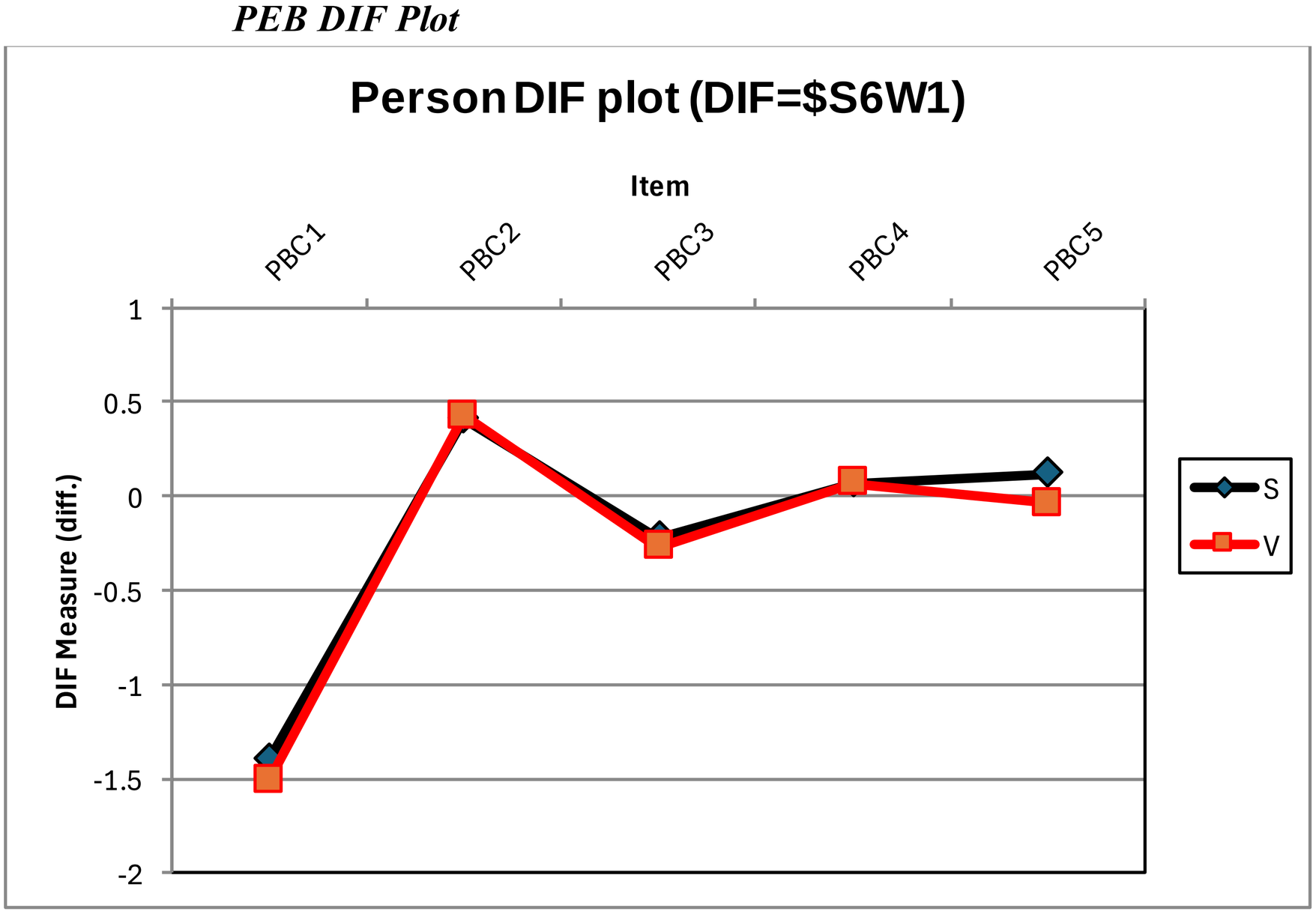
School Types DIF Plots



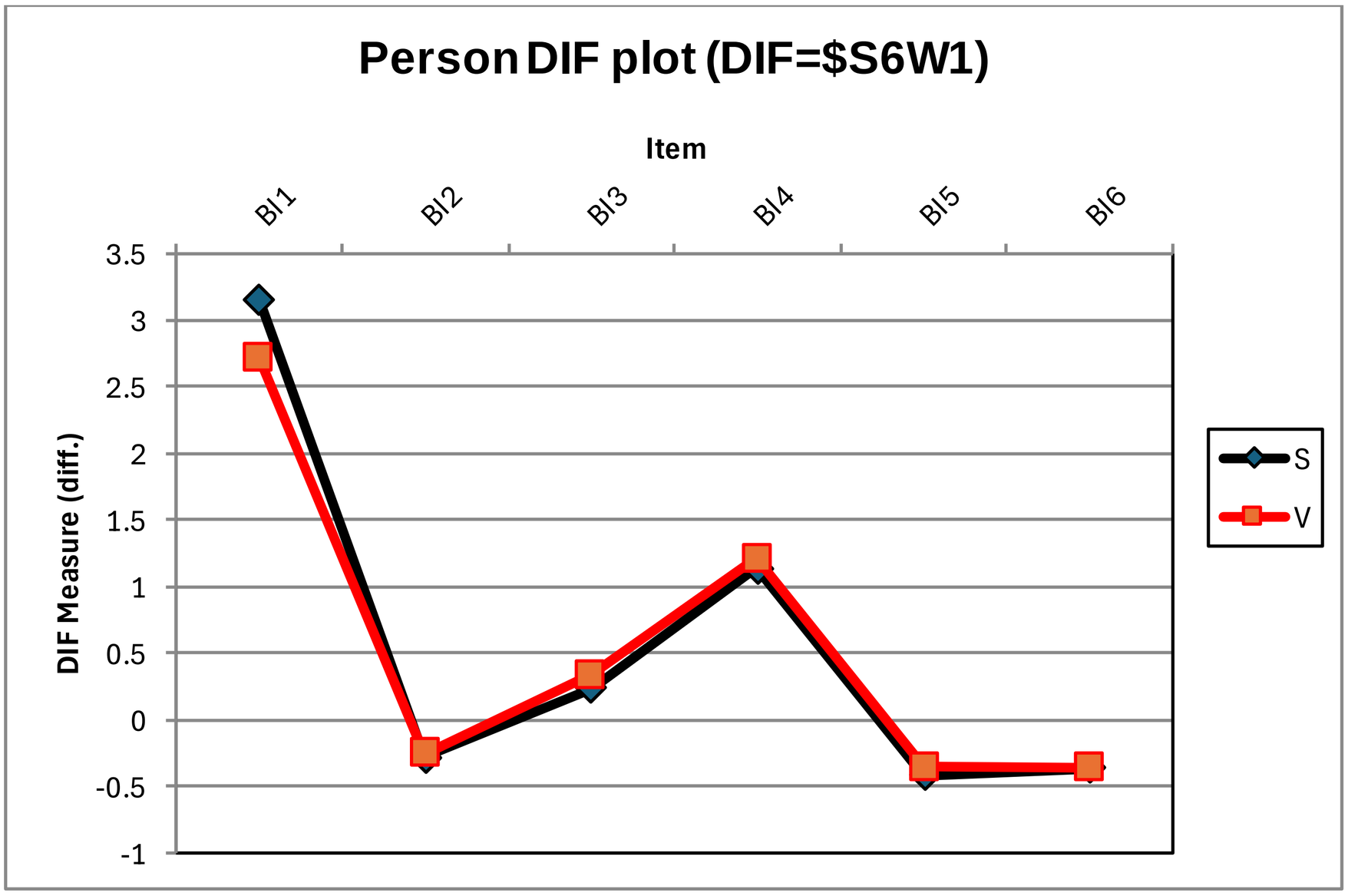
SN DIF Plot



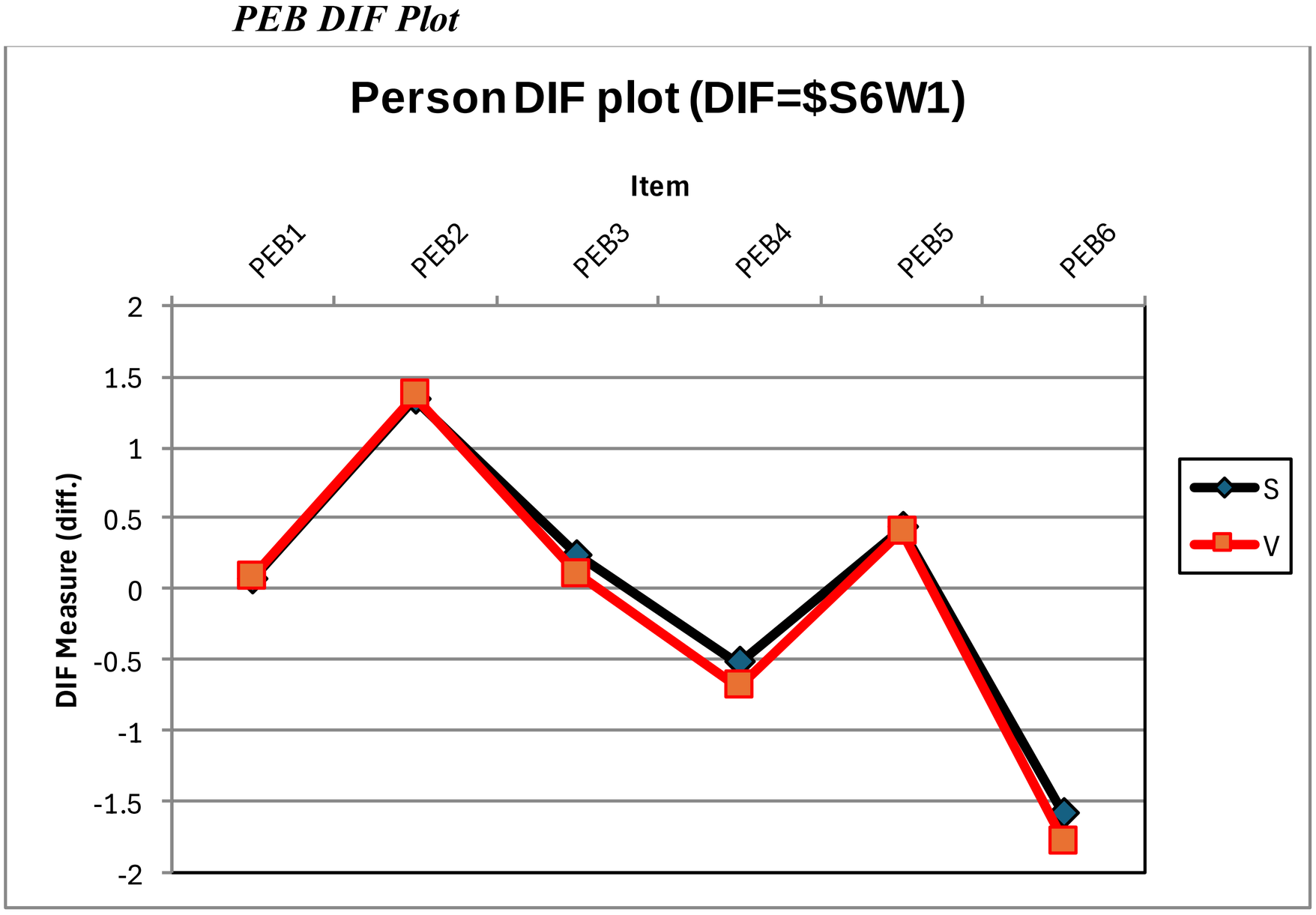
PEB DIF Plot



BI DIF Plot

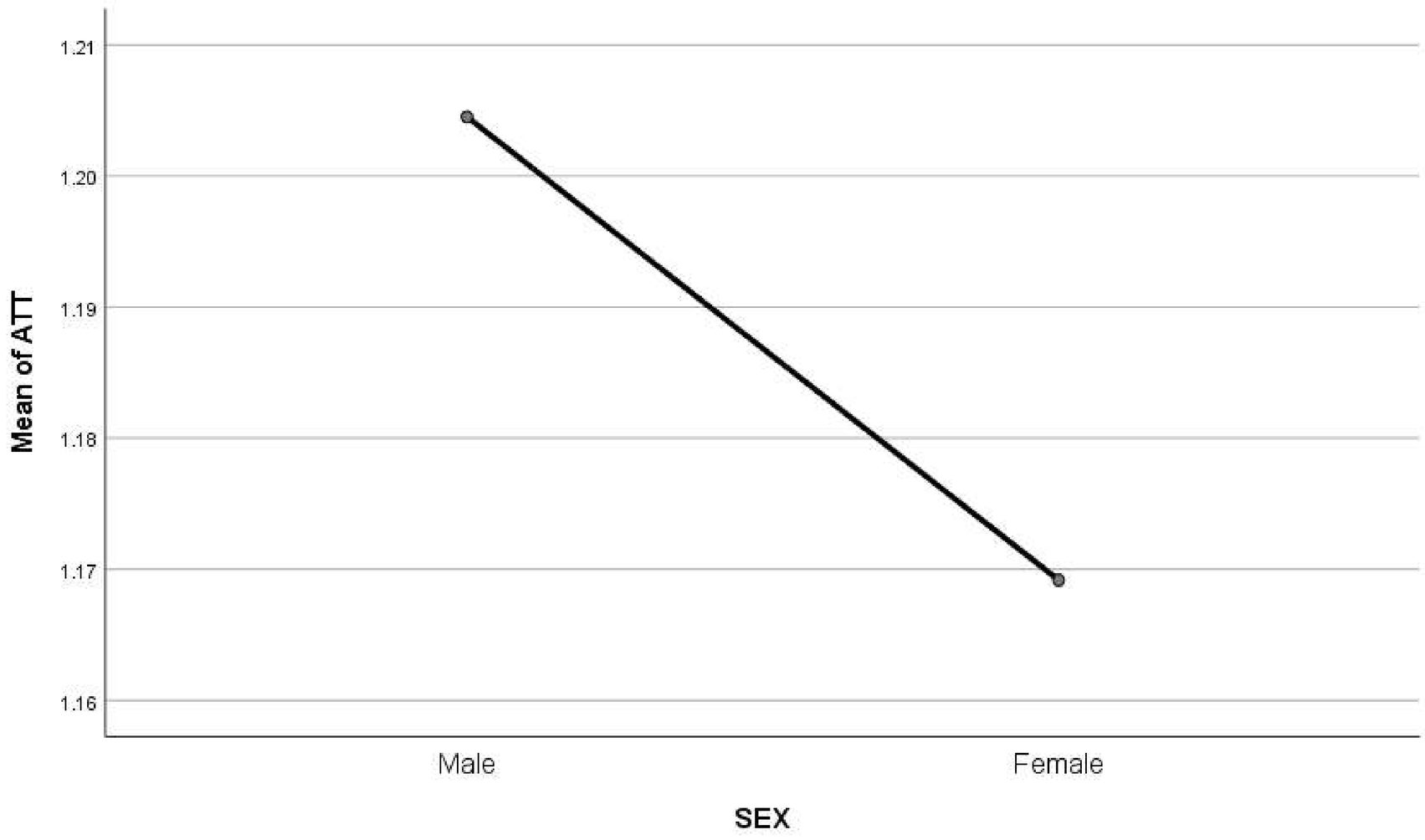


PEB DIF Plot

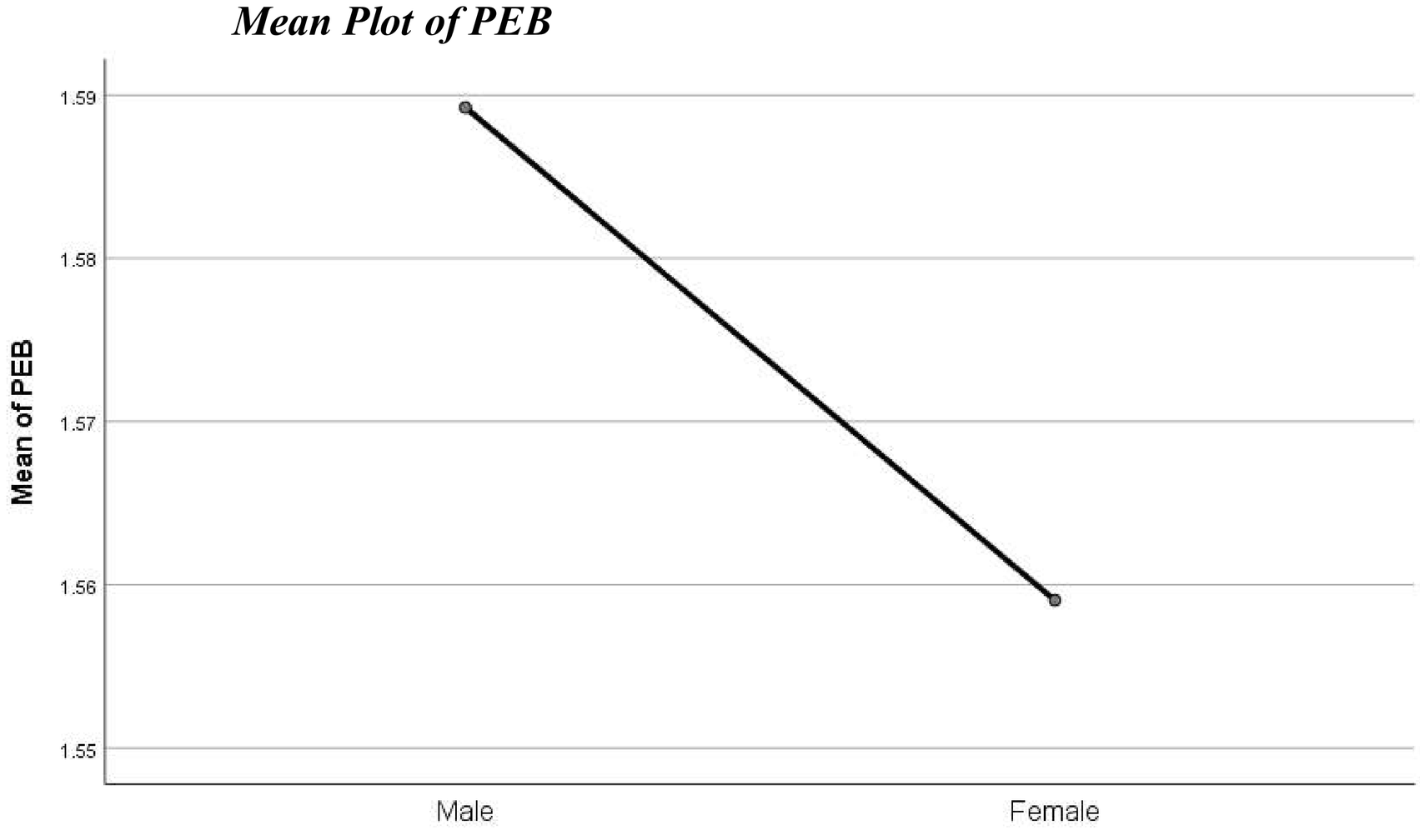


ANOVA Mean Plots of Gender

Mean Plot of ATT

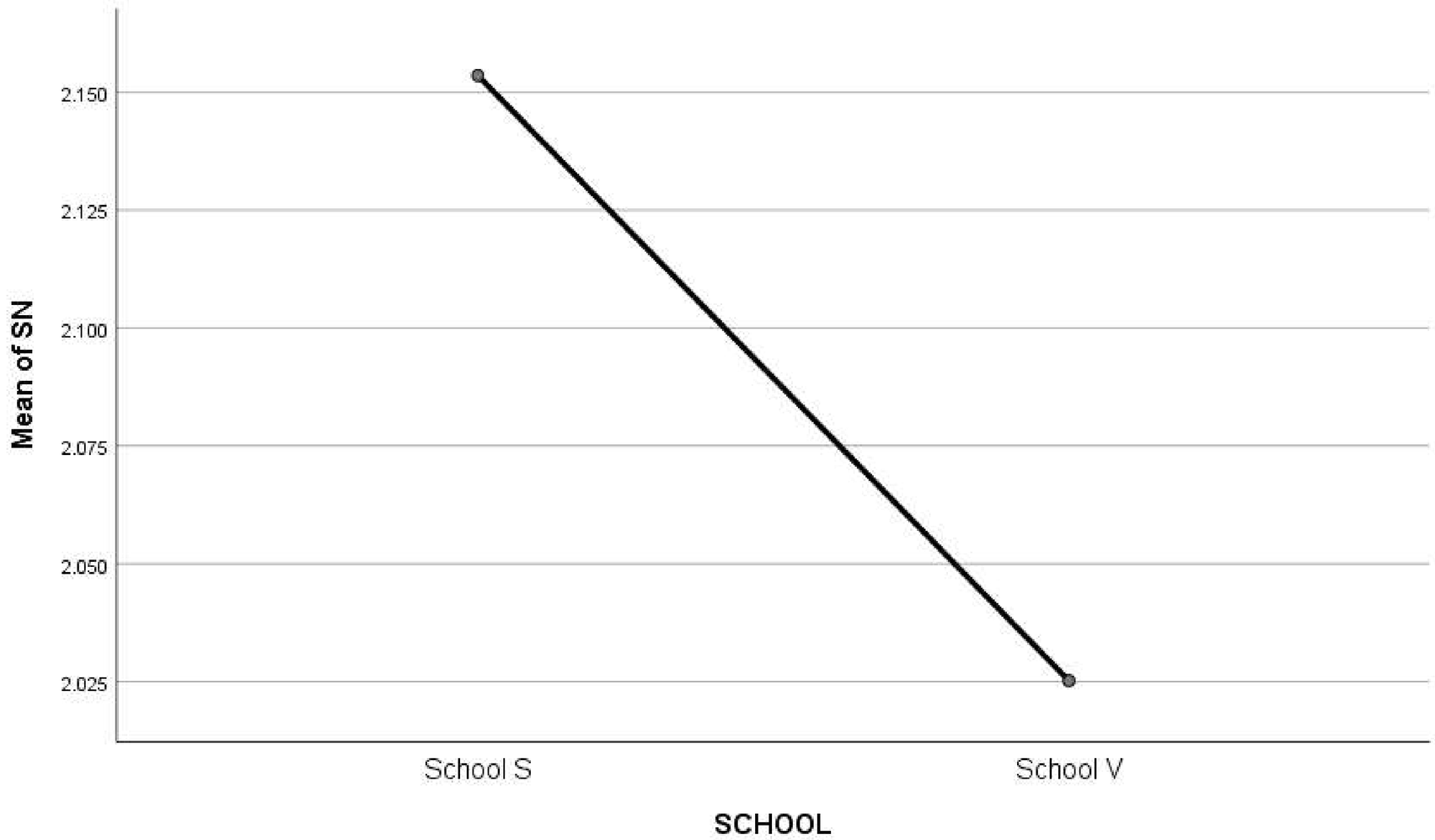


Mean Plot of PEB

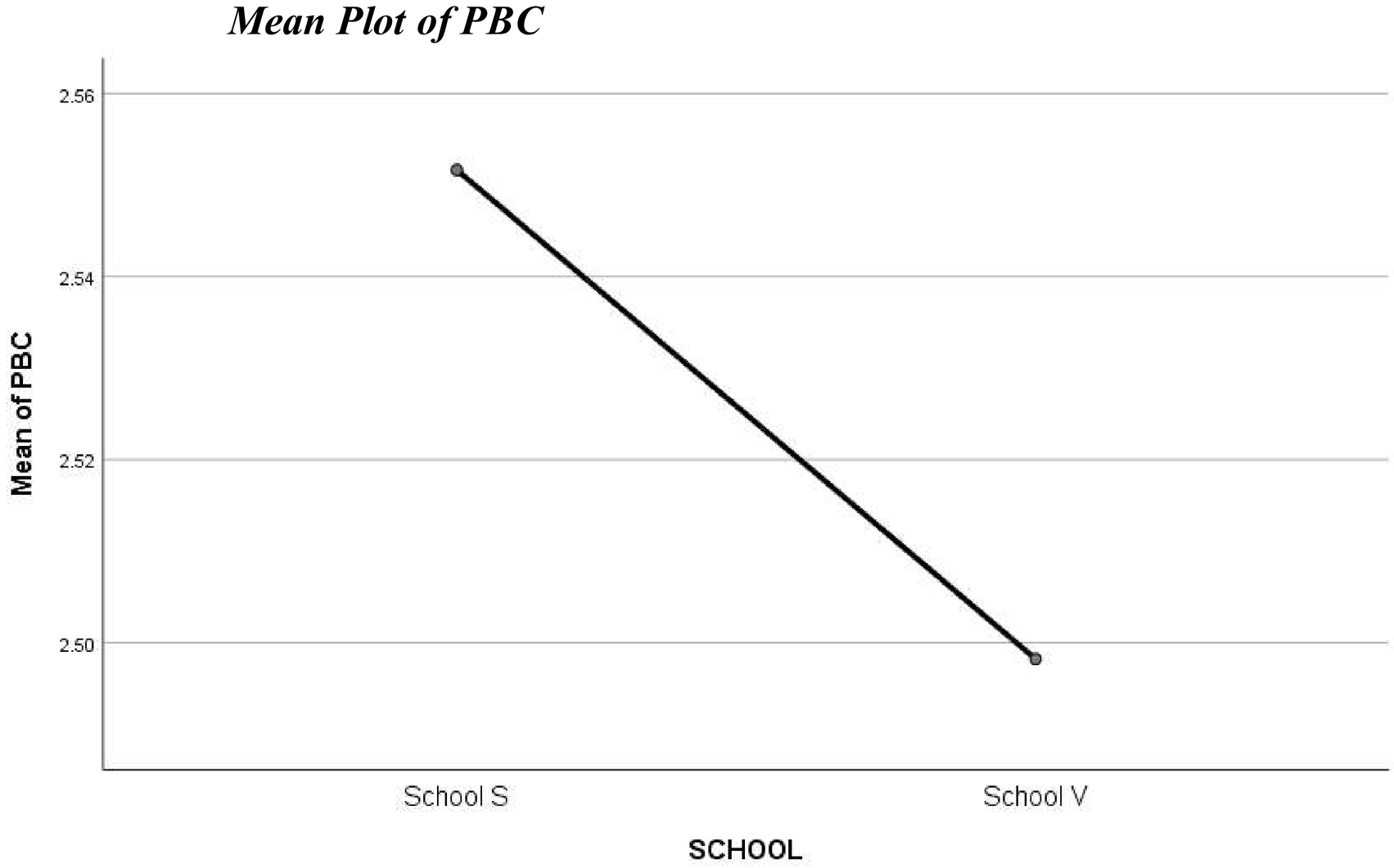


ANOVA Mean Plots of School Type

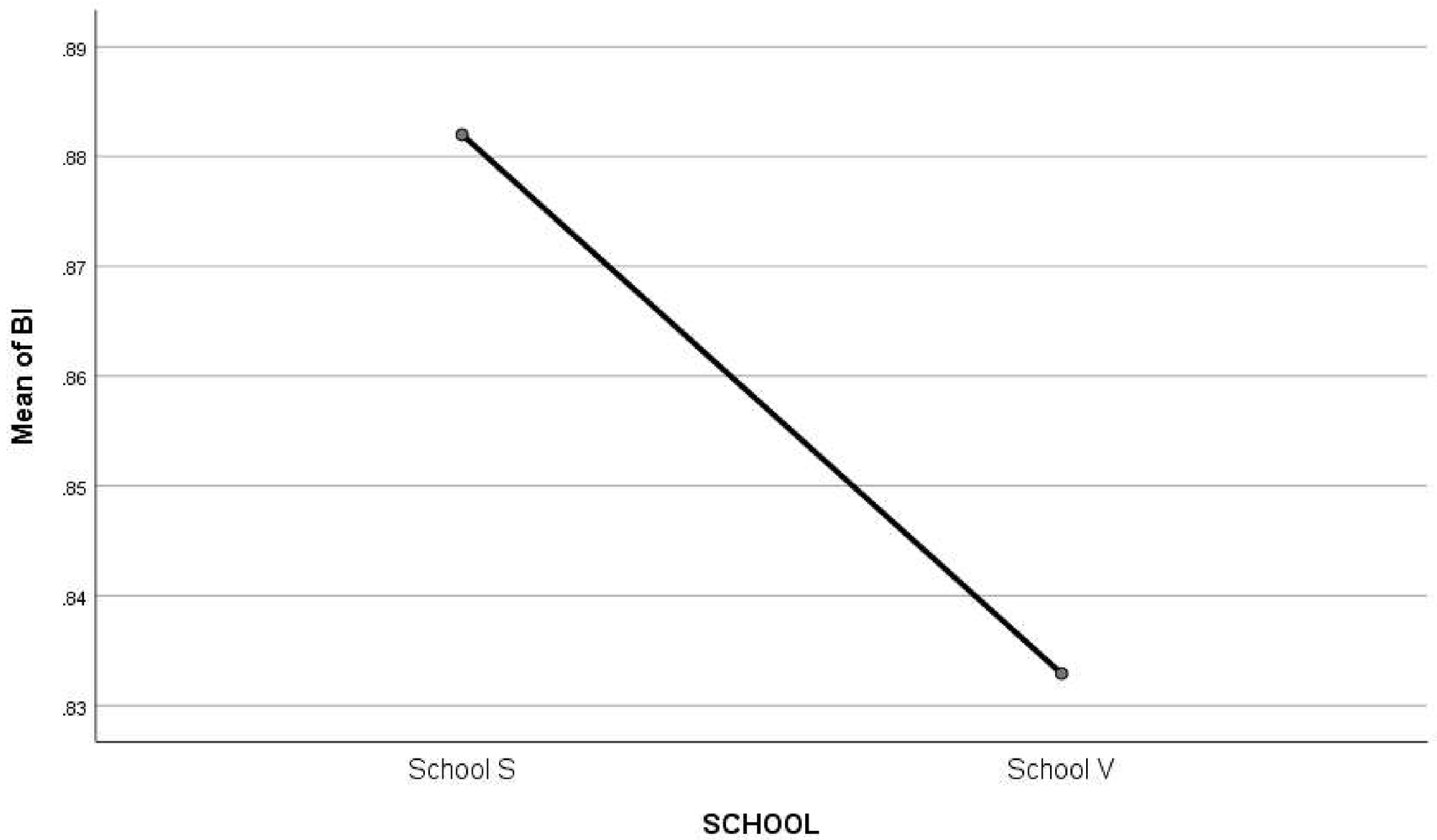
Mean Plot of SN



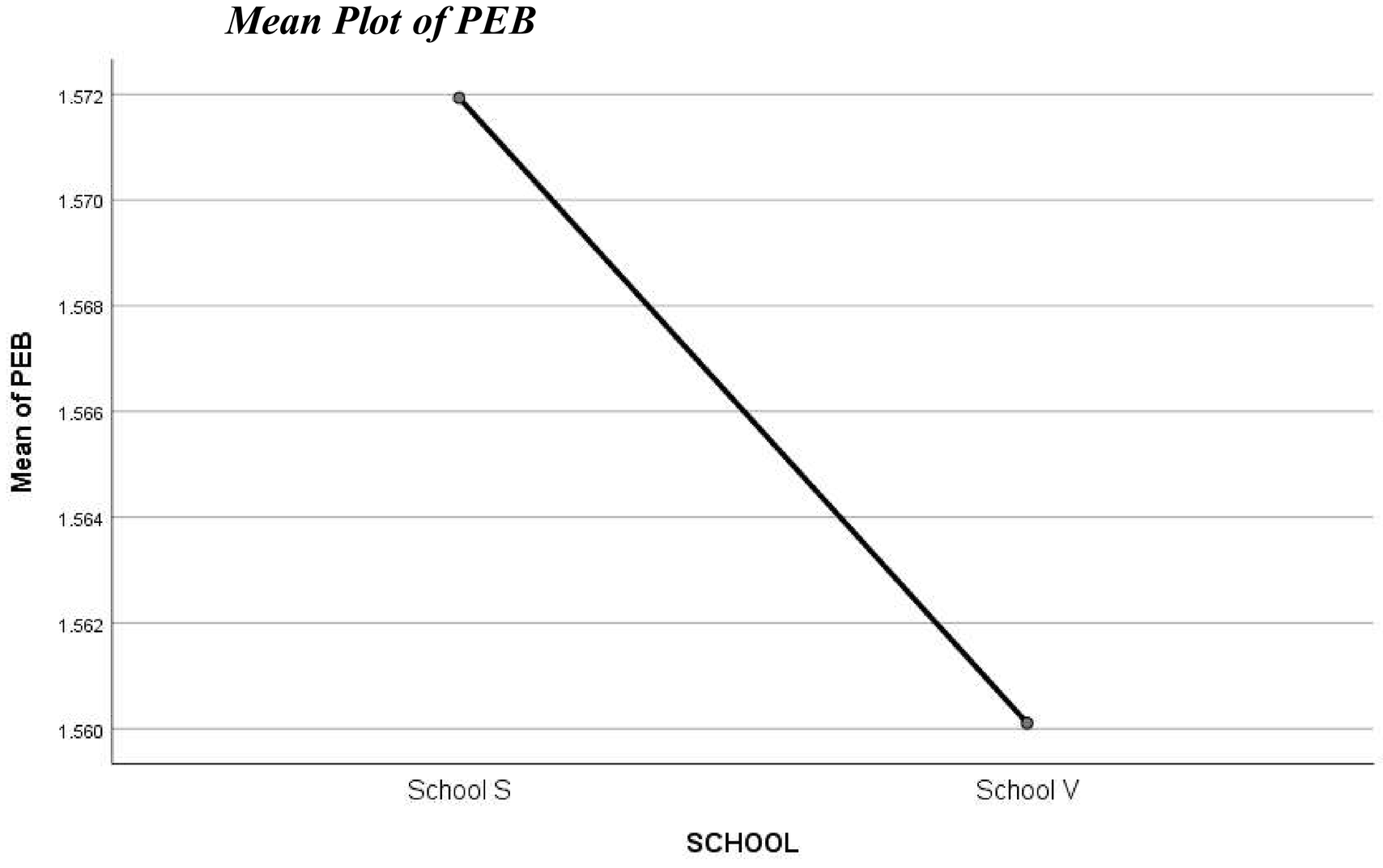
Mean Plot of PBC



Mean Plot of BI



Mean Plot of PEB



Appendix G: Regression PROCESS Macro Hayes

Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.2 *****************

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

****
Model : 4
Y : PEB
X : ATT
M : BI

Covariates:
SN PBC

Sample
Size: 1336

****
OUTCOME VARIABLE:
BI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6245	.3900	1.1943	283.9126	3.0000	1332.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.1800	.0478	-3.7656	.0002	-.2738	-.0862
ATT	-.0422	.0228	-1.8470	.0650	-.0870	.0026
SN	.2602	.0220	11.8315	.0000	.2170	.3033
PBC	.2157	.0155	13.8988	.0000	.1852	.2461

Standardized coefficients

	coeff
ATT	-.0463
SN	.3329
PBC	.3876

****

OUTCOME VARIABLE:
PEB

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6158	.3792	1.7423	203.2633	4.0000	1331.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	.4848	.0580	8.3530	.0000	.3710	.5987
ATT	-.0331	.0276	-1.1986	.2309	-.0873	.0211
BI	.3429	.0331	10.3602	.0000	.2779	.4078
SN	.1815	.0279	6.5000	.0000	.1267	.2363
PBC	.1739	.0201	8.6720	.0000	.1346	.2132

Standardized coefficients

	coeff
ATT	-.0303
BI	.2865
SN	.1940
PBC	.2612

********** TOTAL EFFECT MODEL **********
OUTCOME VARIABLE:
PEB

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5737	.3292	1.8814	217.8491	3.0000	1332.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	.4231	.0600	7.0523	.0000	.3054	.5408
ATT	-.0476	.0287	-1.6595	.0973	-.1038	.0087
SN	.2707	.0276	9.8077	.0000	.2165	.3248
PBC	.2478	.0195	12.7267	.0000	.2096	.2860

Standardized coefficients

	coeff
ATT	-.0436
SN	.2894
PBC	.3722

********** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_cs	
-.0476	.0287	-1.6595		.0973	-.1038	.0087	-.0436

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_cs	
-.0331	.0276	-1.1986		.2309	-.0873	.0211	-.0303

Indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI
BI -.0145	.0087	-.0332	.0018

Completely standardized indirect effect(s) of X on Y:

Effect	BootSE	BootLLCI	BootULCI
BI -.0133	.0080	-.0301	.0017

********** ANALYSIS NOTES AND ERRORS **********

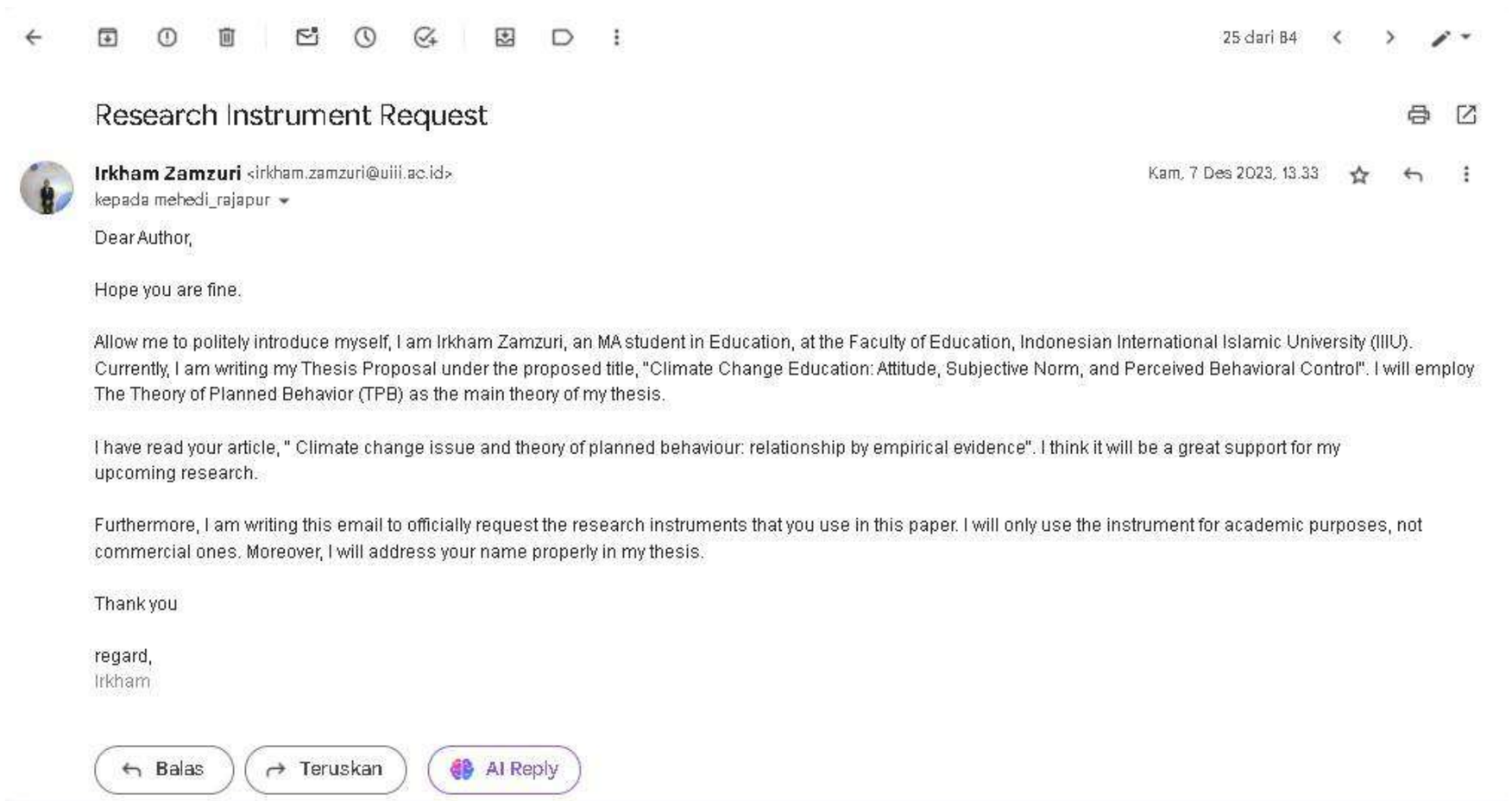
Level of confidence for all confidence intervals in output:
95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals: 5000

------ END MATRIX -----

Appendix H: Documentation of Data Collection Process

Appendix I: Research Instruments Permit



25 dari 84

Research Instrument Request

Irkham Zamzuri <irkham.zamzuri@uiii.ac.id>
kepada mehedi_rajapur

Kam, 7 Des 2023, 13.33

Dear Author,

Hope you are fine.

Allow me to politely introduce myself, I am Irkham Zamzuri, an MA student in Education, at the Faculty of Education, Indonesian International Islamic University (IIIU). Currently, I am writing my Thesis Proposal under the proposed title, "Climate Change Education: Attitude, Subjective Norm, and Perceived Behavioral Control". I will employ The Theory of Planned Behavior (TPB) as the main theory of my thesis.

I have read your article, " Climate change issue and theory of planned behaviour: relationship by empirical evidence". I think it will be a great support for my upcoming research.

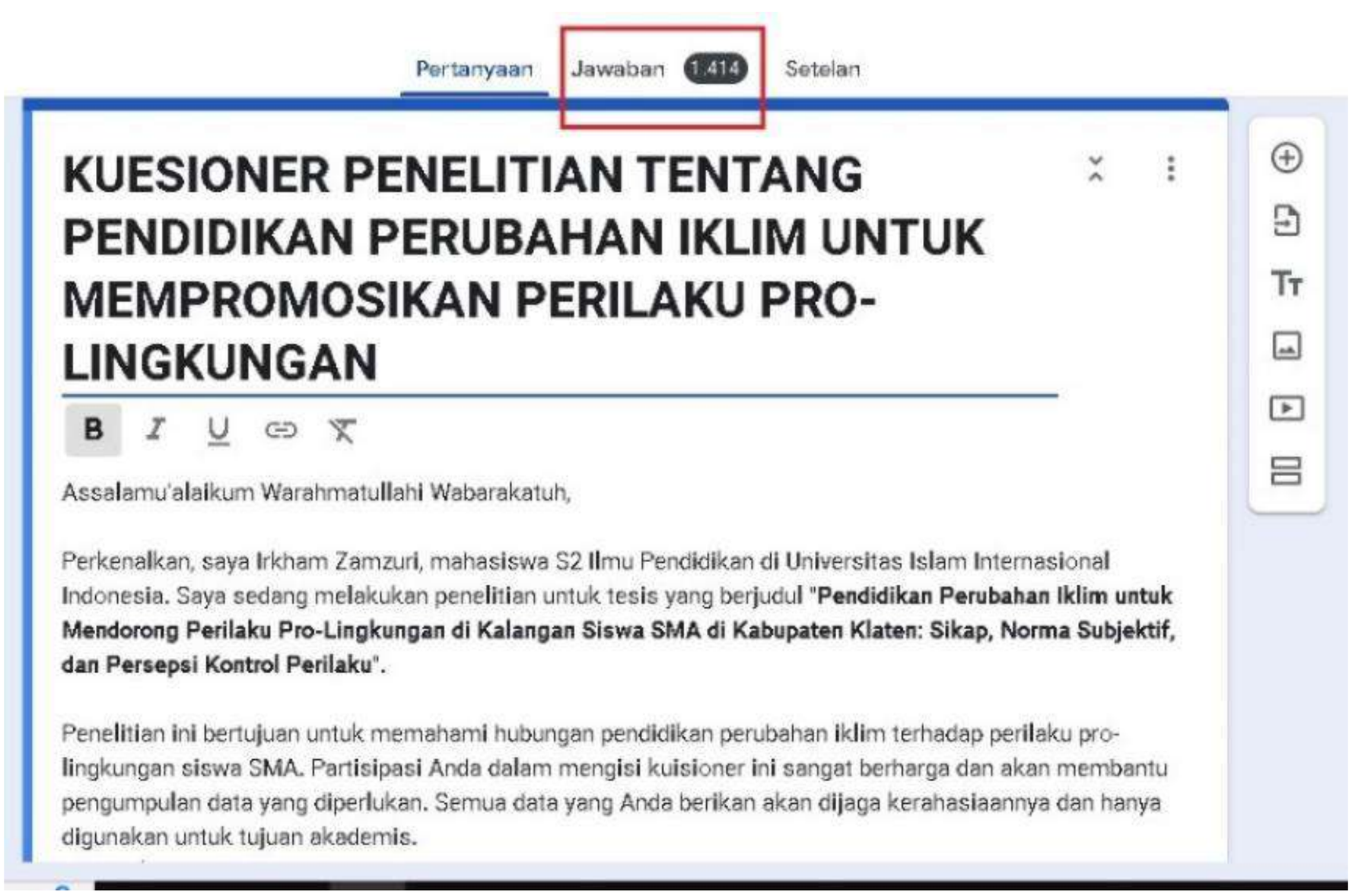
Furthermore, I am writing this email to officially request the research instruments that you use in this paper. I will only use the instrument for academic purposes, not commercial ones. Moreover, I will address your name properly in my thesis.

Thank you

regard,
Irkham

Balas Teruskan AI Reply

Appendix J: Google Form Questionnaire for Real Data Collection



Pertanyaan Jawaban 1.414 Setelan

KUESIONER PENELITIAN TENTANG PENDIDIKAN PERUBAHAN IKLIM UNTUK MEMPROMOSIKAN PERILAKU PRO-LINGKUNGAN

B I U

Assalamu'alaikum Warahmatullahi Wabarakatuh,

Perkenalkan, saya Irkham Zamzuri, mahasiswa S2 Ilmu Pendidikan di Universitas Islam Internasional Indonesia. Saya sedang melakukan penelitian untuk tesis yang berjudul "**Pendidikan Perubahan Iklim untuk Mendorong Perilaku Pro-Lingkungan di Kalangan Siswa SMA di Kabupaten Klaten: Sikap, Norma Subjektif, dan Persepsi Kontrol Perilaku**".

Penelitian ini bertujuan untuk memahami hubungan pendidikan perubahan iklim terhadap perilaku pro-lingkungan siswa SMA. Partisipasi Anda dalam mengisi kuisioner ini sangat berharga dan akan membantu pengumpulan data yang diperlukan. Semua data yang Anda berikan akan dijaga kerahasiaannya dan hanya digunakan untuk tujuan akademis.

Appendix K: Google Form Questionnaire for Pilot Testing Data Collection