

## **Predicting Demand for Tertiary Education in STEM Disciplines: The use of Theory of Reasoned Action and Psychoanalytical Model of Personality**

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**ABSTRACT :**Ensuring that there are adequate resources to meet the needs of the students entering the market is a complex task that entails predicting the demand for tertiary education by policymakers and education institutions. The following paper brings forward two theories, the Theory of Reasoned Action (TRA) and the Psychoanalytical Model of Personality (PMP) to explain the demand for Science, Technology, Engineering and Mathematics (STEM) courses in these institutions. The Theory of Reasoned Action (TRA) assumes that human behaviour is a result of the attitudes, beliefs and subjective norms which influence the STEM education choice that people take. Yet on the other side, the PMP implies that motivation, conflict, and unconscious wishes shape behaviour. The duo of models gives a distinctive perspective on the choice of an individual to join the STEM disciplines at the tertiary level. To obtain a thorough understanding on the topic this paper reviews literature on the use of these models and provides a detailed description on how these models can be applied to predict the demand for tertiary education in STEM disciplines. The paper concludes by discussing the advantages, constraints, and the role of each of the models before it gives the validated recommendations for future research. The results of this research will be used to create strategies and measures to raise students' participation in STEM disciplines at tertiary education institutions.

**KEYWORDS-***predicting demand, STEM disciplines, models, tertiary education, Theory of Reasoned Action, Psychoanalytical Model of Personality*

### **I. BACKGROUND OF THE STUDY**

The increasing demand for skilled workers in science, technology, engineering, and mathematics (STEM) fields, in turn, has led to the rise of the demand for higher education in the same fields (National Science Board, 2018). Carnevale et al. (2013) has claimed that there will be a considerable growth in STEM jobs' employment opportunities rather than the non-STEM fields and the U.S. Bureau of Statistics (2021) has predicted it to grow by 8.8% from 2019 to 2029. Despite these efforts, the participation of minority groups, women, and other groups remains low (National Science Foundation, 2021).

To deal with the prominent problem of the demand for tertiary education in STEM, the factors must be analysed to develop the proper strategies and increase participation in STEM. One of the mechanisms that might be used to forecast the demand for disciplines in tertiary education is the application of models. This paper suggests the use of two models as a framework to understate motivations, attitudes, beliefs, and influences on the choice of disciplines made available in universities and other higher education institutes (Bandura, 1986; Freud, 1923).

The two models used to predict the demand for STEM disciplines in tertiary education are the Theory of Reasoned Action (TRA) and the Psychoanalytical Model of Personality (PMP). The TRA is a model that is used widely to predict demand and it proposes that an individual's choices or behaviours are influenced by their attitudes, beliefs about the final outcomes and their subjective norms which most often is the social factors that complete their behaviour (Ajzen & Fishbein, 1980). Kim & Hunter (1993) have used the TRA to predict career choices in their article and Abe & Chikoko (2020) highlight that it was a useful model to comprehend the influencing factors on STEM education choices. This has further been rehashed in Mesidor (2014) to prove their arguments. The PMP, on the other hand, suggests that the behaviours individuals and their decision making is influenced by their unconscious desires, conflicts, and motivations (Freud, 1905). Sackett & Dubois (2015) and Lent et al. (2000) used the model to understand what motivates students to pursue STEM education and puts forward factors such as need for achievement, desire for intellectual challenge and the desire to be recognized as an expert in a field.

Policymakers, universities, and all higher education institutes can gain insights by using the two models to understand the influences on the decisions of students who wish to pursue STEM disciplines and predict the demand for them in the tertiary sector. This knowledge can be used to devise interventions to

increase the participation in STEM fields to create a more equitable representation in the STEM workforce from the underrepresented groups. This would eventually lead to a diverse, skilled workforce that will help develop economies across the globe. This paper will focus on providing a detailed guide on the use of the TRA and the PMP to predict the demand for STEM disciplines in tertiary education and highlight the importance of using a proper framework or model to comprehensively understand human behaviour.

## **II. LITERATURE REVIEW**

### **a. What is STEM education?**

STEM disciplines are the driving forces behind innovation, economic development, and social advancement. STEM is a learning and development approach which involves science, technology, engineering, and mathematics according to the Western Australian Department of Education. It underlines that STEM education must equip students with skills such as critical thinking, problem solving, independent thinking, communication, and collaboration (Department of Education - Government of Western Australia, 2023).

The usage of the term "STEM" is criticized by Sanders (2009), a professor in technology education, and a more integrative approach to STEM education is demanded. Sanders (2009) promotes integrated STEM education, which entails methods that examine the teaching and learning processes between or among any two or more STEM subject areas as well as between a STEM subject and one or more other school subjects. The study of technology shouldn't be divorced from the study of social studies, the arts, and the humanities in the same way that technical endeavour, for instance, cannot be removed from social and aesthetic settings. Sanders (2009) urges STEM educators and administrators to investigate and put into practice integrative alternatives to conventional, disconnected STEM education through an integrative education program (Sanders, 2009).

### **b. The importance of STEM education**

Education and research in the fields of science, technology, engineering, and mathematics (STEM) are becoming more widely acknowledged as essential to social well-being, economic competitiveness, and national production. Government initiatives to develop STEM policies affecting classroom science and mathematics, as well as higher level education and research in the STEM fields, are obviously evidence of a global move to STEM (Freeman et al., 2019).

A student who is knowledgeable and literate in STEM subjects is more likely to be creative and analytical. He or she may use what they've learned to solve issues in the real world, improving their communities in the process. STEM-literate high school graduates go smoothly into their higher education professions in those subjects. In the end, STEM literacy leads to employment in the increasingly knowledge-based economy that is observed both locally and globally. STEM knowledge translates into profitable employment in higher-paying positions for the workforce of today and future (Stem Education Research Center at SIU (Southern Illinois University, 2023).

STEM subjects are the key factor in both national and international economies as they stimulate innovation and change the labour markets and economies to fit modern requirements of the 21st century. The most important goal of STEM education is to develop a critical thinking approach that in result will lead to a bigger number of people that will solve creative problems in the workforce. In a world that is increasingly becoming a knowledge-based economy, massive demand for creatives problem solvers is of high priority, particularly in the coming years where society is expected to encounter complex problems. (Fomunyan, 2022).

From the above-mentioned studies, it is succeeded that STEM education is central to the direction of the future through equipping the students with basics in science, technology, engineering, and math. It evokes innovation, critical thinking and problem solving. The graduates of STEM programs are the ones who move their communities ahead to new heights and bring to light the importance of STEM education for the economic well-being and advancement of the nation.

### **c. Challenges in STEM Education**

STEM education still faces several challenges, some of which are listed by Bybee (2013). Actively integrating engineering and technology into school courses is the first challenge. Although technology and engineering programs exist, they are normally offered on a relatively small scale in educational institutions. Introducing STEM-related issues like energy efficiency and climate change and creating the capabilities to solve them is one of the most significant challenges cited by Bybee (2013). Additionally, he highlights the need for context-based STEM education, which may be utilized to solve global concerns (Bybee, 2013).

Sanders (2009) criticized the way the acronym STEM is employed, and the usage of this abbreviation has also drawn criticism, according to Bybee (2013) as well. The vague slogan now must be defined with realistic and conversations in terms of educational reality, according to Bybee (2013). Both Sanders and Bybee consider the use of the word STEM as a major challenge in STEM education, and they expect progressive steps to improve STEM education.

Fomunyan (2022), on the other hand, focuses on a few additional difficulties facing STEM education. He claims that there are several obstacles facing STEM education, including a lack of competent teachers,

particularly in Africa, and that students understanding of STEM subjects is hampered by unqualified teachers. He also speaks about the difficulty teachers have in giving each pupil individualized attention due to the large class sizes. He also mentions the lack of resources as a problem. He makes the point that the lack of resources, including computers, labs, chemicals, and textbooks, further hinders STEM education and forces teachers to rely more on theoretical methods than actual experiments. He lists the negative perception of STEM fields in society and a lack of faith in their ability to succeed as one of the primary challenges (Fomunyan, 2022).

**d. Demand for Skilled Labor in STEM**

The question on labour shortage in STEM has contradicting and fascinating answers. As Yue and Larson (2014) state, during the last decade, the STEM workforce, at least in these four areas, has become a subject of widespread concern. Opposing sides paint a polarizing picture: Is STEM in crisis or is there a STEM surplus? The answer is that the two contexts exist. They indicate that Demand for science and technology (S&T) Professional workers will exceed approximately 1 million over the next decade under the current conditions if the United States is to maintain its position as a worldwide leader in S&T (Yue & Larson, 2014). Also, works by Carnevale et al. (2013) establish the growing demand for STEM professionals, which mean that the STEM-based jobs are highly expected to record high growth rates in the coming years (Carnevale et al., 2013).

**e. Gender Disparities in STEM**

The fairness of how women are treated in STEM jobs has been debated for many years. The women's underrepresentation in STEM field has been viewed from several perspectives as far as the related studies are concerned. For example, Moss-Racusin et al. (2012) show that professors gendered bias takes part when evaluating genders thereby, unconscious bias might be contributing to the gender pay gap in STEM academia. Besides, they say again that the gender gap is the issue in academic science even though several programs have been introduced to encourage women to join and stay within this community. What really attracts one's attention is that numerous research has proved that gender bias exists even across different demographics, but no studies have been made so far to experimentally test whether bias against female students is a facet of science faculty, which could be a plausible explanation of the existing gender gap in the field of academics (Moss-Racusin et al., 2012).

The same perspective is shared by Freeman et al. (2019), who say that the STEM workforce has a gender gap, and the disadvantages of gender related to STEM education are still existent in Australia and the US.

**f. Diversity and Inclusion in STEM**

Diversity in STEM may encompass the broad range of differences including gender, race, socio-economic class, ethnicity, talent, geography, religion, and others. The researchers of Australia carried out a study Ramiaha et al., (2022) argue that Australia is a nation of diversity. This diversity is wide, and it covers other demographic groups like gender identity, sexual orientation, disability status and caring responsibilities. Nevertheless, such diversity is not mirrored in the STEM workforce or in STEM departments at universities e.g. the entrance into the traditionally strong STEM academic and industrial areas of STEM is difficult for the persons with disabilities and the people from the non-Western cultures (Ramiaha et al., 2022).

In a paper written by Seagroves et al. (2022) published in the US, their views are the same. In conformity with what the authors say, minority and women of all races and ethnicities are underrepresented in STEM fields corresponding to their percentages in the American population.

**g. What is the 'Theory of Reasoned Action' (TRA)?**

The Theory of Reasoned Action is a social psychological theory that explains the relationship between attitudes and behaviours within human action and, it was first introduced by Martin Fishbein in 1967, and then expanded by Martin Fishbein and Icek Ajzen. It is a cognitive theory and mathematical model developed by the above-mentioned psychologists. It seeks to comprehend how people behave in situations, such as predicting if people will develop healthy behaviours. This theory enables scientists to forecast behavioural intentions based on attitudes and subjective norms. The TRA emphasizes three key components: beliefs, attitudes, and intentions (Nickerson, 2023) (Refer Fig 1 below).

Beliefs are an individual's assessment of the likelihood that a particular action will result in a particular outcome, whereas attitudes indicate whether the outcome is thought to be favourable or unfavourable. A person's intentions are their deliberate actions based on their ideas and attitudes. A chain is formed by how beliefs influence attitudes, which in turn influence intentions, which influence behaviours (Nickerson, 2023).

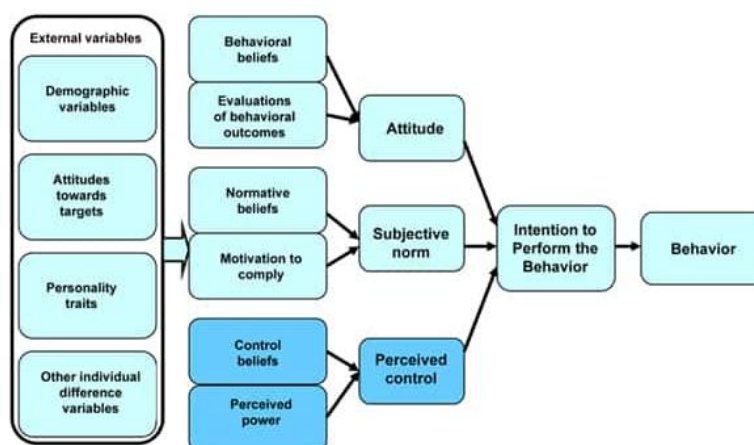


Fig 1: Theory of Reasoned Action and Theory of Planned Behaviour (Nickerson, 2023)

Fishbein and Ajzen proposed a hierarchical structure for the theory, suggesting that attitudes, subjective norms, and perceived behaviour control all influence intentions, which in turn impact behaviour to some extent. Additionally, external factors like demographics and personality can influence the underlying behavioural, normative, and control beliefs. They further enhanced the theory by introducing two new elements: attitude and expectations of others in predicting behavioural intent (Nickerson, 2023).

#### h. Attitudes and Behavioural Intentions

The psychological concept that people's attitude towards the behaviour they opt to engage in or not affect their behavioural intentions is the third concept in the TRA. Behavioural intentions refer to what a person declares to be his or her level of willingness to perform a certain behaviour, while attitudes deal with the way they conceptualize regarding a specific behaviour. According to TRA, attitude results from the association between antecedents and belief in certain consequences. At the same time, the behavioural intentions that are determined by these attitudes become to be an important predictor of real behaviour (Ajzen, 1991).

Attitudes are a product of expending energy on an outcome that leaves an evaluator at a desired state through an evaluation of the outcomes of actions and the subjective value placed on those outcomes. Repeatedly, the interconnections between attitudes and behavioural intentions have been shown by scientific studies performed under different conditions (Ajzen, 1991). The TRA provides a framework for analysing and predicting human behaviour in different fields of activity by focusing on the attention between attitudes and behavioural intentions. This framework, in its turn, can help design interventions and strategies that would succeed in stimulating behavioural change for the better.

#### i. Subjective Norms

The role of attitudes and subjective norms in changing behavioural intentions is suggested in the TRA. According to the concept, one won't be active and sincere in fulfilling one's responsibilities if they have a negative attitude towards certain behaviour. Thus, whether a person will perform an intended behaviour would subjectively depend on the attitudes and the norms that a person expects and experiences from society. Subjective norms are one's belief about what other important people expect them to do or not to regarding the behaviour in question (Ajzen, 1991). In a nutshell, people are driven by normative beliefs to conform to the expectations of the important people to take part in or to drop a specific act.

Social forces of family, friends, peers, and norms of culture have influence over these ideas. It was realized by TRA that subject norms and attitudes tend to have a big influence on behavioural intentions, which then have a big role played on behaviour action (Ajzen, 1991). This theory can be extended to students who intend to choose their disciplines for higher education.

#### j. Perceived Behavioural Control

Perceived Behavioural Control (PBC) is a central notion in TRA, as it reflects people's view of their ability to act in the desired way. In addition, TRA believes that towards about PBC, or one's perception of self-efficacy, plays a crucial role in people's intentions to act. The PBC can be affected by skills, resources, and opportunities. Behavioural intentions tend to be good for the behaviour to be carried out when people perceive they have high control over it. Nevertheless, on the contrary, low perceived behavioural control can hinder the creation of intentions and completely prevent a person from acting (Ajzen, 1991).

#### k. Application and Extension of the TRA

The application of the TRA has been diverse, being deployed in organizational behaviour, consumer behaviour and environmental behaviour among others. The TRA has been used to investigate the behaviour of health in a few areas, e.g. health psychology, cessation of smoking and medication adherence. Withing health



psychology, healthy behaviour is producing great concern that the study of the behaviours that influence health, as well as the factors that determine which people are going to perform the behaviours and who is not are of major concern. Use of TRA was done by Bledsoe (2006) in his study who evaluated the determinants that impact smoking cessation at the premature stage of change (Bledsoe, 2006). It has also been used to explore the factors influencing medication adherence among individuals with chronic illnesses (Rich et al., 2015).

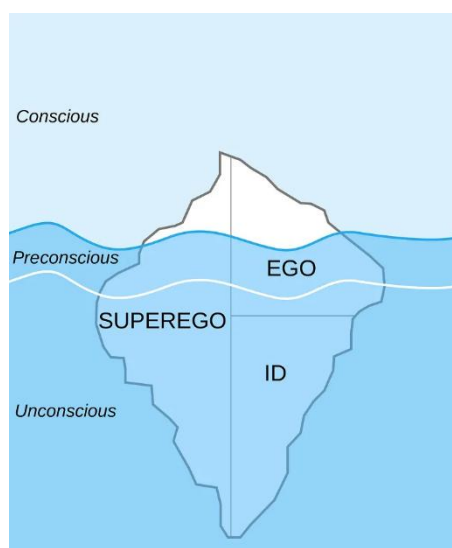
The TRA has been applied in numerous disciplines, which contributed to the theory's acceptance. The TRA has been used in sports to predict adherence to training in athletes (Anderson & Lavallee, 2008). It has also been used in environmental science (Si et al., 2019). TRA was used in an interesting study to boost breakfast consumption among schoolchildren in a region of Iran. According to the study's findings, employing TRA significantly increased breakfast consumption. All nutrient intakes—except for fat and sugar—saw significant increases as well. The results suggest that the TRA can be used to enhance breakfast eating intentions and behaviours (Hosseini et al., 2015). The TRA has also been extended and modified to enhance its predictive power. Another expansion is the Theory of Planned Behaviour (TPB), which adds the idea of perceived behavioural control to the theory of reasoned action with a broader scope of it (Ajzen, 1991).

The Theory of Reasoned Action (TRA) has been a beneficial framework through which one can understand and predict human behaviour in different situations. By considering the effects of attitudes, subjective norms, and perceived behavioural control, the TRA provides the needed insights into how the factors influencing behavioural intentions and subsequent behaviour work. Even though it has its own limitations, TRA has provided a starting point for the development and extension of social psychology which builds more accurate and complete conception of change processes. Thus, the same model and theory can be extended and used to predict the demand for tertiary education in STEM disciplines.

#### **I. What is the Psychoanalytical Model of Personality (PMP)?**

Probably, one of the most influential and important theories in psychology is the Psychoanalytical Model of Personality developed by the famous Austrian psychiatrist, Sigmund Freud. The groundwork for the analysis of the human mind's intricate structure and the way it underlies such phenomena as behaviour, emotions and thoughts was laid by Freud's original findings. The concepts of id, ego, and superego—which altogether form the architectonic framework of human psyche—constitute the structural basis of this model (MBA Knowledge Base, n.d.) (Refer Fig 2 below).

*Fig 2: Psychoanalytical Model of Personality (MBA Knowledge Base, n.d.)*



In 1923, "The Ego and the Id," (which was a part of "The Standard Edition of the Complete Psychological Works of Sigmund Freud" series), was published. This book proposed new ideas and concepts that formed the foundation of his psychoanalytic theory. In his work "The Ego and the Id", Freud deepened the understanding of human behaviour by looking into the unconscious elements of an individual's personality: the id, ego, and superego (MBA Knowledge Base, n.d.).

The id means the primitive part of the mind that is controlled by instincts and immediately satisfies the desires and functions on the principle of pleasure. It is totally unconscious and spontaneous, determined by basic needs and wants. The ego, on the other side, is seeking practical and socially acceptable solutions to meet the requirements of the id and to serve as the mediator. Also, Freud developed the concept of the superego, which includes social, family, and cultural morality principles and precepts. In case it is not followed, the superego, that is the super ego, may result in feelings of guilt and remorse (Freud, 1923).

Within the framework of the psychoanalytic model of Freud, personality development is said to proceed through various stages and to be involved with certain kinds of difficulties as well as sources of pleasure or anxiety. These stages are realized only through relational conflicts between the id, ego, and superego. The early life experiences, particularly those involving the parent-child relationships, are approved to have a high response on the adult personality traits and later behavioural patterns (Freud, 1905).

Although it is criticized and challenged, the psychoanalytic model is still a core of psychology, it has great impact on the development of different therapeutic approaches and may be the basis of latter studies of human mind and personalities.

**m. Strengths and weaknesses of the PMP**

The growing influence of psychoanalysis started during the early 20th century. Yet, this was far from unanimous, and although it had its faults, psychoanalysis still played a significant role in the growth of psychology. It exerts its influence on psychology up to now and it defines the way one deals with those who suffer from psychological difficulties (Cherry, 2023).

According to Cherry (2023), the theory made a significant contribution to the development of experimental psychology, thus one of its strongest points. Also, psychodynamic philosophers' ideas for theories of personality such as Freud's psychosexual stage theory and Erikson's psychosocial stages theory have continued to influence the field. Another good reason is it as psychoanalysis converted how people consider mental illness, particularly how you can feel less psychologically troubled by discussing issues with a qualified psychoanalyst.

In contrast, one of the criticisms of Freud's theories is he put too much focus on the subconscious mind, sex, aggression, and childhood experiences in his theory. Unlike real scientific research, Freud's theories were mostly empirically based on case studies and clinical observations and many of the ideas advocated by the psychodynamic thinkers are challenging to measure and quantify (Nash, 2018).

**n. Application of Psychoanalytical model of personality (PMP)**

The psychoanalytic model of personality represents a revolutionary model in psychology. It has been applied to comprehend a lot of psychological matters, such as neurosis, psychosis, and personality disorders. The theory is also applied to psychoanalytic therapies, a still commonly used psychotherapy method. A 2015 review found that psychodynamic therapy could be effective in the treatment of several conditions including depression, eating disorders, some somatic disorders, and some anxiety disorders (Nash, 2018). PMP model can be used to understand the motivations of students who wish to pursue higher education and their inclinations to choose STEM disciplines.

### **III. DISCUSSION**

STEM education is acknowledged as the backbone of innovative growth, economic development, and the progress of society (Department of Education - Government of Western Australia, 2023) globally. The Western Australian Department of Education says that STEM learning is indeed a must for students to develop the ability to think critically, solve problems, and use communications and collaboration strategies (Department of Education - Government of Western Australia, 2023). Nevertheless, a great deal of criticism has been levelled at the term "STEM" particularly from the views of Sanders, a technology education professor, who calls for an integrative or trans-disciplinary approach.

Sanders (2009) argues the integrated STEM education is where teachers and administrators should investigate and exploit the teaching and learning linkages between STEM subjects and other disciplines (Sanders, 2009). He emphasizes technology's interdisciplinary nature with the areas of social sciences, arts, and humanities. Such integrated approach, according to Sanders, addresses the shortcomings of conventional and isolated STEM education which lacks a holistic comprehension of the subjects (Sanders, 2009).

Beyond an individual level, STEM education has a prominent role in determining the competitiveness of a nation's economy as well as the prospects of the global labour force. Governments worldwide, therefore, understand that the STEM policies are key as the only way to guarantee the society's well-being, economic competitiveness, and sustained growth (Freeman et al., 2019). STEM-trained individuals not only have the readiness for higher education and careers, but they are also utilized to solve real-world problems, consequently strengthening their communities (Southern Illinois University, 2023).

On the one hand, STEM education is of paramount importance, but it is also flawed. Bybee (2013) highlights issues such as the need for active integration of engineering and technology, context-based education to address global concerns, and the ambiguous use of the STEM acronym. Fomunyam (2022) strictly points out issues like lack of competent teachers, resource constraints, and societal perceptions which are the challenges to STEM education.

The demand for STEM skilled workers creates a paradox—argument if there is shortage or surplus of the said workers exist. Yue and Larson (2014) argue that the US will need a one-million increase in the number

of STEM professionals in the next decade to maintain its historical hold on science and technology. Carnevale et al. (2013) argue this point further, pointing out the expected dynamic growth of STEM-related jobs.

The gender gap in STEM professions is still present, and a study by Moss-Racusin et al. (2012) and Freeman et al. (2019) examine biases in evaluations and under-representation of women. The diversity and inclusivity in STEM are still a challenge that has been observed in Australia (Ramiaha et al., 2022) and in the United States (Seagroves et al., 2022), signifying the need to have representation in different demographics.

The Theory of Reasoned Action (TRA) offers an important perspective to explore human behaviour in the STEM education context. Fishbein and Ajzen's TRA focuses on the interaction of beliefs, attitudes, and intentions and provides information on behaviour formation based on how these factors impact it (Nickerson, 2023). Attitudes, subjective norms, and perceived behavioural control are core variables that help form behavioural intentions and, therefore, actions (Ajzen, 1991).

On a different psychological note, the Psychoanalytical Model of Personality (PMP), formulated by Sigmund Freud, offers a deep understanding of human behaviour by exploring the id, ego, and superego. Freud's psychosexual stages of development further elucidate the complexities of personality formation through childhood experiences (Freud, 1923). While the PMP has faced criticisms for its emphasis on subjective and unquantifiable aspects, it undeniably influenced experimental psychology and the development of psychotherapeutic approaches (Cherry, 2023). The model's application in understanding mental health issues and its contributions to psychodynamic therapies highlight its enduring impact on psychology (Cherry, 2023).

It is evident that STEM education stands as a linchpin for fostering innovation and skill development. The challenges it faces, coupled with the demand for skilled STEM professionals and the persistent issues of gender disparities and diversity, necessitate a comprehensive and integrative approach. The TRA offers a lens to understand behavioural aspects in STEM education, while the PMP contributes to the broader understanding of personality dynamics. As the complex landscape of education and psychology is navigated, these theories provide valuable frameworks for analysis and intervention.

#### **IV. CONCLUSION**

In conclusion, STEM education remains a cornerstone for fostering innovation, economic growth, and social progress. But when faced with a multi-faceted challenge from integrating technology and technology to addressing gender inequality and promoting diversity and inclusion, practice theory (TRA) and the psychoanalytic model of personality (PMP) provide a valuable lens through which to understand human behavior in STEM education. Whereas TRA focuses on attitudes, beliefs about the self, and perceived control over behavior, PMP examines deeper personality developments, including the id, ego, and superego.

Despite the criticism and controversy surrounding these models, they provide important frameworks for research and engagement in STEM education. By effectively addressing the challenges and leveraging the insights provided by TRA and PMP, stakeholders in STEM education can work to create inclusive, diverse, and effective learning environments.

#### **V. RECOMMENDATIONS**

- *Integrated STEM Education:* Embrace an integrated approach to STEM education, as advocated by scholars such as Sanders (2009), to integrate STEM disciplines with other disciplines to foster a holistic understanding of STEM theory of various types.
- *Addressing challenges:* Take proactive measures to address challenges such as lack of qualified teachers, resource constraints, and social assumptions, which hinder STEM education, as Fomunyam (2022) constructed emphasizes the.
- *Encourage diversity and inclusion:* Recognizing the importance of representation in diverse demographics, prioritize initiatives that encourage diversity and inclusion in STEM fields, as highlighted by Ramiah et al. (2022) and Seagroves et al. (2022) and their results.
- *Applying behavioral insights:* Use insights from the Theory of Reasoned Action (TRA) to understand behavioral intentions and influence STEM education, focusing on attitudes, cognitive beliefs, and attitudes perceived power over (Nickerson, 2023; Ajzen, 1991).
- *Understanding personality development:* Incorporate insights from the psychoanalytic model of personality (PMP) to develop a deeper understanding of personality development in STEM education, examining factors such as the id, ego, and superego (Freud, 1923; Cherry, 2023).

By implementing these recommendations and sharing the insights provided by the TRA and PMP, stakeholders in STEM education can work to create an inclusive, diverse, and effective learning environment as it enables individuals to advance in science, technology, engineering, and mathematics in a rapidly developing landscape.

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