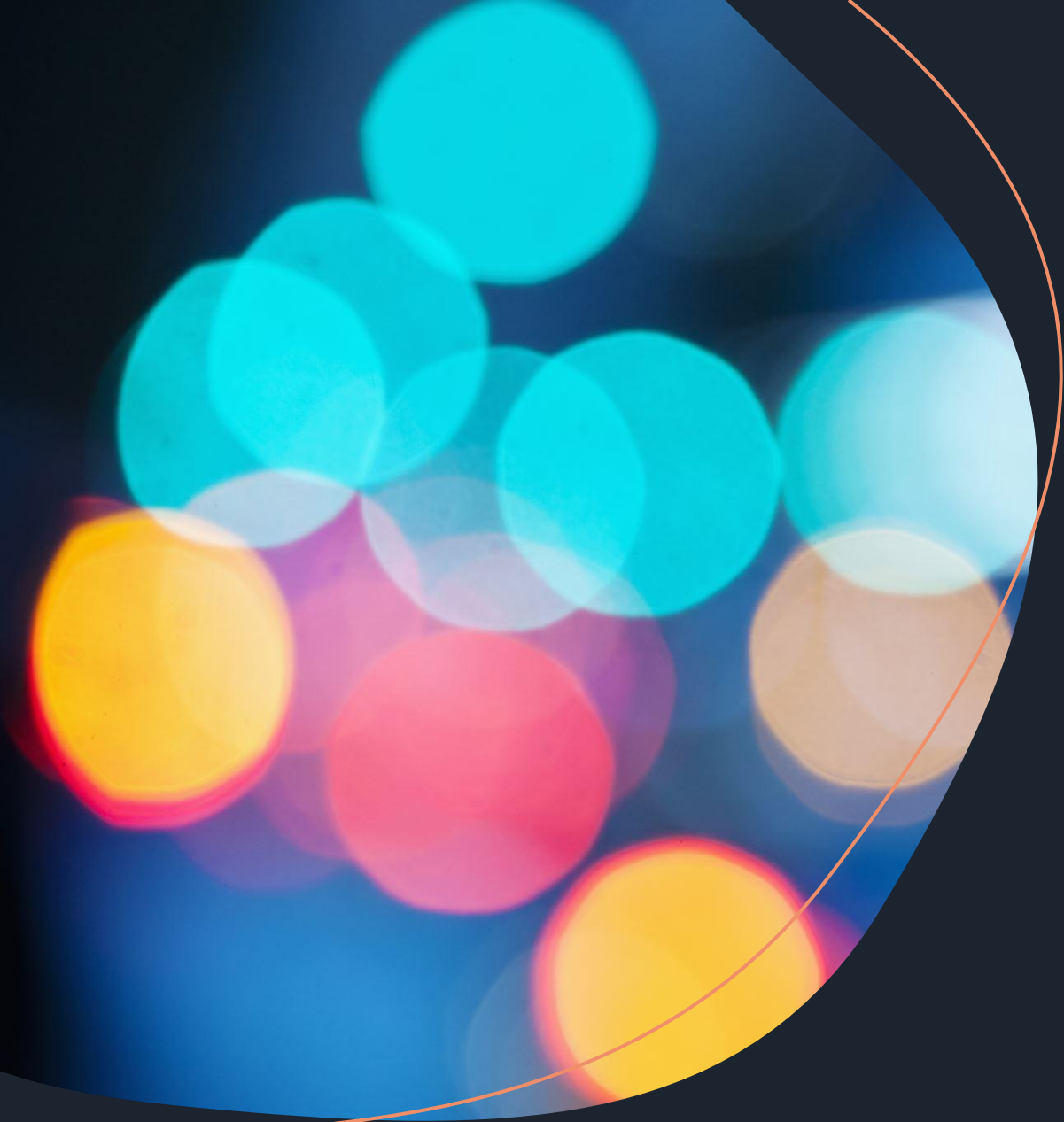




Addressing the Challenges of Virtual Learning on High School Students

Joshua Yoo

Purpose

- With COVID-19 causing schools to go virtual, students faced new challenges through virtual learning
- The questionnaire was made and given to students to find the effects of virtual learning at MLWGS



Four Constructs

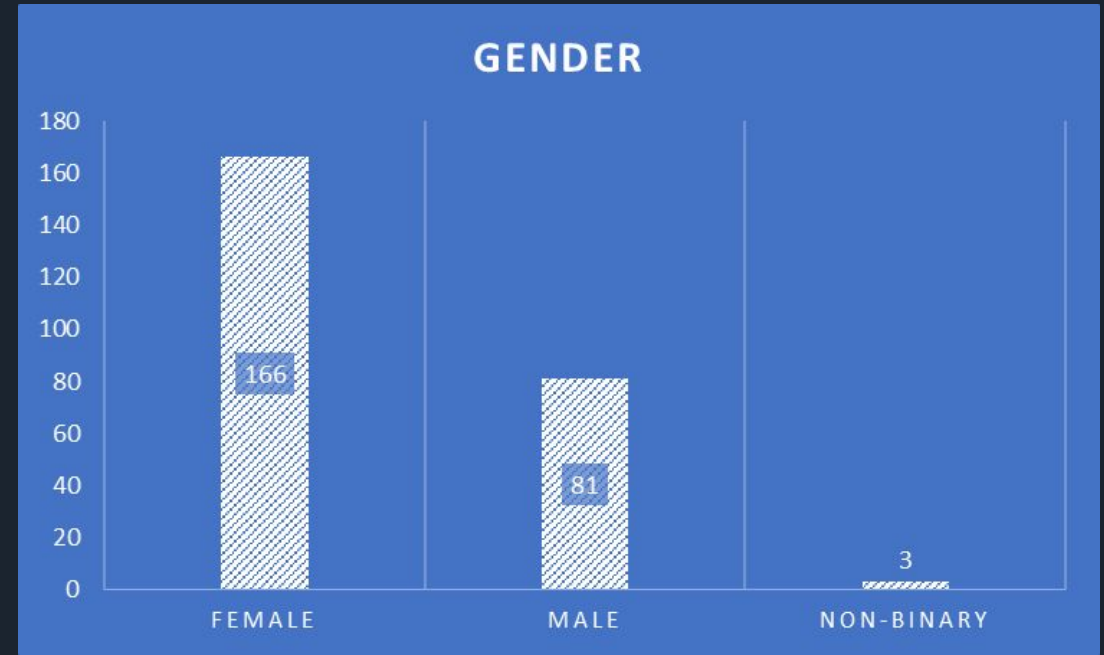
- Four constructs were made for this research
 1. Big Five Personality
 - a. Extroversion, Agreeableness, Emotional Instability, Consciousness, Intellect
 2. Information Technology
 - a. Performance Expectancy, Effort Expectancy, Hedonic Motivation
 3. Psychological Learning Processes
 - a. Learning Orientation, Self Regulated Learning Strategies, Absorptive Capacity
 4. Learning Outcomes
 - a. GPA Change, Satisfaction, Continuous Intention
- Control Variables
 1. Age, Gender, Experience, Device

Sources of Questionnaire

Constructs	Sources
Big Five Personality	Bansal et al. (2010)
Information Technology	Venkatesh et al. (2012)
Psychological Learning Process	Santhanam et al. (2008)
Learning Outcomes	Venkatesh et al. (2012)

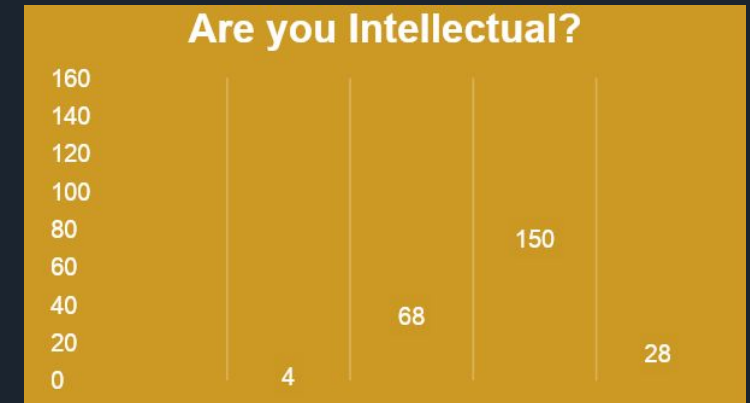
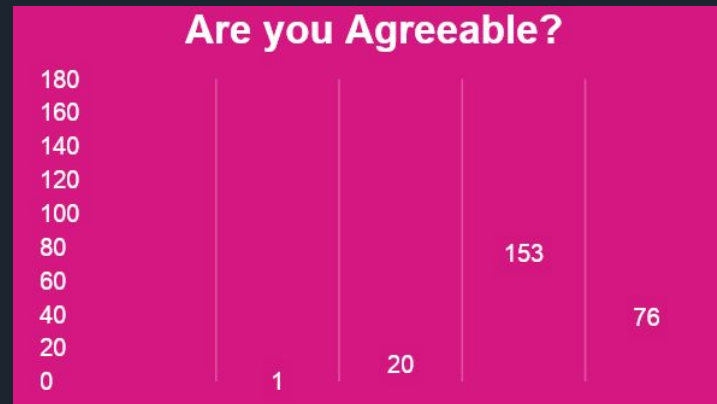
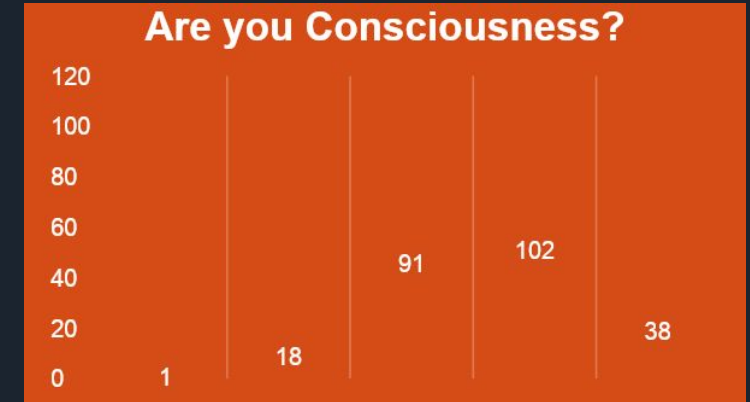
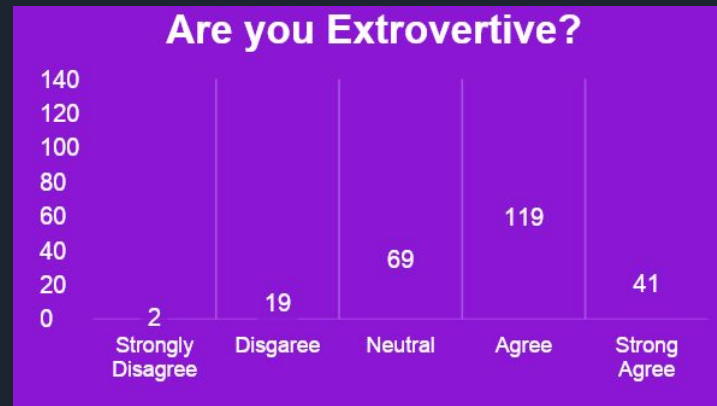
Basic Facts

- A total of 250 responses were collected and used
- 81 males, 166 females and 3 non-binary took the survey
- 83 freshman, 58 sophomores, 57 juniors and 52 seniors took the survey

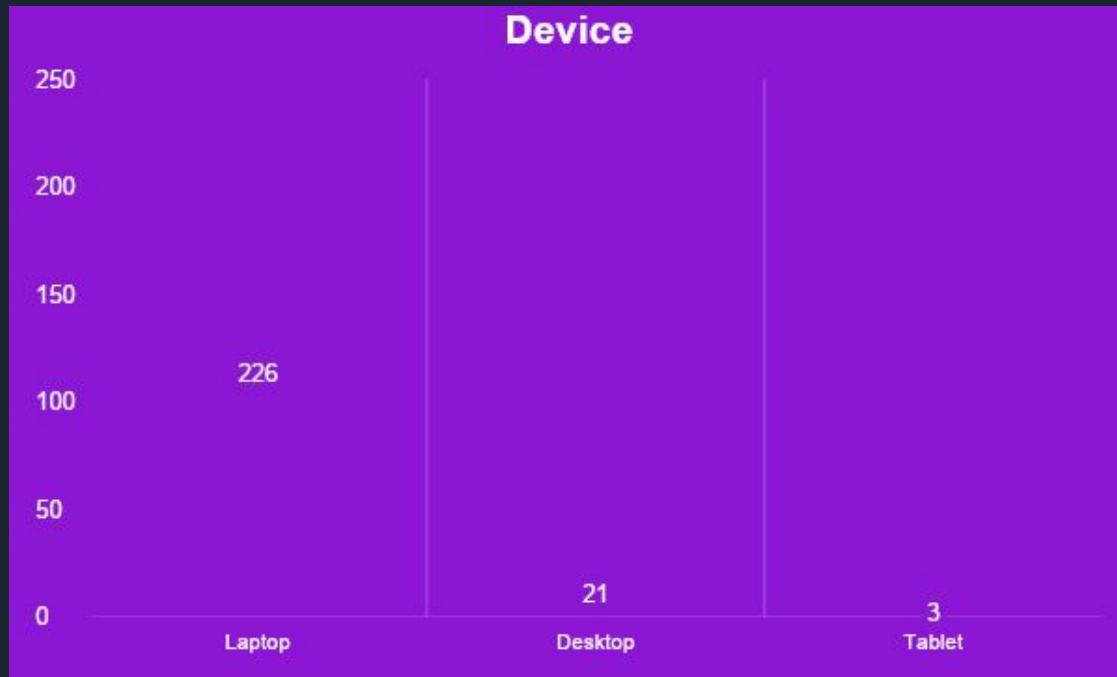


Personality

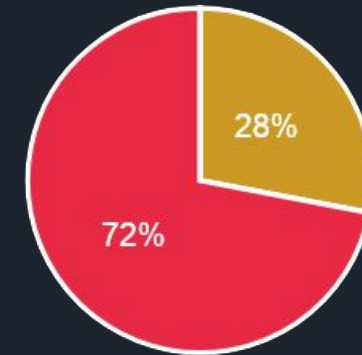
- Five personality types were surveyed in the context of Virtual Learning



Control Variables

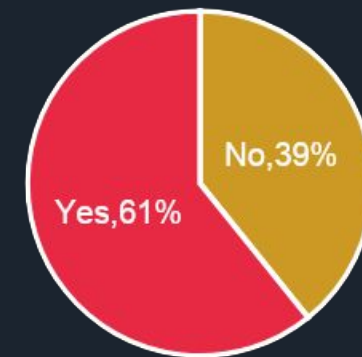


Have you Taken an Asynchronous Class Before?



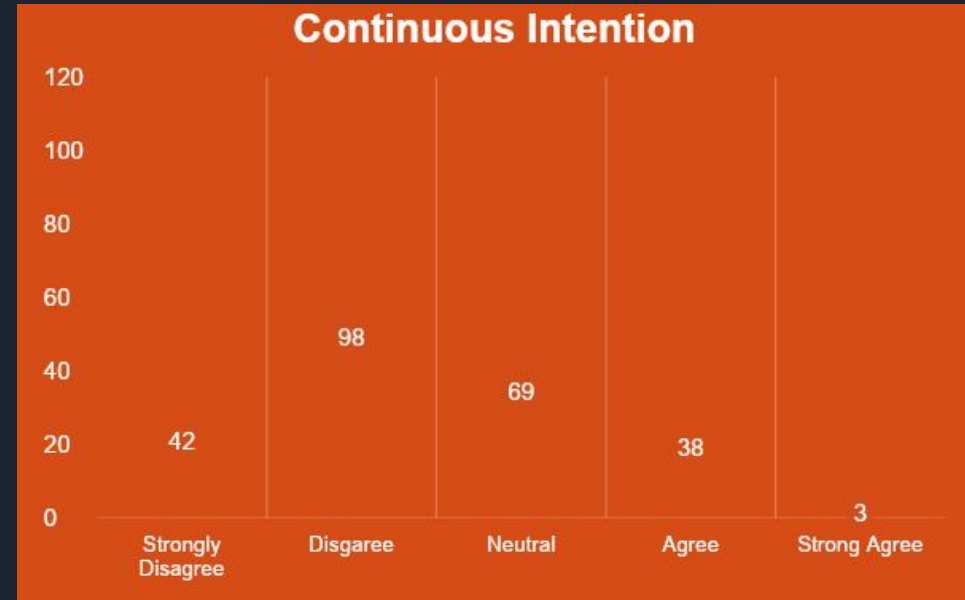
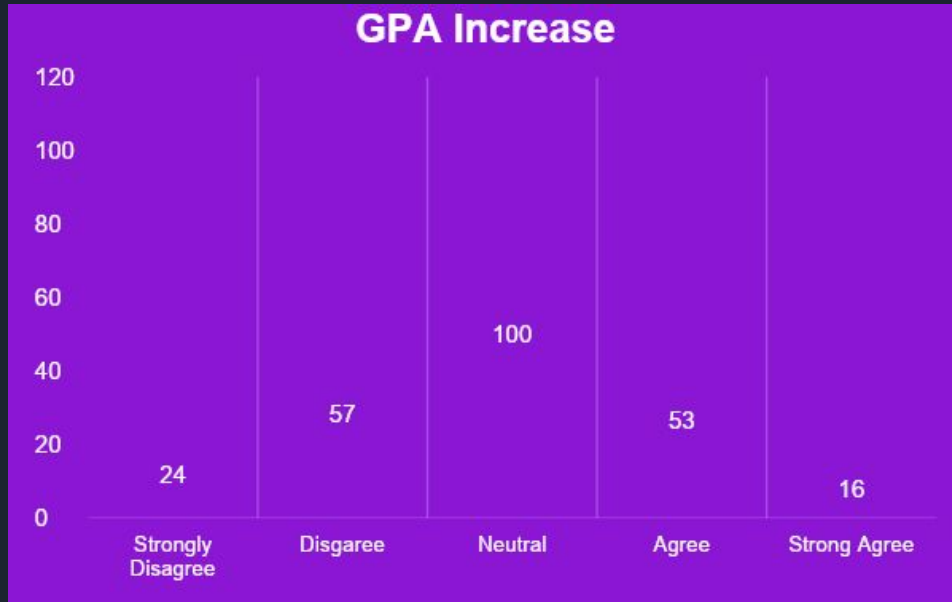
■ No ■ Yes

Have you Taken a Synchronous Class Before?



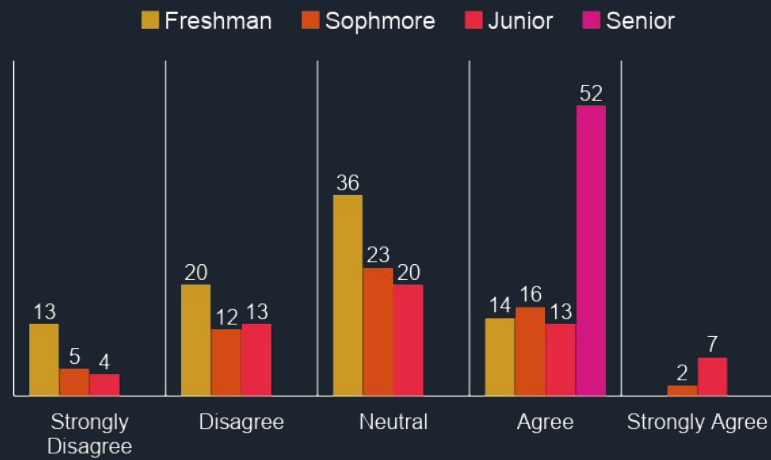
■ No ■ Yes

Effects of Virtual Learning

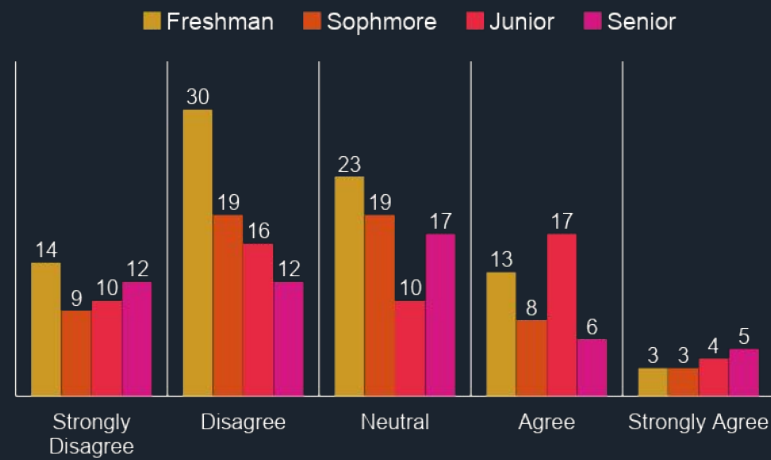


Effects Sorted by Grade

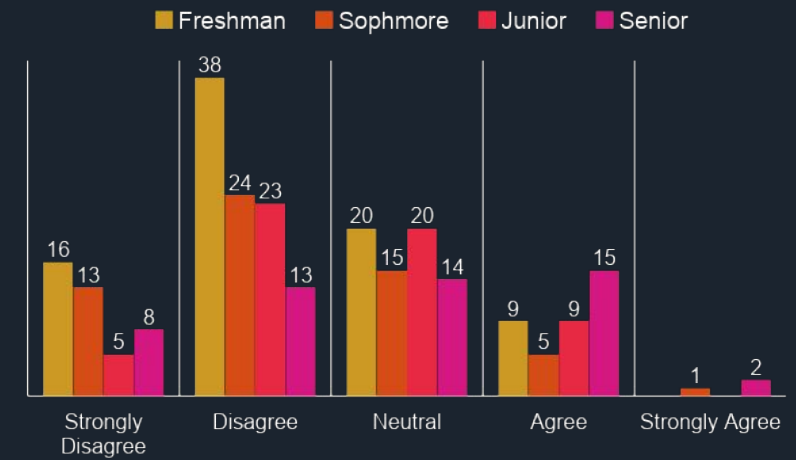
GPA Increase



Satisfaction



Continuous intention

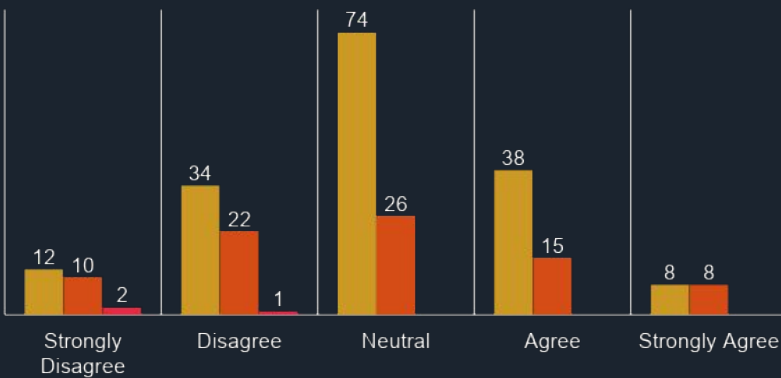


KEY

Effects Sorted by Gender

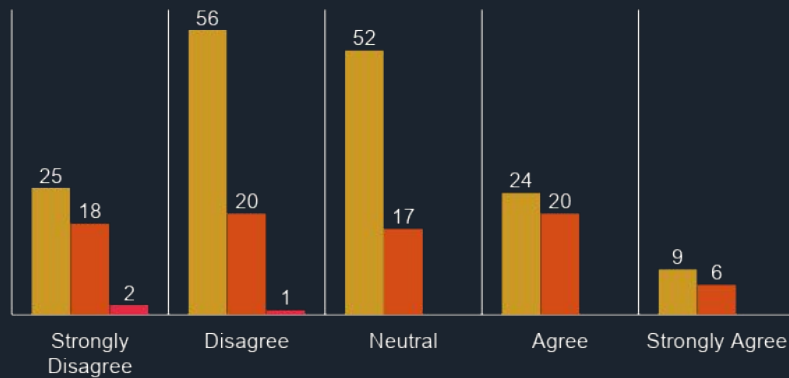
Gender and gpa

Female Male Non-Binary



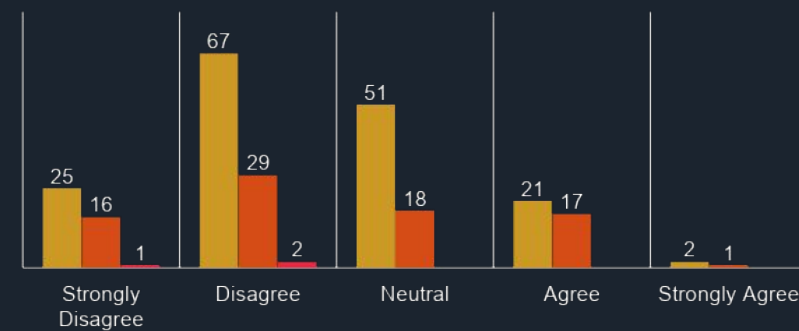
Gender and Satisfaction

Female Male Non-Binary



Gender and continuous intention

Female Male Non-Binary



Regressions

- Using R, regressions were deployed to find the direct and interactions of three constructs, (i.e., Big Five Personality, Information Technology and Psychological Learning Process) on the three dependent variables (i.e., GPA Increase, Satisfaction and Continuous Intention).



KEY

GPA Increase

- Personality, Information Technology and Psychological Learning Processes are significant on GPA increase.

DV: GPA Increase	Full Data	
	(N = 250)	
	Control variables	Direct
R ²	0.03	0.53
Adj. R ²	0.01	0.50
Control		
Gender	-0.21	-0.22**
Experience	-0.07	-0.02
Device	0.15	0.14
Personality		
Extroversion		0.02
Agreeableness		0.10
Emotional Instability		-0.11
Consciousness		0.12*
Intellect		-0.20*
Information Technology		
Performance Expectancy		0.39***
Effort Expectancy		0.25**
Facilitating Conditions		-0.10
Psychological Learning Processes		
Learning Orientation		-0.08
Absorptive Capacity		0.24***

Note: * Significant at $\alpha < .05$

** Significant $\alpha < .01$

*** Significant $\alpha < .001$

KEY

Satisfaction

- Information Technology and Psychological Learning Processes are significant for Satisfaction.

DV: Satisfaction	Full Data	
	(N = 250)	
	Control variables	Direct
R ²	0.03	0.71
Adj. R ²	0.01	0.70
Control		
Gender	-0.05	-0.06
Experience	0.16	0.16
Device	0.13	0.12
Personality		
Extroversion		-0.04
Agreeableness		-0.05
Emotional Instability		-0.03
Consciousness		0.01
Intellect		-0.06
Information Technology		
Performance Expectancy		0.60***
Effort Expectancy		0.23***
Facilitating Conditions		0.00
Psychological Learning Processes		
Learning Orientation		0.08
Absorptive Capacity		0.17**

Note: * Significant at $\alpha < .05$
** Significant $\alpha < .01$
*** Significant $\alpha < .001$

KEY

Continuous Intention

- Personality and Information Technology are Significant for Continuous Outcomes.

DV: Continuous Intention	Full Data	
	(N = 250)	
	Control variables	Direct
R2	0.04	0.48
Adj. R2	0.02	0.45
Control		
Gender	-0.07	-0.08
Experience	0.06	0.02
Device	0.24	0.25*
Personality		
Extroversion		-0.21***
Agreeableness		-0.03
Emotional Instability		0.02
Consciousness		-0.07
Intellect		0.18*
Information Technology		
Performance Expectancy		0.40***
Effort Expectancy		0.29***
Facilitating Conditions		-0.01
Psychological Learning Processes		
Learning Orientation		0.08
Absorptive Capacity		-0.09

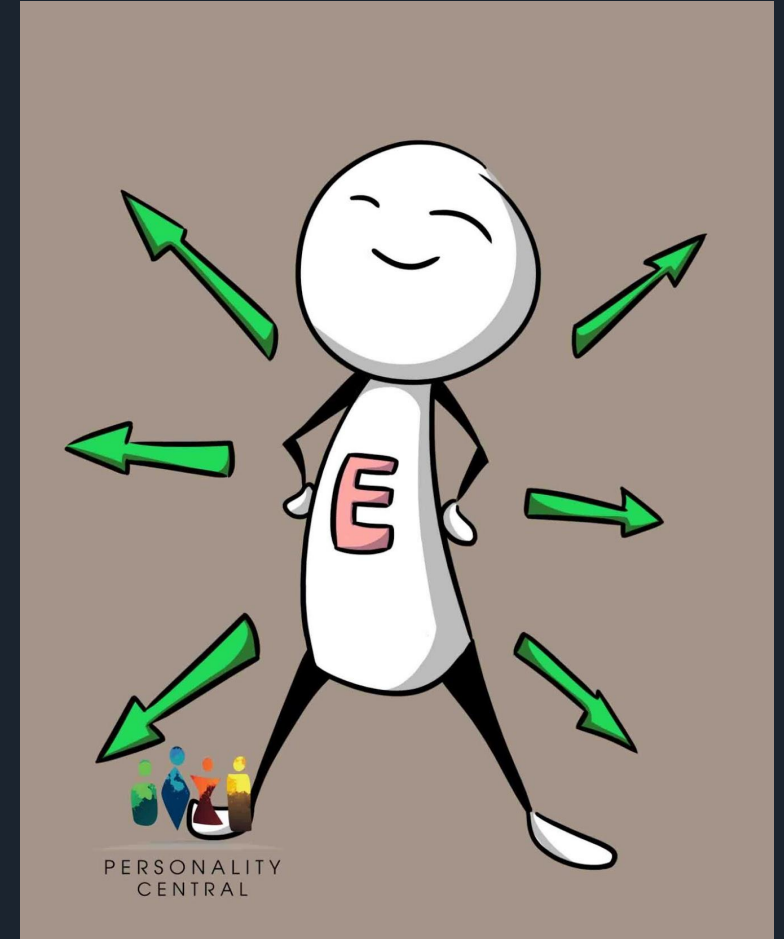
Note: * Significant at $\alpha < .05$

** Significant $\alpha < .01$

*** Significant $\alpha < .001$

Findings

- The personality that had the most significance was extroversion in continuous intention. People who were more extroverted were less likely to use virtual learning in the future
- Information Technology (Performance Expectancy, Effort Expectancy, Hedonic Motivation) was significant for all Learning Outcomes (GPA Increase, Satisfaction, Continuous Intention)





Machine Learning

Using R



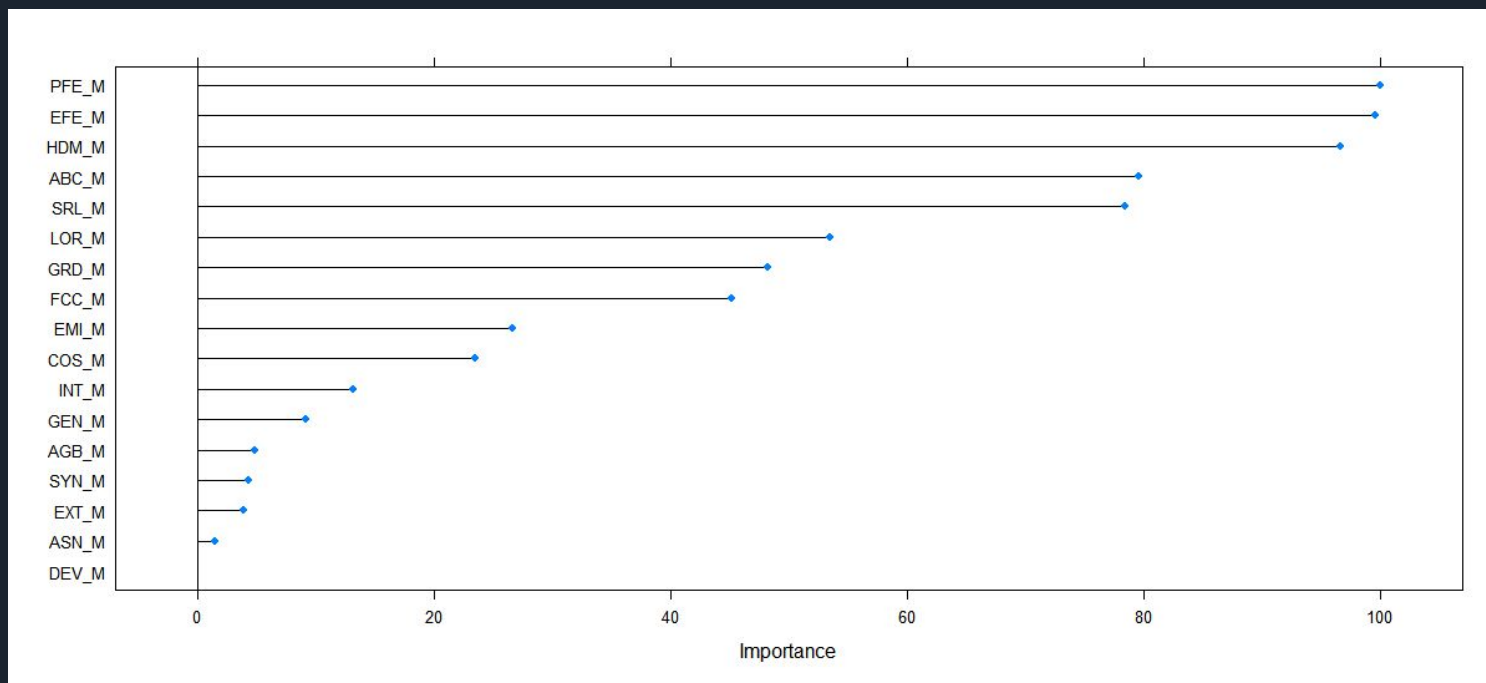
Support Vector Machine

- Using the R programming language, machine learning was used to find the support vector machine (SVM), finding which variables were the most significant for the response variables of GPA Increase, Continuous Intention and Satisfaction and the accuracy of each. The best SVM was radial basis.

KEY

SVM Radial: GPA Increase

Accuracy: 88%

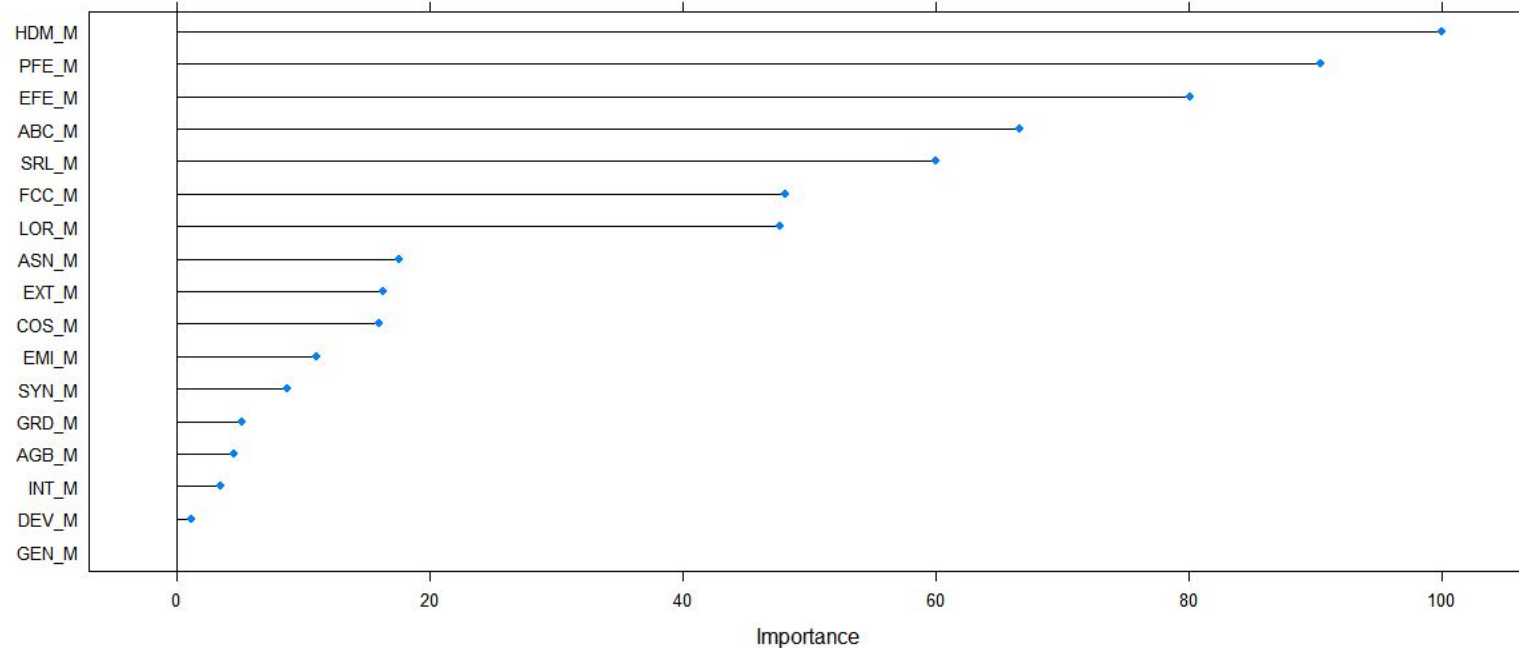


Importance	
Performance Expectancy	100
Effort Expectancy	99.556
Hedonic Motivation	96.656
Absorptive Capacity	79.534
Self-Regulated Learning Strategy	78.392
Learning Orientation	53.46
Grade	48.169
Facilitating Conditions	45.185
Emotional Instability	26.582
Consciousness	23.471
Intellect	13.185
Gender	9.143
Agreeableness	4.804
Experience	4.317
Extroversion	3.894
Device	0

KEY

SVM Radial: Satisfaction

Accuracy: 85%

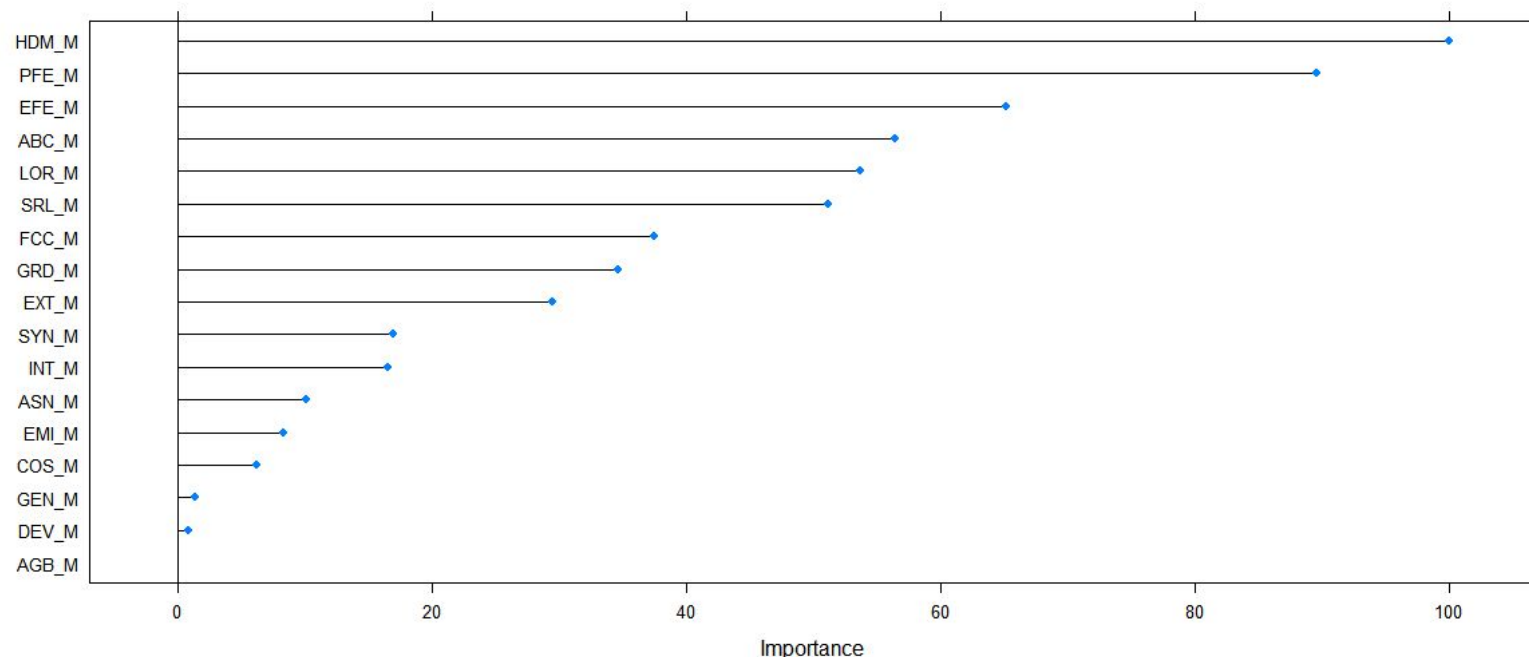


Importance	
Hedonic Motivation	100
Performance Expectancy	90.448
Effort Expectancy	80.092
Absorptive Capacity	66.659
Self-Regulated Learning Strategy	59.977
Facilitating Condition	48.152
Learning Orientating	47.635
Extroversion	16.303
Consciousness	16.028
Emotional Instability	11.079
Experience	8.68
Grade	5.132
Agreeableness	4.478
Intellect	3.433
Device	1.102
Gender	0

KEY

SVM Radial: Continuous Intention

Accuracy: 79%



Importance	
Hedonic Motivation	100
Performance Expectancy	89.584
Effort Expectancy	65.127
Absorptive Capacity	56.3934
Learning Orientation	53.6708
Self-Regulated Learning Strategy	51.1471
Facilitating Conditions	37.4732
Grade	34.6589
Extroversion	29.4586
Experience	16.9471
Intellect	16.5035
Emotional Instability	8.3359
Consciousness	6.1793
Gender	1.3154
Device	0.8259
Agreeableness	0



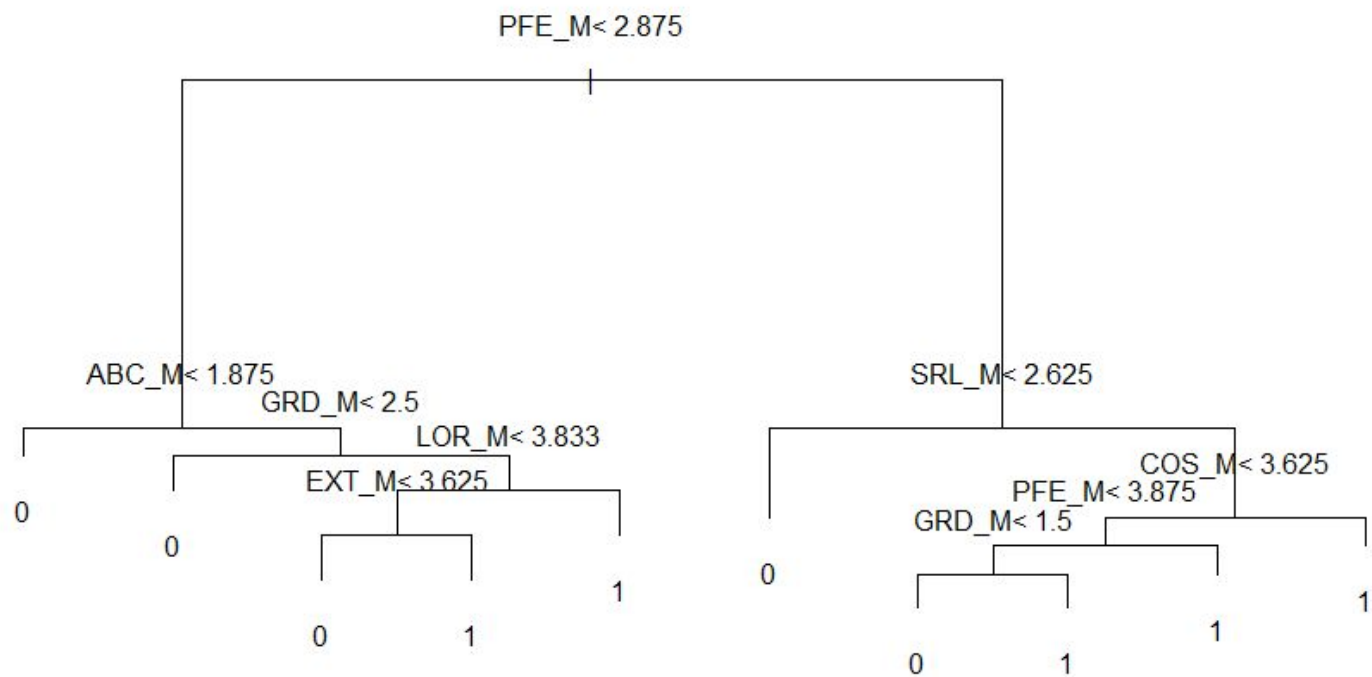
Full Tree Models

- Using the R programming language, Full Tree Models were created to see which independent variables and their values would change the response variables.
- 

KEY

Full Tree: GPA Increase

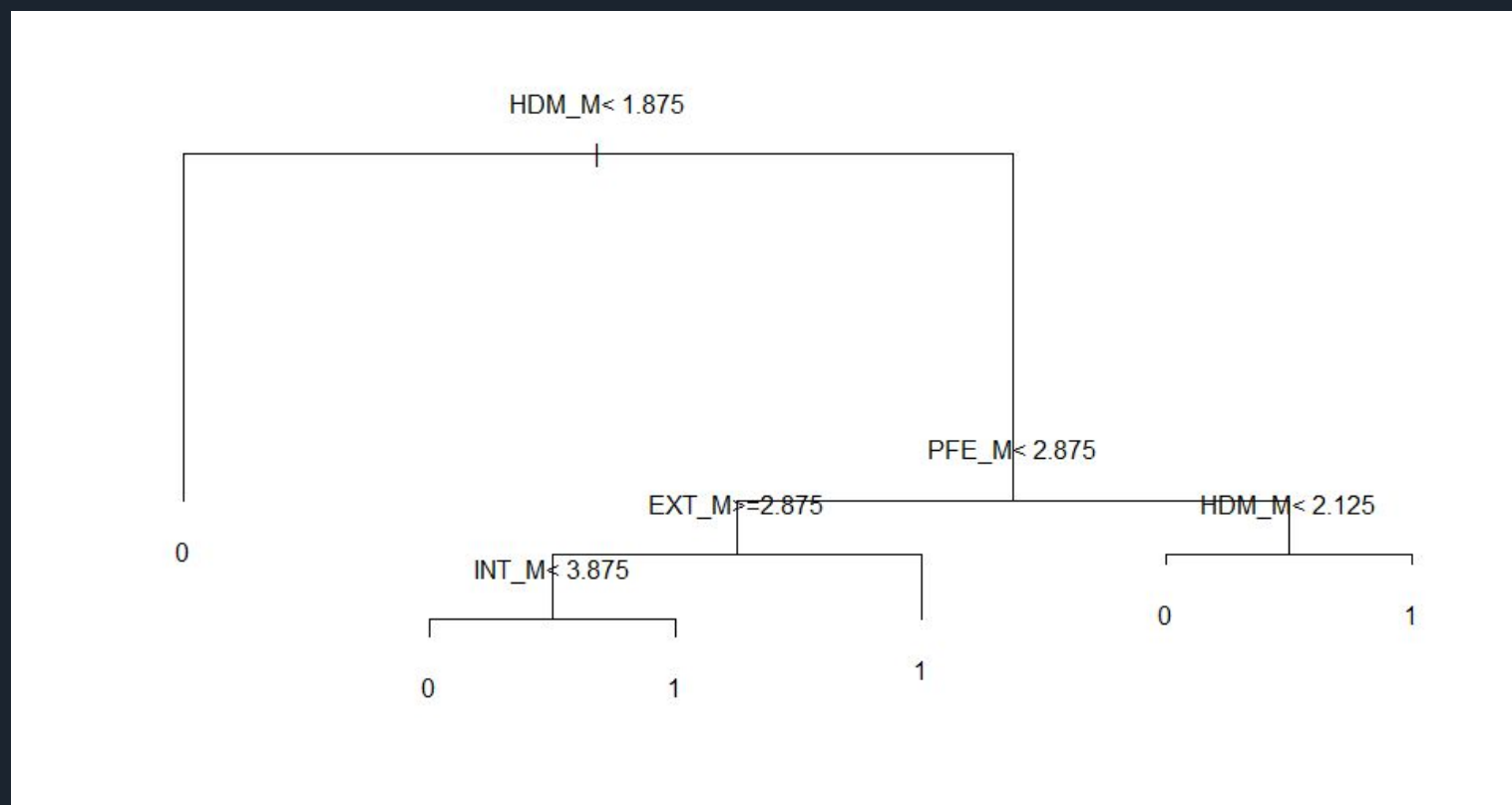
Accuracy: 80%



KEY

Full Tree: Continuous Intention

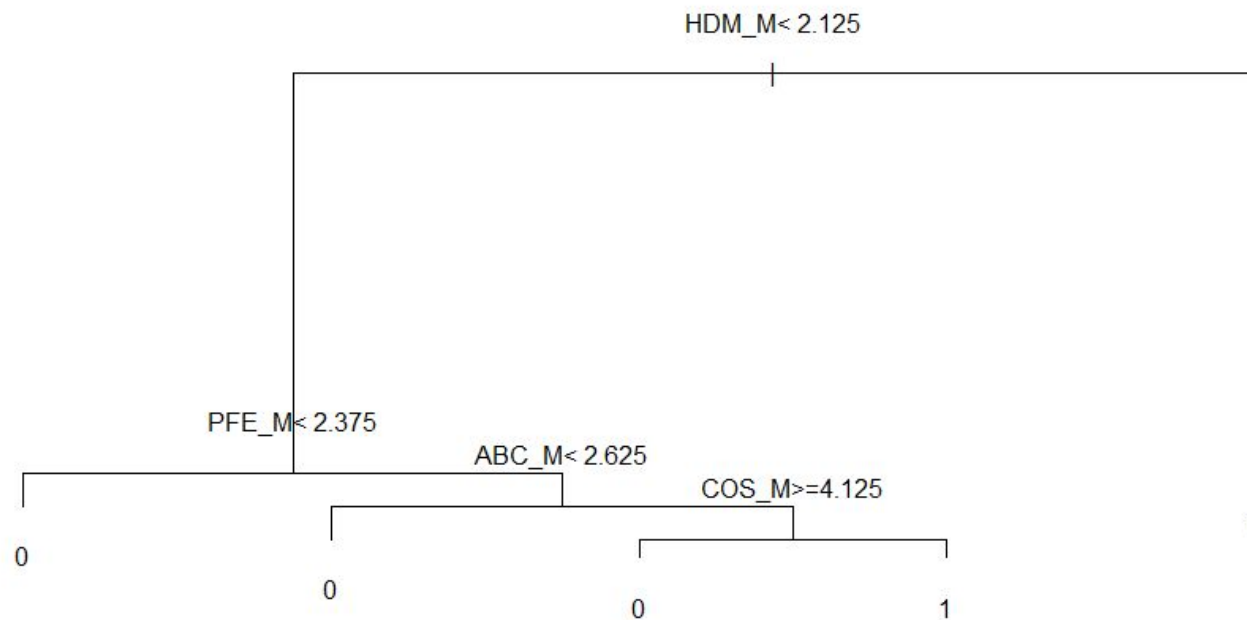
Accuracy: 70%



KEY

Full Tree: Satisfaction

Accuracy: 86%



Key

- EXT_M – Extroversion
- AGB_M– Agreeableness
- EMI_M– Emotional Instability
- COS_M– Consciousness
- INT_M – Intellect
- PFE_M – Performance Expectancy
- EFE_M – Effort Expectancy
- FCC_M – Facilitation Conditions
- HDM_M – Hedonic Motivation
- DEV_M – Device
- SRL_M – Self-Regulated Learning Strategies in Virtual Learning
- LOR_M – Learning Orientation for Virtual Learning
- ABC_M – Absorptive Capacity
- GPA_M – GPA Change
- SAT_M – Satisfaction
- CTI_M – Continuous Intention
- GEN_M – Gender
- GRD _M – Grade
- ASN_M – Asynchronous experience
- SYN_M – Synchronous experience