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Editorial

The September/October 2023 JIRSEA Issue has consistently resulted in 60% of papers being declined due to relevance to JIRSEA's focus on Higher Education issues or Institutional Research and those that do not meet the "sound scientifically grounded" research requirements of JIRSEA. Of the 25 papers that went through the Preliminary Reviews with revisions and re-submitted, and after the Double-Blind Review of 12 papers, only 6 papers were accepted for this issue publication after the rigorous and stringent vetting process, with 1 non-follow-up. The first paper looked at differences in and relationships among academics' research expectations, external activities, and social contributions in Taiwanese HEIs, with 3 papers looking at the moral education, emotional intelligence (EI), and transformational leadership practices (TLP) of academics in conflict-prone areas, and the relationship between these possible diversity markers and the demographic variables of gender, degree of higher education, living arrangement, and student employment status. 5 papers covering academic assessment or e-testing, assessment & remote learning, 2 papers were on analyzing the impact of learning satisfaction and motivation on students' willingness and the context of language learning.

We also continue with our tradition of celebrating the "Best Paper Award" and 2 "Outstanding Paper Citations" selected by a panel of peer reviewers. These papers were invited to be re-submitted to the JIRSEA after additional and substantial modifications to bring the conference paper to the requirements of JIRSEA's stringent publication requirements. The Best Paper covered utilizes Python programming and machine learning algorithms to design a predictive model for assessing faculty effectiveness. The two Outstanding papers aim to build an ROI model to support educational policy in the first thousand days and develop, design, and evaluate the developed e-module in advanced Swimming as a learning material for Physical Education classes utilizing the ADDIE model, respectively.

The key synopses of these nine papers are as follows:

- **Article 1 – Sophia Shi-Huei Ho** of *the University of Taipei, Taiwan*, **Robin Jung-Cheng Chen** *of National Chengchi University, Taiwan*, and **Ying-Yan Lu** of *Ming Chuan University, Taiwan*, adopts the Expectancy–Value Theory (EVT) to investigate the differences in and relationships among academics' research expectations, external activities, and social contributions in Taiwanese HEIs. It examines individuals' expectancy beliefs and the value they attach to their current activities or achievements on future tasks. The present study adopted *The Academic Profession in a Knowledge-Based Society* as a research instrument. The research provides three crucial findings: first, the research variables vary significantly across individual factors; second, academics' external activities mediate the relationship between individual research expectations and social contributions; and third, external activities significantly moderate the relationship between academics' research expectations and social contributions. The findings contribute to extant research on EVT by demonstrating the complex relationships between various dimensions of academic work environments. Furthermore, they provide a reference for enhancing institutional governance in HEIs.

- **Article 2 – Cui Hongmei** of *Universiti Teknologi MARA, Shah Alam, Malaysia & Ningxia Medical University,* **Wu Chuan** and **Wang Bingqi**, both of *Ningxia Medical University, Ningxia, China* and **Naginder Kaur** of *Universiti Teknologi MARA, Perlis Branch, Malaysia*, qualitatively explored moral education has become an integral component for international students, which helps cultivate students with ideals and responsibilities, guides students worldwide to look at the world from the perspective of appreciation, mutual learning, and sharing, and promotes exchanges and mutual learning among different civilization. No significant differences were recorded in their moral education with different genders, length of study/stay in China, educational background, and Chinese language proficiency. However, in contrast, some students expressed problems such as shallow moral awareness, weak moral emotion and will, and poor moral behavior.
- **Article 3 – Tria Ina Utari and Dewi Nofrita,** both from *IAIN Ambon*, explored the emotional intelligence (EI) and transformational leadership practices (TLP) of academics in conflict-prone areas (Ambon). It examined whether the segregation of territories due to conflicts had a relationship between emotional intelligence and transformational leadership practices using a causal relationship approach to describe circumstances. The results showed that participants' emotional intelligence (EI) correlated favor of transformational leadership practices (TLP). The findings show that vulnerability of conflicts in the Ambon city area does not affect the results of the Emotional intelligence assessment (ESAP) and Leadership practice inventory (LPI), especially the contribution to factors that encourage and enable others to act, shared vision, modeling the way, and challenging the process. In practice, it can be interpreted as regional segregation in Ambon City.
- **Article 4 – Royce A. Salva** *of De La Salle University-Dasmariñas, & University of the Philippines-Diliman, Philippines***, Paula Glenda Ferrer Cheng** *of De La Salle University-Manila & National University-Mall of Asia, Philippines*, and **Roann Munoz Ramos** *of De La Salle University-Dasmariñas* investigated the relationship between these possible diversity markers and the demographic variables of gender, degree of higher education, living arrangement, and student employment status. Results showed that the students' living arrangements are the most critical demographic variable. Anxiety and digital phenotypes may be diversity markers for students' living arrangements.
- **Article 5 – Tao-Ming Cheng** of Chaoyang University of Technology, Taiwan; **Chiu-Yao Ting**, of China Medical University, Taiwan; **Hsing-Yu Hou** of National Taichung University of Science and Technology, Taichung, Taiwan, examines the disparities in learning satisfaction and willingness among international students from diverse backgrounds at the University of Technology in Taiwan case that analyses the impact of learning satisfaction and motivation on students' willingness. The findings revealed significant disparities in learning satisfaction and willingness to study across international students at different program levels. At the graduate level, international students demonstrated higher satisfaction and willingness to study than their undergraduate counterparts. English medium of instruction (EMI) programs demonstrated higher levels of satisfaction than Chinese-medium instruction in the sub-factors of learning satisfaction and willingness to study. The outcomes of the study further demonstrated that "learning satisfaction" was positively and

significantly influenced by factors such as "life function," "learning environment," "course materials," "teaching methods and assessment," "teacher teaching," and "administrative support." Moreover, it was found that "willingness to study" was positively and significantly affected by "learning satisfaction."

- **Article 6 – Taif Ibrahem AL-Kinany and Sultan Saud Nasser AlDighaishi,** both from *The University of Technology and Applied Sciences, Oman/Nizwa,* develop a test to assess Omani EFL college students' production of consonant clusters found in the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'. Twenty-five EFL college students from Oman consented to read words and sentences aloud with the different kinds of inflectional suffixes containing consonant clusters while audio-recorded. Results showed that the atomistic evaluation method offers an objective and particularly thorough assessment of the phonetic components involved. However, it takes a lot of time and requires repeated listening to samples for many students. Results also revealed that Omani EFL college students struggle to pronounce consonant clusters in inflectional suffixes.
- **Article 7 – 23rd SEAAIR Conference "Best Paper" Citation** of **Mateo Borbon, Jr., Jeffrie Atendido, Adlin Mae Dimasuay**, all from De La Salle-College of Saint Benilde, Manila, Philippines research project aims to utilize Python programming and machine learning algorithms to design a predictive model for assessing faculty effectiveness. The model considers various factors such as teaching effectiveness, course management, course materials, class openness, and course management. The study results demonstrate that Naive Bayes, Random Forest, and Decision Tree algorithms are particularly effective in predicting faculty performance based on the provided data. These findings promise to inform the development of strategies and policies that enhance faculty effectiveness and contribute to institutional excellence.
- **Article 8 – 23rd SEAAIR Conference "Outstanding Paper" Citation** of **Jay Somasundaram** of *Central Queensland University*, **Sahadev Somasundaram** *University of Queensland*, and **Mohammad G. Rasul** of *Central Queensland University* aims to build an ROI model to support educational policy in the first thousand days. It proposes a three-phase model: (1) rigorous adolescent teaching of emotional and social skills; (2) an "it takes a village to raise a child" strategy; and (3)a "parents as first teachers" strategy. We found that (1) Australian government agencies lack a coordinated strategy; (2) Education funding is primarily directed at supporting educational professionals and institutions rather than empowering and skilling families and communities. (3) More research on forgetting and loss of skill post-course completion is needed, and (4) Research into and awareness of complex systems can be fostered with easy-to-use systems dynamics software platforms. This research applies four powerful tactics for empowered educational research: (1) empowering individuals and communities; (2) education as operating in multi-disciplinary complex systems; (3) championing recent transformational discoveries; and (4) exploring the ROI of policies.
- **Article 9 – 23rd SEAAIR Conference "Outstanding Paper" Citation** of **Teresita E. Portugalete** of *the University of the Philippines Visayas* and **Abegail Panase** of *St. Therese MTC Colleges, Philippines,* aimed to develop, design, and

evaluate the developed e-module in advanced Swimming as a learning material for Physical Education classes utilizing the ADDIE model. The e-module was developed based on the course specifications and the acceptability ratings of students and key informants. Results revealed that the developed e-module has excellently met the standards. The parts were adequate, sufficient, and appropriate as learning material for the intended users and were fitted to help the students learn easily. It also served its purpose of catering to the maritime students' needs during the pandemic. Further research should be conducted on the effectiveness of e-modules on the practical performance of students in advanced Swimming.

JIRSEA Editor: Assoc. Prof. Teay Shawyun, Ph.D.

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Do External Activities Matter? Research Expectations and Social Service Contributions in Taiwan Academia

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ABSTRACT

Higher education institutions provide professional and cross-disciplinary contributions to solving real-world problems and improving institutional governance (Figueiró et al., 2022). This study adopts the Expectancy–Value Theory (EVT) to investigate the differences in and relationships among academics' research expectations, external activities, and social contributions in Taiwanese HEIs. It examines individuals' expectancy beliefs and the value they attach to their current activities or achievements on future tasks. The present study adopted *The Academic Profession in a Knowledge-Based Society* as a research instrument. Data were collected from Taiwanese HEIs in 2019, and 1,524 Taiwanese academics were enrolled. After questionnaires with incomplete data were excluded, 1,206 valid surveys were obtained, yielding an effective rate of 79.13%. The research provides three crucial findings: first, the research variables vary significantly across individual factors; second, academics' external activities mediate the relationship between individual research expectations and social contributions; and third, external activities significantly moderate the relationship between academics' research expectations and social contributions. The findings contribute to extant research on EVT by demonstrating the complex relationships between various dimensions of academic work environments. Furthermore, they provide a reference for enhancing institutional governance in HEIs.

Keywords: APIKS, Expectancy-Value Theory, External Activities, Research Expectations, Social Service Contributions

Introduction

Higher education institutions (HEIs) are places of social learning where individuals with distinct interests, expectations, values, goals, and constructions of reality congregate and create an environment for meaningful learning (Heffernan et al., 2018). HEIs and the academic profession have the potential to offer novel solutions to address worsening problems related to sustainability (Mok, 2015). The goal of HEIs - the pursuit of research and transmission of knowledge—is generalized and substantiated by each member of academia, and increasingly specialized methods are employed by HEIs to adapt to a diverse and evolving environment (Kwiek, 2017; Rawn & Fox, 2018).

Understanding the various aspects of the academic profession, including teaching, research, campus operation, outreach activities, and social contributions, is vital for ensuring effective institutional governance. Globally, higher education systems have undergone unprecedented transformations. The academic profession has changed regarding institutional governance and management models, teaching load, research intensity, participation in external activities, administrative service performance, and social contribution (Carvalho, 2017; Mudrak et al., 2018). Although HEIs worldwide have common origins and are primarily modern institutions focused on teaching, research, and public service, they exhibit different academic professional development patterns (Altbach, 2007).

In 2018, *university social responsibility* was promoted in Taiwan, enabling HEIs to become active contributors to social sustainability (Ministry of Education, 2018). This *university social responsibility* project guides HEIs in adopting a social-centered approach and addressing social requirements through five strategies: (a) promoting the integration of research expectations and external activities - HEIs link the outcomes of research by facilitating partnerships between public agencies and private businesses and promoting external activity cooperation, which accelerates the close relationships between HEIs research expectations with participation of external activities; (b) enhancing connections between external activities and social service contribution - encouraging academics to contribute to social service through the development of external activities on their localities; (c) strengthening connections between HEI research expectations and social service contribution - emphasizing the social value of collaboration between academia and industry which can upgrade the value of social service and enhance the research expectations of companies; (d) connecting the relationships among research expectations, external activities, and social service contribution - invigorating research networks for social sustainability by encouraging academics to engage in external activities for social service contribution; and (e) collaborating with other institutions abroad to expand research horizons - HEIs increase social engagement with international institutions and enhance global research cooperation and expectations. Moreover, this collaboration enables the promotion of high co-ownership of research expectations, the establishment of multiple participation in external activity models, and the promotion of social service contributions (Ministry of Science and Technology, 2014). In conclusion, this national project enhances the relevance of research expectations, academics' participation in external activities, and social service contributions to academia-industry collaborations (Ching, 2021; Wu, 2013).

Eccles et al. (1983) developed the Expectancy–Value Theory (EVT) of achievement motivation, which provides a framework for understanding how individuals' self-expectations affect their value of task activity participation and social service achievements. According to past studies, numerous

psychologists have posited that individuals' expectations and task values are essential in understanding their motivation for participating in various activities and social service contributions based on EVT theory (Demb & Wade, 2012; Song, 2018; Vargiu, 2014). Demb and Wade (2012) asserted that academic participation in external outreach activities is required to promote their research expectations and contributions to society. Song (2018) stated that HEIs' higher research expectations for academics increase their efforts to obtain research projects and the time spent on external activities. Vargiu (2014) contended that higher individual academic research expectations might promote academics' contributions to social service through either socially oriented-or commercially oriented external activities. The above studies show that academics' participation in external activities may affect individual or institutional research expectations and social service contributions. To further examine the EVT theory, the main goal of this study is to explore the relationships among academics' research expectations, external activities, and social service contributions in Taiwan HEIs.

Literature review

Diversity in Higher Education on Academic Profession

A study on critical trends in higher education research identified "diversity" as one of the most persistent topics over five decades (Brennan et al., 2008). "Diversification" refers to a desirable or inadvertent trend that emerged in response to the "explosion" of systematic knowledge and the goals of institutional governance. Policies related to higher education may induce moderate or significant growth in diversity (Teichler, 2010). Geschwind and Broström (2015) asserted that research-oriented professors receive more funds from external sources, conduct more interdisciplinary research, and make more academic contributions to industry-academia collaboration than teaching-oriented professors. Zacher et al. (2011) contended that relative to senior academics, junior academics may spend more time on research, teaching, and service in pursuit of promotions. Studies have revealed that female professors are more devoted to social contributions than their male counterparts (Hicks, 2015; Settles et al., 2022). However, other studies have revealed that male academics generally hold important positions in HEIs, leading to more opportunities for their participation in external activities, such as public lectures and speeches, executive roles, contract-tailored programs and courses, and external boards and committees (e.g., expert councils, boards of directors, and boards of trustees) (Fisher & Kinsey, 2014; O'Connor & Irvine, 2020). Another study argued that private HEIs feature more industry-academia collaborations and commercially oriented research expectations for academics for providing external resources relative to public HEIs (Khalid et al., 2012).

To conclude, the above findings indicate the diversity of the academic profession in HEIs. To understand the diversity of Taiwanese academics in HEIs, the study compares personal and institutional norms with various background factors (e.g., academic rank, academic field, institution type, academic preference, gender, and age). By comparing differences in academics' research expectations, external activities, and social contributions attributed to certain individual factors, this study further examined the diversity of academic professions in Taiwanese HEIs.

Expectancy-Value Theory (EVT) in Academic Profession

Over the past century, numerous psychologists have posited that individuals' expectations and task values are critical in understanding their motivation for performing various activities (Higgins, 2007; Meyer, 2016; Rokeach, 1973). Meyer (2016) highlighted that individuals with high self-expectations have higher task values and participation in social activities. Both expectations and task values are stable factors that influence various beliefs, attitudes, norms, intentions, and behaviors of individuals and institutions within society (Higgins, 2007; Rokeach, 1973). Eccles and colleagues (1983) developed the EVT of achievement motivation, which provides a framework for understanding how individuals' self-perceptions, others' perceptions, and aspects of their learning environment affect their task choices, aspirations, and achievement.

The EVT defines expectations for success as individuals' beliefs about how well they will complete future tasks. Furthermore, task value comprises three components in the EVT: intrinsic value, attainment value, and utility value (Eccles, 2007; Eccles et al., 1983; Wigfield et al., 2016). Intrinsic value represents the extent to which an individual enjoys completing a task or the consequences of completing a task. Attainment value denotes the extent to which an individual views a task as personally meaningful or important. Utility value refers to the extent to which an individual believes a task will help achieve current or future goals.

Several studies have applied the EVT theory to investigate individuals' self-expectancy and work value (Bong et al., 2014; Dorenkamp & Ruhle, 2019; Wigfield et al., 2015). Bong et al. (2014) reported that individuals' research expectations of success can significantly improve their work motivations and external activity participation. Wigfield et al. (2015) found that individuals with a high passion for external activities may be more active in social service contributions. Dorenkamp and Ruhle (2019) further pointed out that individuals' high research expectations of success play a crucial role in adopting social-oriented contributions that may be significantly moderated and mediated by their work value of external activities.

The EVT theory is a framework for exploring the relationships between individuals' research expectations, work-related motivational beliefs, and social contribution behavior. Thus, the present study extends relevant studies by adopting the EVT theory to explore the relationships among Taiwanese academics' research expectations, external activities, and social service contributions in HEIs.

Current Study

This study examined diversity in the academic profession in terms of how academics in Taiwanese HEIs perceive their workplaces and how these perceptions affect their achievement performance. We explored these effects using the EVT framework, a well-established model of organizational behavior (Eccles et al., 1983), to analyze the relationships among academics' research expectations, external activities, and social contributions. It provides insights that enrich the extant literature focusing on Taiwanese HEIs. First, previous studies indicated the diversity of the academic profession in HEIs (Geschwind & Broström, 2015; O'Connor & Irvine, 2020; Settles et al., 2022; Zacher et al., 2011). Thus, the study would further explore the diversity within the academics in Taiwan by analyzing the differences in their research expectations, external activities, and social service contributions

attributed to certain individual factors. Second, Demb and Wade (2012) pointed out that academics' external activity participation can help them promote their research expectations and have more opportunities for social service contributions. Thus, this study would implement path analysis based on the EVT theory to examine the mediating role of external activities in the relationship between academics' research expectations and social service contributions. Third, Dorenkamp and Ruhle (2019) pointed out that individuals' research expectations play an important role in adopting social-oriented contributions that their work value of external activities may significantly moderate. Thus, the study would extend the previous studies to investigate the moderating effects of external activities on different dimensions of academics' research expectations and social service contributions by employing multiple hierarchical regression. Based on the EVT and the literature review, we empirically evaluated the following hypotheses in a large sample of Taiwanese academics in HEIs.

H1: Academics differ significantly in terms of their research expectations, institutional research expectations, external activities, and social contributions, and these differences are contingent on various individual factors (i.e., academic rank, academic field, institution type, academic preference, gender, and age).

H2: Academics' external activities mediate the relationships among individual research expectations, institutional research expectations, and social contributions.

H3: Academics' external activities moderate the relationships among individual research expectations, institutional research expectations, and social contributions.

Methodology

Data Collection

The current study's participants were full-time academics employed at Taiwanese HEIs. Potential participants were contacted by email and provided relevant information about the research. The purpose of the survey was explained in the opening remarks, and the confidentiality of respondents was guaranteed.

This study used data from *The Academic Profession in Knowledge-Based Society* (APIKS), an international comparative survey conducted in more than 30 countries. The survey covers six themes related to the academic profession: career and professional situations, general situations and activities, teaching, research, external activities, and governance and management. In addition, it includes the experiences of academics in formative career stages (APIKS-IDB, 2021). The analytical variables used in this study were extracted from APIKS, namely, six questions on the respondents' background (i.e., academic rank, academic field, institution type, academic preference, gender, and age), four items on individual research expectations, three items on institutional research expectations, eighteen items on participation in external activities, and four items on social contributions.

Data were collected through a paper survey that was distributed in 2019. Samples with missing values were excluded from the analysis, resulting in 1,206 cases used for analysis. As presented in Table 1, more than 75% of the respondents were associate professors (35.8%) or assistant professors (39.6%); 48.4% were social science academics, and 51.6% were natural science academics. Most of the

respondents were from public HEIs (62.1%), and the sample included more teaching-oriented academics (61.4%) than research-oriented academics (38.6%). Male respondents (64.8%) outnumbered female respondents (35.2%). In addition, to analyze the differences in academic performance by age, this study divided the survey respondents into three categories: middle-aged (<50 years; 35.1%), senior (50–60 years; 46.9%), and golden-aged (>60 years; 18.0%). We compared the demographic distribution of the survey sample with that of the general population to verify its representativeness. The results indicated that the survey respondents were relatively representative of the general population regarding their factors.

Table 1: Demographic characteristics of participants (*N* = 1,206)

Individual Factors	Demographics	Frequency	Percentage (%)
Academic rank	Professor	259	21.5
	Associate Professor	432	35.8
	Assistant Professor	478	39.6
	Others	37	3.1
Academic field	Social science	584	48.4
	Natural science	622	51.6
Institutional type	Private HEIs	456	37.9
	Public HEIs	750	62.1
Academic preference	Teaching-oriented	741	61.4
	Research-oriented	465	38.6
Gender	Male	781	64.8
	Female	425	35.2
Age	Middle (under 50 years old)	422	35.1
	Senior (50-60 years old)	567	46.9
	Golden (above 60 years old)	217	18.0
Total		1,206	100

Variables and Measures

This study examined the four critical variables of academics' research expectations, institutional research expectations, external activities, and social contributions. To examine the content validity of the constructs, this study recruited a total of 12 experts to determine whether each item was "essential," "useful but not necessary," or "not necessary" for accurately measuring the constructs (Cohen & Swerdlik, 2010). The experts were six field experts specializing in higher education and six professional experts highly proficient in psychology and educational variable measurement. The content validity ratios (CVRs) of each item were determined. Each CVR is expressed as the ratio of experts stating that an item is required to the total number of experts consulted (Lawshe, 1975). Moreover, the CVR can determine which items to retain and which to remove, thereby improving the scale's validity (Gilbert & Prion, 2016).

As presented in Table 2, academics' research expectations were measured using the question, "How would you characterize the emphasis of your primary research in the past two academic years?". The items were scored on a Likert scale ranging from 1 to 5, and each item separately assessed academics' basic, applied, commercially oriented, and socially oriented individual research expectations. The CVR values of four individual research expectation items met the minimum standard CVR value of 0.56. Next, institutional research expectations were measured using the question, "To what extent do you consider yourself to be exposed to the following expectation by your institution?". The items

were scored on a Likert scale ranging from 1 to 5, and each item separately assessed the effects of institutional research expectations on academics' external funds, applied research, and industry-academia collaboration. The CVR values of all three items met the minimum standard CVR value of 0.56. Academics' external activities were measured using the question "In the past three years, have you been involved in any of the following activities with external partners (e.g., industry, government, museum, or school)?". The survey included 18 optional items, and the scores were calculated by summing the number of items the respondents selected. The CVR values of the items were at least 0.67, meeting the content validity criteria. Finally, academics' social contributions were measured using the question, "To what extent do your external activities contribute to the following items?". The items were scored on a Likert scale ranging from 1 to 5, and each item separately assessed academics' contributions to the local community, industry, society at the national level, and society at the international level. The CVR values of all four items met the criteria for good content validity. In conclusion, the CVR values of all items met the minimum standard CVR value, indicating good content validity, and these items were retained in the final survey.

Analytical Model and Data Analysis

We employed three research frameworks to examine our hypotheses. First, descriptive statistics were used to analyze the data and develop the research model. The background factors were compared (Figure 1). Independent *t*-tests and analysis of variance (ANOVA) were implemented to compare the differences in academics' research expectations, external activities, and social contributions stratified by certain individual factors.

Second, structural equation modeling (SEM) was implemented to test the EVT framework, examine the research variables' relationships, and investigate the mediating effect of external activities on the relationship between academics' research expectations and social contributions (Figure 2). In the SEM model, no missing values or outliers were detected, and all reported coefficients from our analyses were standardized.

Moreover, multiple hierarchical regression was implemented to test the EVT framework and to verify the relationships among each item for the four variables (Figure 3). This analysis also examined the potential moderating effect of external activities on the relationship between research expectations and social contributions. Before the regression analysis was implemented, this study cross-checked the multicollinearity among the independent variables, and the variance inflation factor of the independent variables was less than 10.

Table 2: Variables, items, measurement, and CVR value of the survey

Variables	Items	Measurement	n_e	*N*	CVR
Individual Research Expectation	How would you characterize the emphasis of your primary research in the past two academic years?	5 Point Likert scale (1= strongly disagree to 5= strongly agree)	10	12	0.67
	1. Basic/theoretical		10	12	0.67
	2. Applied/practically-oriented		11	12	0.83
	3. Commercially oriented/intended for technology transfer		11	12	0.83
	4. Socially oriented/intended for the betterment of society				
Institutional Research Expectation	To what extent do you consider yourself to be exposed to the following expectations by your institution?	5 Point Likert scale	10	12	0.67
	1. Raising substantial amounts of external funds		11	12	0.83
	2. Conducting applied (and possibly commercially oriented) research		11	12	0.83
	3. Being active in carrying the research results beyond typical publications (technology transfer, dissemination in various media, etc.)				
External Activities	In the past three years, have you been involved in the following activities with external partners (e.g., industry, government, museums, and schools)?	Sum of the chosen items (18 items in total)	10	12	0.67
Social Service Contribution	To what extent do your external activities contribute to the following items	5 Point Likert scale	11	12	0.83
	1. The local/regional community		11	12	0.83
	2. Industry		10	12	0.67
	3. Society at the national level		10	12	0.67
	4. Society at the international level				

Note: n_e: number of experts who indicated 'essential'; *N*: number of experts; content validity ratio (CVR) = $(n_e - N/2) / (N/2)$; for 12 experts, the estimated CVR value of each accepted item must exceed 0.56 (Lawshe, 1975)

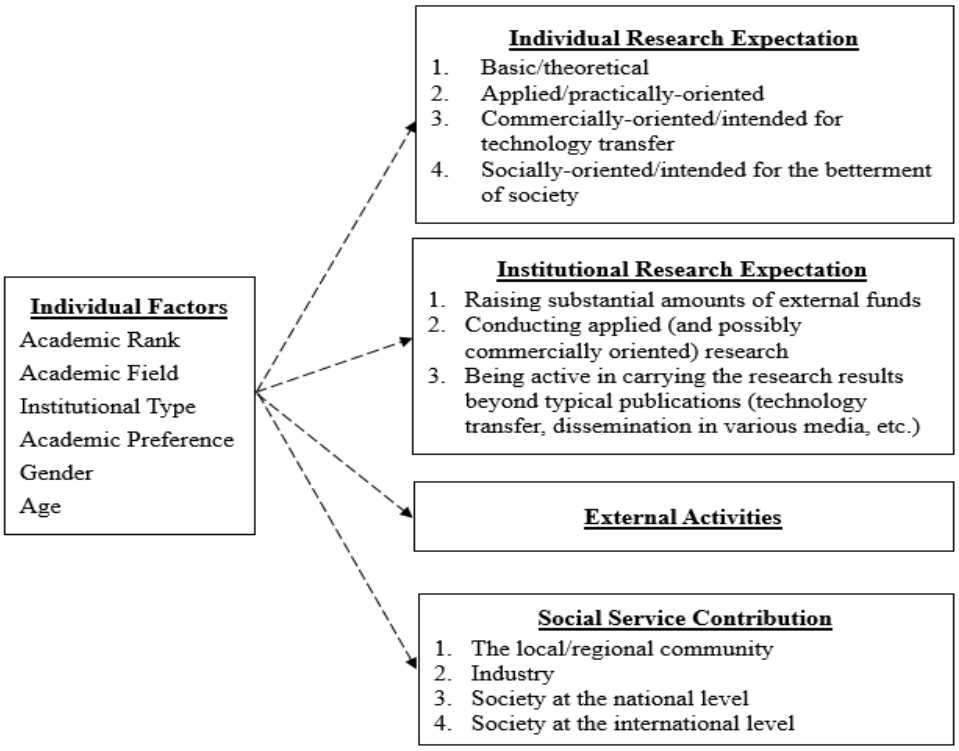

Figure 1: Research framework for research hypothesis 1

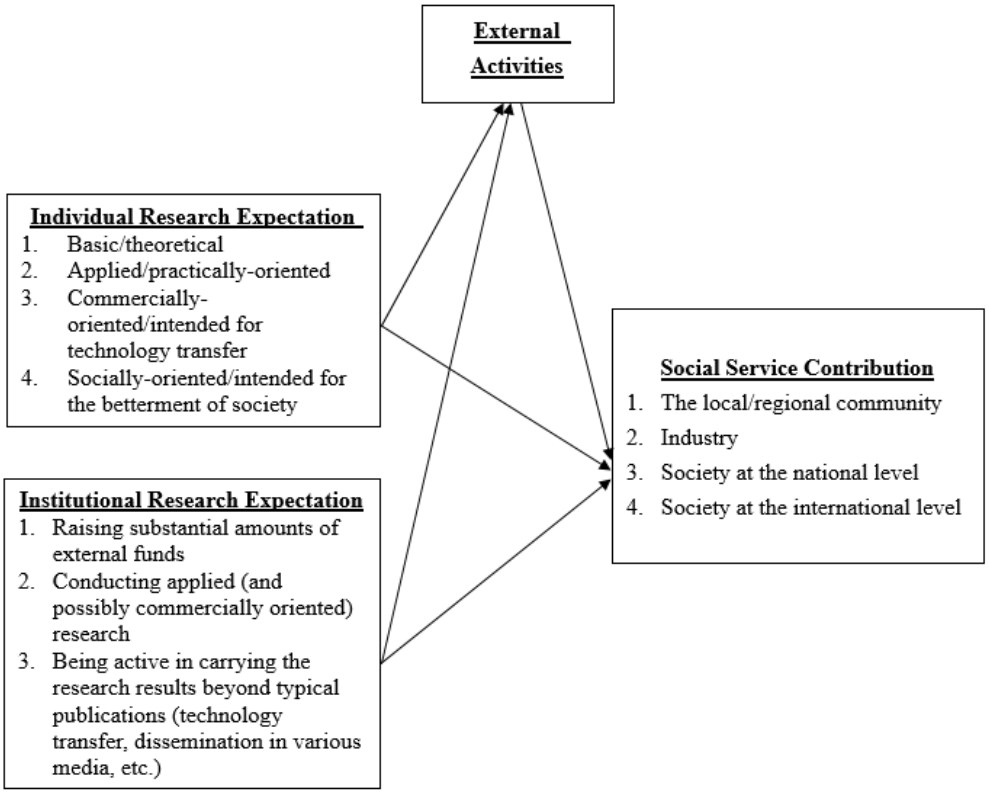

Figure 2: Research framework for research hypothesis 2

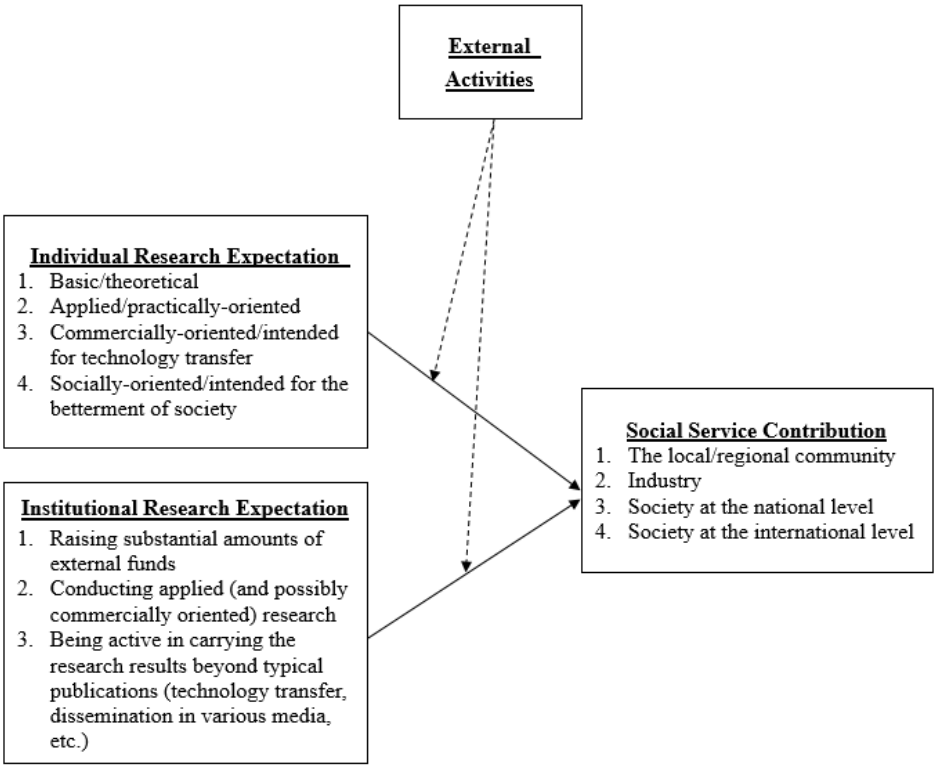

Figure 3: Research framework for research hypothesis 3

Results

Difference Analysis of Individual Factors

This study implemented independent *t*-tests and ANOVA to analyze the differences in six individual factors concerning academics' research expectations, institutional research expectations, external activities, and social contributions (Appendix 1). First, the results for academic rank indicated that professors have higher scores for external activities than assistant professors and other academics (F = 9.884, p < .001). Second, the results for the academic field indicated that Taiwanese social science academics generally have higher socially oriented individual research expectations (t = 6.216, p < .001) and that they are more motivated than natural science academics to provide local or regional social contributions (t = 2.374, p = .018). However, Taiwanese natural science academics may be more active in disseminating research results beyond typical publications, such as for technology transfer, than social science academics (t = −3.463, p = .001). Third, the results for institution type indicated that Taiwanese academics in private HEIs are more active in technology transfer (t = 2.918, p = .004) and participation in industry-oriented social contributions (t = −2.032, p = .042) than Taiwanese academics in public HEIs. Fourth, the results for academic preference revealed that research-oriented academics have higher applied individual research expectations (t = −3.037, p = .002) and greater willingness to engage in international social contributions (t = −5.517, p < .001) than teaching-oriented academics. Fifth, the results for gender revealed that male academics are more motivated to engage in technology transfer related to individual research expectations (t = 2.371, p = .018) and industry-oriented social contributions (t = 2.141, p = .032)

than female academics. The results for age revealed that middle-aged academics have higher expectations for engaging in applied research, such as technology transfer ($F = 3.077$, $p = .047$), and for participating in international social contributions ($F = 5.180$, $p = .006$). Furthermore, golden-aged academics may possess more substantial social influence, more academic experience, and greater socially oriented individual research expectations ($F = 4.211$, $p = .015$) than middle-aged academics.

SEM Analysis

This study first examined the variables' reliability and validity to ensure the models' interpretability. The reliability of all variables was greater than 0.7, indicating good internal consistency (Table 3). Two validity indicators (i.e., convergent validity and discriminant validity) were examined to verify the validity of the models (Hair et al., 2010). First, in this study, confirmatory factor analysis was implemented to evaluate convergence validity: (a) the values of the average variance extracted (AVE) ranged from 0.53 to 0.66, exceeding the minimum threshold of 0.5 (Fornell & Larcker, 1981), and (b) the values of composite reliability (CR) ranged from 0.71 to 0.80, exceeding the threshold of 0.6 (Bogozzi & Yi, 1988). Therefore, the variables in the model had good convergent validity. Next, discriminant validity was evaluated based on the square root of the AVE. As presented in Table 3, the values of the square root of the AVE were 0.77, 0.73, 0.81, and 0.77, and all values were larger than the absolute value of the correlation coefficient between that variable and other variables, meeting the discriminant validity criterion (Fornell & Larcker, 1981).

To assess the fit of the structural model, this study employed several model fit criteria: a root mean square error of approximation (RMSEA) less than 0.08, a standardized root mean square residual (SRMR) less than 0.06, and goodness-of-fit index (GFI) and comparative fit index (CFI) values greater than 0.90 (Hu & Bentler, 1999). All the model fit criteria were satisfied (GFI = 0.99, CFI = 0.92, RMSEA = 0.08, SRMR = 0.04); therefore, the theoretical model could be employed to examine the relationships among academics' research expectations, institutional research expectations, external activities, and social contributions.

The results of SEM analysis (Figure 4) revealed that academics' research expectations positively and significantly influence their external activities ($\beta = .21^{***}$); academics' external activities positively and significantly influence their social contributions ($\beta = .22^{***}$); and academics' research expectations positively and significantly influence their social contributions (direct effect: $\beta = .22^{***}$; indirect effect: $\beta = .10^{**}$). However, the results indicate that institutional research expectations do not significantly influence external activities ($\beta = .05$) or social contributions ($\beta = .06$). In conclusion, this study demonstrated that academics' participation in external activities mediates the relationship between individual research expectations and social contributions but does not mediate the relationship between institutional research expectations and social contributions.

Table 3: Descriptive statistics and Pearson's correlation matrix of the variables

	1	2	3	4
Individual research expectation	0.77			
Institutional research expectation	0.13**	0.73		
External activities	0.21**	0.08**	0.81	
Social Service Contribution	0.28**	0.15**	0.28**	0.77
Mean	3.14	2.96	4.94	3.26
SD	2.71	2.27	2.26	2.82
AVE	0.60	0.53	0.66	0.59
CR	0.76	0.71	0.80	0.78

Note: ** $p < .01$; coefficients on diagonal lines indicate the root of AVE of each variable

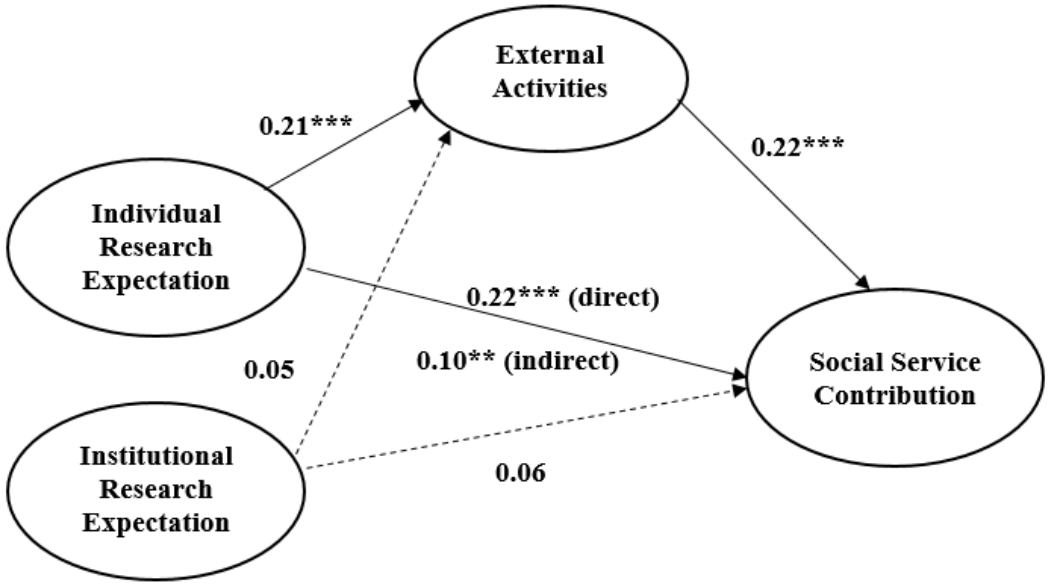

Figure 4: Structural equation modeling with standardized coefficients of the structural model

Multiple Hierarchical Regression Analysis

This study implemented multiple hierarchical regression models to examine the moderating effects of external activities on the relationships between (each item of) individual research expectations or (each item of) institutional research expectations and (each item of) social contributions. As presented in Table 4, the complete set of predictors (i.e., main effects of control variables and independent variables as well as interaction effects) explained 12.2% of the variability in *local or regional social contributions*, 35.9% of the variability in *industry-level social contributions*, 25.6% of the variability in *national social contributions*, and 24.5% of the variability in *international social contributions*. These regressions revealed that external activities significantly moderate the relationship between academics' socially oriented individual research expectations and local or regional social contributions ($\beta = .289$, $p < .05$) and the relationship between academics' commercially oriented individual research expectations and industry-level social contributions ($\beta = .232$, $p < .05$).

As provided in Table 5, the complete set of predictors (i.e., main effects of control variables and independent variables as well as interaction effects) explained 30.0% of the variability in *local or*

regional social contributions, 27.7% of the variability in *industry-level social contributions*, 22.7% of the variability in *national social contributions*, and 23.6% of the variability in *international social contributions*. The results revealed that external activities significantly moderate the relationship between institutional research expectations related to disseminating research results beyond typical publications and industry-level social contributions ($\beta = .287$, $p < .05$).

Table 4: Multiple hierarchical regression analysis for the moderating effect of external activities on the relationships between individual research expectation and social service contribution

	local/regional community	**industry**	**society at the national level**	**society at the international level**
Control variables				
academic rank	.020	-.024	.021	-.009
academic field	-.008	.067*	.002	-.010
institutional type	-.037	-.066*	.045	.017
academic preference	-.032	-.037	.052	.167***
gender	.083**	-.013	.033	.035
age	-.033	.010	-.005	-.055
Independent variables				
basic/theoretical	.081	.104	.102	.021
applied/practically-oriented	-.009	.076	.141	.049
commercially oriented/intended for technology transfer	-.059	-.011	-.103	.135
socially-oriented/intended for the betterment of society	.005	.104	.012	.080
external activities	-.105	-.124	.248	.206
Interaction variables				
basic/theoretical*external activities	-.009	.004	-.100	-.014
applied/practically-oriented* external activities	.101	.158	-.238	-.095
commercially-oriented/intended for technology transfer*external activities	.088	.232*	.122	-.045
socially-oriented/intended for the betterment of society*external activities	.289*	.001	.174	-.058
F value	8.410***	8.972***	4.271***	3.895***
R^2	.122	.359	.256	.245

Note: *$p < .05$, **$p < .01$, ***$p < .001$

Table 5: Multiple hierarchical regression analysis for the moderating effect of external activities on the relationships between institutional research expectation and social service contribution

	local/regional community	industry	society at the national level	society at the international level
Control variables				
academic rank	.026	-.020	.028	.003
academic field	-.074*	.023	-.034	-.027
institutional type	-.029	-.066*	.049	.016
academic preference	-.024	-.018	.053	.171***
gender	.053	-.050	.017	.029
age	-.021	.011	.005	-.042
Independent variables				
raising substantial amounts of external funds	-.005	.003	-.021	.116
conducting applied research	-.036	.004	.100	.093
being active in carrying the research results beyond typical publications	.052	-.045	.043	.135
external activities	.047	-.060	.185	.289*
Interaction variables				
raising substantial amounts of external funds*external activities	.062	.026	.064	-.107
conducting applied research* external activities	.075	.045	-.069	-.058
being active in carrying the research results beyond typical publications* external activities	.132	.287*	.009	-.144
F value	6.967***	5.824***	3.835***	4.134***
R^2	.300	.277	.227	.236

Note: *$p < .05$, ***$p < .001$

Discussion

Understanding Academic Profession Diversity in Taiwan HEIs

This study first compared the differences in academics' research expectations, external activities, and social contributions attributed to certain individual factors for analyzing the diversity within the academic profession in Taiwanese HEIs. These findings provide insights into the differences in Taiwanese academic professional development patterns attributed to individual factors. Six findings from this investigation are noteworthy and contribute to the extant higher education literature. First, regarding academic rank, studies have asserted that junior academics such as assistant professors generally dedicate more effort to teaching, research, and service than senior academics for several reasons: (a) to acquire more work and social experiences; (b) to enhance the visibility and reputation

of their university; (c) to express their high job enthusiasm and self-expectations; (d) to obtain more resources and funding for research; (e) to establish connections and interpersonal interactions; and (f) to attain academic promotions (Bentley & Kyvik, 2013; Esdar et al., 2016; Mishra & Smyth, 2013). The Taiwanese government is actively promoting university social responsibility, and our findings indicate that Taiwanese professors who may possess more educational resources and experience in academic endeavors participate in more external activities than assistant professors and other academics.

Second, our results comparing academic fields align with those of Datu et al. (2017), revealing that social science academics are generally more motivated to participate in socially oriented activities. Moreover, Taiwanese social science academics may be more willing to contribute to local or regional society than natural science academics. By contrast, Taiwanese natural science academics are more active in leveraging their research results beyond typical publications, for example, for technology transfer and dissemination through various media channels, than social science academics.

Third, our results for institution type are consistent with those of Khalid et al. (2012), revealing that private HEIs in Taiwan are more active in technology transfer and industry-academia collaboration to obtain more research funds and external resources than public HEIs. Studies have described that an increasing number of private HEIs in Taiwan have established policies that encourage academics to apply for more industry-academia collaboration projects, and private HEIs even use these projects as evaluation indicators for promotion.

Fourth, concerning academic preference, most HEIs in Taiwan value academics' research performance and have higher research expectations for these academics. These HEIs actively form international research collaborations to enhance their global reputation and ranking. Thus, research-oriented academics generally have higher applied individual research expectations and higher willingness to engage in international-level social contributions than teaching-oriented academics. This finding aligns with those of Geschwind and Broström (2015) and provides further insights into academic preferences in professional development in Taiwan.

Fifth, in contrast to the results of a relevant study (Hicks, 2015), which contended that female professors are often more devoted to social contributions than male professors, our results indicated that male academics have higher commercially oriented individual research expectations and industry-level contributions than female academics, which cultural differences may influence. First, because of traditional Chinese social expectations, male students tend to major in science, technology, engineering, and mathematics (STEM). In contrast, female students tend to major in social sciences, humanities, and the arts. Although the gender gap in STEM is shrinking in Taiwan, previous results indicate that most men still choose STEM, whereas women tend to choose fields such as education, social services, language, and the arts (Chang & Chang Tzeng, 2020; Hsieh, 2019). Second, male academics generally hold essential positions in HEIs and have more opportunities to participate in external activities that strengthen their research expectations and enhance their motivation to engage in social contributions (O'Connor & Irvine, 2020). Therefore, our findings revealed that male academics are more motivated to participate in industry-academia collaboration, technology transfer research, and industry-level service contributions than female academics.

Lastly, this study examined the differences in academic performance by age. The results revealed that age was not a significant factor. In recent years, an increasing proportion of the working population has delayed retirement because of Taiwanese pension reform and the increased retirement age. To analyze the differences between academic age groups, this study categorized the participants into middle-aged (<50 years), senior-aged (50–60 years), and golden-aged (>60 years) groups. Consistent with the findings of Zacher et al. (2011), our findings indicated that middle-aged academics generally have higher engagement in applied research and higher participation in international-level social contributions. The findings revealed that golden-aged academics may possess more social influence and academic experience and have higher socially oriented individual research expectations than middle-aged academics.

The effect of external activities on the relationship between research expectations and social service contributions

This study examined the relationship among the research variables by the EVT. It analyzed the mediating and moderating effects of external activities on the relationship between Taiwanese academics' research expectations and social contributions. Our results prove EVT dynamics among Taiwanese academics' research expectations, external activities, and social contributions. First, the results revealed that academics' research expectations significantly influence their external activities. Therefore, like the findings of Meyer (2016), our findings imply that academics with higher self-expectations for their research performance may participate more in external activities. That study asserted that individuals with higher self-expectations possess higher task values and participate more in social activities. Second, similar to the results of Demb and Wade (2012), our results indicate that academics' external activities can significantly predict their social contributions. The Taiwanese government's promotion of university social responsibility provides academics more opportunities to engage in various external activities. These activities enable them to explore new avenues, establish meaningful connections with the community, and contribute their expertise and knowledge to local networks and regional development. Third, the findings of this study align with those of Wigfield et al. (2015). That study contended that individuals' high expectations of success play a crucial role in the adoption of approach-oriented mastery goals and performance goals. In addition, these findings indicate the mediating effect of academics' participation in external activities, which influences their research expectations and social contributions. Our study revealed that Taiwanese academics with higher research self-expectations seek more opportunities to engage in diverse external activities to implement research projects, effectively contribute to society, and enhance industry-academia collaboration and sustainable academic research development. Lastly, this study revealed that academics' participation in external activities plays a crucial mediating role, especially in the relationship between individual research expectations and social contributions, but not in the relationship between institutional research expectations and social contributions. The results indicate that Taiwan's teaching and research policies encourage academics to use individual competition-based funding to enhance their teaching practice research and fulfill their social responsibilities. Academics with higher individual research expectations may be more willing to participate in external activities, influencing their intention to contribute to society.

Furthermore, the present study found that external activities can moderate the relationship between academics' research expectations and social contributions. According to the EVT, individuals' beliefs about how well they perform tasks substantially affect their future achievement performance

through the level of involvement in external activities (Dorenkamp & Ruhle, 2019; Higgins, 2007). The current study provides insights into the moderating effects of participation in external activities on the relationships between the following: (a) socially oriented individual research expectations and local or regional social contributions - when academics have higher socially oriented individual research expectations, they may have a higher willingness to contribute to the local or regional community through socially oriented external activities; (b) commercially oriented individual research expectations and industry-level social contributions - when academics have higher commercially oriented individual research expectations, they may be more motivated to participate in industry-level social contributions through their engagement in industry-oriented external activities; and (c) institutional research expectations for the dissemination of research results beyond typical publications and industry-level social contributions - when HEIs have higher research expectations that academics leverage their research results beyond typical publications (e.g., technology transfer), academics provide industry-level social contributions through their participation in industry-oriented external activities. Therefore, we recommend that HEIs assist academics in identifying their suitable research domains and determining whether they are socially or commercially oriented. Besides, HEIs should help academics obtain external educational resources and research project grants, enabling them to engage in socially oriented services and industry-academia collaboration. Such measures can promote more complete and diversified institutional governance and the development of high-quality higher education.

When a country provides research support, the societal demand for new knowledge and technology grows exponentially. Research-focused HEIs, which emerged in the mid-1990s and have gained prominence since the introduction of global education rankings in the 2000s, are at the core of research systems and have reshaped the landscape of national higher education systems (Altbach, 2009). These initiatives were initially implemented primarily in East Asia, including Taiwan, and were driven by their rapidly developing national economies and accompanying demands for new knowledge and technology. Therefore, this study recommends that each HEI identify its function and position to establish sustainable development strategies. HEIs should emphasize research publications, socially oriented activities, and industry-academia collaboration to encourage engagement in local, regional, and industry-level social contributions. These measures can promote the development of sustainable institutional governance and high-quality higher education.

Importance of Findings and Implications

The EVT successfully explains the relationships among academics' research expectations, external activities, and social contributions in Taiwanese HEIs. First, the findings indicate that academics' research expectations and external activities significantly foster their social contributions, accounting for 27% of the variance in the mediation results. Participation in external activities substantially affects academics' research expectations and social contributions. Thus, HEIs should provide increased support and encouragement to academics in pursuing research projects and funding, fostering stronger connections with local communities and industries. When academics engage in more external activities, they can broaden their perspectives and raise their research expectations, which enhances their motivation to contribute to social communities.

Second, analyzing the moderation effects of external activities also provides valuable insights into predicting the effects of academics' individual and institutional research expectations on social

contributions. Greater participation in external activities strengthens the positive relationship between socially oriented individual research expectations and local or regional social contributions. In addition, greater participation in external activities strengthens the positive relationship between commercially oriented individual research expectations, institutional research expectations related to disseminating research results beyond typical publications, and industry-level social contributions. The following suggestions merit consideration: (a) HEIs should provide additional support and financial subsidies to academics with lower participation in external activities to help them identify suitable research programs and strengthen their self-expectations of task value concerning their achievement performance; (b) HEIs should implement appropriate research reward policies to promote academics' willingness to participate in more external activities, which only enhances their self-confidence in their academic performance but also leads them to share their knowledge with local communities and industries; and (c) experienced academics can invite younger academics to join their research team, guide them when applying for or implementing research projects, and encourage them to engage in external activities that may influence their task value and motivation to contribute to society.

Moreover, this study found considerable diversity within the academic profession in Taiwanese HEIs. Therefore, HEIs must strive to understand academics' expectations and task values and provide practical support to promote their participation in external activities and social contributions. HEIs should implement initiatives to encourage all education partners to adopt sustainable behaviors to achieve the shared social vision of a more sustainable future. Crucially, HEIs must proactively encourage academics to develop individual task-oriented achievement performance, especially by participating in more socially oriented or industry-oriented external activities and establishing social service contributions.

This study provides valuable insights into the differences and relationships among academics' research expectations, external activities, and social contributions. The findings can be used as a reference for promoting better institutional management and sustainable development in HEIs, focusing on fostering the teaching-research nexus, university social responsibility, and academia-industry collaboration.

Limitations and Future Directions

This study has several limitations. One limitation involves using self-reported data for both the outcomes and predictors. Although using self-reported data is a common approach in research, it can be influenced by factors such as social desirability and approval bias (Althubaiti, 2016). Similar challenges arise from using retrospective data as a proxy for actual experiences because such data can lead to underestimation or overestimation of the actual effect or association (Mueller & Gaus, 2015). Another limitation is the generalizability of findings. Although data were collected in Taiwan and the findings can be considered reliable in this study, the generalizability of the findings to other parts of Taiwan or other countries may be limited.

Nevertheless, these findings provide a valuable and reasonable baseline for understanding the differences and relationships among Taiwanese academics' research expectations, external activities, and social contributions. Future international comparative studies should employ

longitudinal quantitative data to examine diversity in the academic profession and to assess how academics' external activities influence their research expectations and social contributions.

Conclusions

This study provides three noteworthy contributions. First, it provides a more comprehensive understanding of diversity within the Taiwanese academic profession, especially for research expectations, external activities, and social contributions across various individual factors (e.g., academic rank, academic field, academic preference, institution type, gender, and age). Second, we employ the EVT to explain how academics' participation in external activities mediates the relationship between their research expectations and social contributions. Lastly, our research contributes to the extant literature on EVT by revealing that academics' participation in external activities considerably influences their research expectations and social contributions. Thus, this study recommends that each HEI identify its unique position for implementing sustainable institutional management and assisting academics in socially-oriented or industry-oriented external activities. These findings provide valuable insights into the extant model of EVT and reveal the differences and relationships among academics' research expectations, external activities, and social contributions. The results of this study can be employed as an evidence-based reference by HEIs to foster the development of high-quality higher education.

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Appendix 1

Effects of differences in academics' research expectations, institutional research expectations, external activities, and social contributions attributed to certain individual factors

Individual factors	Dependent Variable (Outcomes)			
	Individual Research Expectations	**Institutional Research Expectations**	**External Activities**	**Social Service Contributions**
Academic Rank	No significance	No significance	Professor (*M*= 5.47, *SE*=2.52) > Assistant Professor (*M*= 4.85, *SE*=2.21) > Others (*M*= 3.62, *SE*=1.53) 〔*F*= 9.884, *p* < .001〕	No significance
Academic Field	**【Socially-oriented/intended for the betterment of society】** social science (*M*= 3.13, *SE*=1.21) > natural science (*M*= 2.68, *SE*=1.26) 〔*t*= 6.216, *p* < .001〕	**【Being active in carrying the research results beyond typical publications】** natural science (*M*= 3.65, *SE*=1.00) > social science (*M*= 3.44, *SE*=1.09) 〔*t*= 3.463, *p* = .001〕	No significance	**【The local/regional community】** social science (*M*= 3.35, *SE*=1.24) > natural science (*M*= 3.19, *SE*=1.13) 〔*t*= 2.374, *p* = .018〕
Institutional Type	No significance	**【Being active in carrying the research results beyond typical publications】** private (*M*= 3.66, *SE*=0.98) > public (*M*= 3.48, *SE*=1.08) 〔*t*= 2.918, *p* = .004〕	No significance	**【Industry】** private (*M*= 3.32, *SE*=1.19) > public (*M*= 3.17, *SE*=1.24) 〔*t*= 2.032, *p* = .042〕
Academic Preference	**【Applied/practically-oriented】** research-oriented (*M*= 4.06, *SE*=1.03) > teaching-oriented (*M*= 3.87, *SE*=1.16) 〔*t*= 3.037, *p* = .002〕	No significance	No significance	**【Society at the international level】** research-oriented (*M*= 3.05, *SE*=1.14) > teaching-oriented (*M*= 2.68, *SE*=1.10) 〔*t*= 5.517, *p* < .001〕

Moral Education for International Students: Institutional Insight from China

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ABSTRACT

Institutional research provides objective, systematic, and thorough research for university administrative offices to make educational plans and decisions. As an indispensable part of higher education in China, international students play an essential role in national diplomacy and cultural exchanges. As such, moral education has become an integral component for international students, which helps cultivate students with ideals and responsibilities, guides students worldwide to look at the world from the perspective of appreciation, mutual learning, and sharing, and promotes exchanges and mutual learning among different civilizations. However, studies on international students' status of moral education are rather limited. Hence, a quantitative research method was adopted on 64 international students from a university in China to find out the current status of moral education among international students in China. The questionnaire survey showed that international students' moral education level is generally good. Furthermore, no significant differences were recorded in their moral education with different genders, length of study/stay in China, educational background, and Chinese language proficiency. However, in contrast, some students expressed problems such as shallow moral awareness, weak moral emotion and will, and poor moral behavior. It is therefore suggested that students raise their moral education awareness, higher education institutions strengthen the connotation construction of moral education, improve the structure of instructors for moral education, and guide students in establishing correct values in addition to excavating moral education factors in teaching materials.

Keywords: International students in China, Personal morality, Family virtues, Professional, Social morality

Introduction

Institutional research focuses on students' moral education to provide objective, systematic, and thorough research for the university administrative office to make educational plans and decisions. The findings of such 'institutional research' can assist institutional leaders (in both academic and administrative domains) by informing their planning and decision-making (Zimmer, 1995). As is known, moral education plays a vital role in an individual's growth, which is also an essential part of ideological and political education in universities. In the report of the 18th CPC (Communist Party of China) National Congress, Chinese President Xi Jinping proposed to take "fostering virtue through education" as the fundamental task of education, and classroom teaching in the new era should educate people in the whole process and in all directions (as cited in Li, 2020). China's Education Modernization 2035 also clearly puts forward eight concepts to promote the modernization of education, the first of which is to attach importance to morality; thereby, the role of moral education is getting increasingly significant (Wang, 2022). Similarly, moral education is regarded as an important topic in some Western countries, which has been believed to be a national teaching about students' spiritual and moral values (Nargiza, 2022) and also as much as in the policies of governments and international institutions (García-Moriyón et al., 2020). Hence, moral education plays a significant role in human beings in different countries.

In the backdrop of an increasingly open educational environment, the university, as a higher institution, is responsible for 'vigorously cultivate international talents who understand China's national conditions and culture, and to play a more active role in promoting the mutual bond between the peoples of all countries', as reported in Xi Jinping's reply to the international students at Peking University (2021). As an important group in spreading China's voice to the world, international students have been cultural ambassadors for cultural exchanges between China and foreign countries (Li et al., 2023). Thence, it has become one of the priority works of international education in China that attaching importance to the moral education work of international students, cultivating international students who can do a better job of telling China's stories and conveying China's voice, constantly strengthening the construction of international communication capacity. Given this situation, it is an unavoidable new task to carry out ideological and moral education for international students in China, which is also meaningful in international talent training (Wang, 2022; Yang, 2022). Further, more scholars have argued the necessity and importance for educational institutions to conduct systematic moral education (Wong, 2020; Sison & Redín, 2022). The related research can support teachers or researchers in understanding students' perceptions of the quality of institutional governance and administration, and the more institutional resources for teachers, the higher the productivity can be created in higher institutions (Cheng et al., 2022).

Therefore, carrying out moral education for international students is a requirement of relevant national policy documents. The Ministry of Education of the People's Republic of China has promulgated many policies and regulations regarding the education and management of international students. Higher Education Quality Standards for International Students in China (Trial) (2018) mentions that higher education institutions should continuously improve international students' education quality. Administrative Measures for the Enrollment and Training of International Students in Higher Education Institutions (2017) proposes that institutions educate international students regarding Chinese laws and regulations, school discipline and rules, national conditions, and excellent Chinese traditional culture and customs. Guiding Outline for the Ideological and

Political Construction of Colleges and Universities (2020) points out that the comprehensive promotion of the ideological and political construction of the curriculum is a strategic measure to implement the fundamental task of cultivating people with morality. Because of this fact, helping students to shape a correct worldview and outlook on life and values and cultivate a good personality is the proper meaning of talent training, which is a new development in the education of international students in China (Ye, 2020).

However, with the expansion of international students, many problems of moral education appear in international students' teaching and management work. For example, moral education for international students is generally not highly valued and systematically studied (Li et al., 2023); most universities do not have a deep understanding of the situation of moral education of international students under the current education management level, which is not conducive to promoting the sustainable development of international students' education and also not conducive to promoting the internationalization of higher education in China (Li, 2022; Yang, 2022). As a result, administrative teachers encountered many difficulties caused by moral issues in international students' management work. Moreover, international students have a biased understanding of the Chinese social system due to the differences between China and their native country concerning social development, political and economic culture, and cultural environment, leading to low morale levels, weak moral will, personal value bias, inappropriate speech and behavior, and even disregarding the Chinese social morality and disturbing the public order. It is encouraging that carrying out moral education can help and guide international students to have a deeper understanding of China's system, culture, and development achievements, cultivate their correct moral character and cultural concepts, and form an objective, accurate, and comprehensive understanding of China's history and current national conditions.

As such, it is apparent that moral education is vital for international students, which is beneficial to help them establish a correct view and promote the development of comprehensive quality. Successful moral education can promote students' language and professional learning and enhance communication between China and foreign countries. Therefore, it is urgent to study moral education for international students and consciously guide them to cultivate a rational, peaceful, healthy attitude and build a bridge between humanistic care and psychological counseling. Thus, this study investigates the current status of moral education for international students, aiming to improve the moral education work of higher institutions, guide further and help them lay a scientific, ideological foundation, establish a correct value orientation, and provide references for teachers and researchers. The following research questions are made to guide the inquiry:

(1) What is the current status of moral education for international students in China?

(2) Are there differences in moral education for international students of different genders, studying time in China, educational background, and Chinese language proficiency?

Literature Review

Moral education is a great concept that comprises many disciplines (Kristjánsson, 2021). Researchers generally believe moral education is formed between the 1770s and the 1780s (Wang, 2022), covering both broad and narrow moral education. In a broad sense, moral education refers to ideological, moral, political, legal, and psychological education. In a narrow sense, it specifically refers to moral education in school, which is about students'

moral education and cultivation (Li et al., 2023). Frisancho and Delgado (2018) proposed that moral education should reflect peoples' social, cultural, political, and spiritual dilemmas and their communities in a diverse country such as Peru to improve understanding and respect among people from different sociocultural backgrounds. The classifications have revealed moral education's value and connotation and increased scholars' importance on moral education (Lee, 2022).

Regarding moral education for international students, many people think it is a special and sensitive topic because they consider it ideological and political; it is not like this. The moral education work of universities in China essentially lets students become talents with both ability and political integrity and overall development as the reference goal (Xi, 2017). While influenced by different times, nationalities, and cultural traditions, moral education has the characteristics of history, nationality, class characteristics, and inheritance. This study is about the restraint and norm of moral behavior, which is a kind of education to cultivate a sound personality, focusing on morality in the narrow sense, which is more accordant with the moral education for international students and is not easy to cause misunderstanding and cultural conflicts.

In recent years, moral education for international students has gradually attracted attention from academic circles. Scholars in Western and some European and American countries have done much theoretical and experimental research on ideological and moral education in schools, mainly focusing on character education (Li, 2022). García-Moriyón et al.'s (2020) research shows that moral education and growth are central themes within the educational proposal of Philosophy for Children, which is necessary to start from a more global approach to moral growth. Bazarova (2019) discussed the spiritual and moral education of students in a technical university and presented the positive implementation of spiritual and moral education of students.

In converse, research on moral education for international students in China is in the initial stage, with limited research depth and breadth (Li, 2021). The current research primarily focus on 1) the content of moral education, as suggested by Liu and Wu (2018) to not forcibly instilling political ideology and socialist core values in international students but respecting the moral values formed before coming to China, as well as strengthening the moral education to further improve international students' management, promote their learning motivation, improve their Chinese cultural identity and quality (Wang et al., 2021); 2) the objectives and pathways of moral education, for example, the Chinese international education goal is believed to determine that international students should be cultivated into all-around talents with academic success (Dai, 2015) and strengthening moral education for international students should be combined with classroom teaching and clarify the specific implementation path with the critical link to actively integrate moral education into cultural teaching (Wang, 2022); 3) the principles and methods for moral education, for instance, Wang and Wang (2019) stated that choosing the correct method and approach could assist to solve problems and promote the effective implementation of moral education.

The above research provides theoretical guidance for moral education for international students. Given that moral education has shown a common trend worldwide in the 21st century and plays an irreplaceable role in the overall development of people, social development, and national stability, more and more countries and regions have begun to take the needs of society and human development in formulating the goals and contents of moral education into account (Li, 2021). Whereas the current research has apparent limitations, such as limited empirical studies (especially research on the status of moral

education for international students), fewer researchers are studying it, and also limited research achievements.

Therefore, given the limitations in the present research on moral education, this study attempts to find out international students' status of moral education, which will enrich the scope of research participants and make up for the shortcomings of the lack of empirical research, further formulate relevant countermeasures accordingly, improve students' moral education level, and cultivate talents who contribute to the world.

Methodology

Research Design

This study applied a quantitative descriptive survey design to investigate moral education for international students from personal morality, family virtues, professional ethics, and social morality. A survey design assists researchers in answering descriptive questions, which are frequently used in social science research and especially in survey studies (Creswell & Creswell, 2018). Based on a survey, the research questions in this study were set. The gender differences, studying time in China, educational background, and Chinese language proficiency, which may affect moral education, were surveyed to improve further research on moral education for international students in China, such as formulating relevant countermeasures, improving students' moral education level, and cultivating talents.

Given this matter, a questionnaire survey was developed to investigate international students' current moral education status and the differences in their moral education with genders, studying times, educational backgrounds, and Chinese language proficiency levels. A research model was drawn to help better understand the current moral education research (see Figure 1).

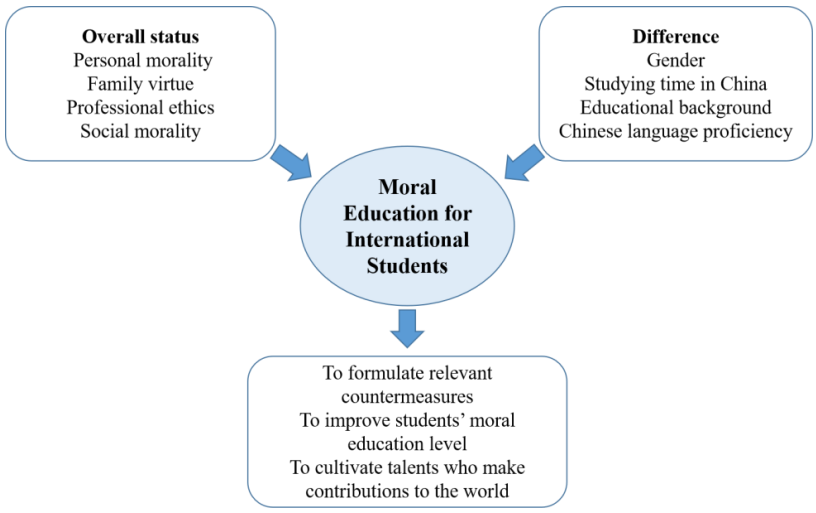

Figure 1: Research Model

Instrument

The questionnaire employed in this study adapted to Li's (2021) survey on moral education for international students from Laos, comprised two parts with the participants' demographic information and a survey. The basic information was to understand the

international student's gender, educational background, Chinese language proficiency level, and studying time in China. The survey on moral education was mainly based on four dimensions of personal morality (moral cognition, moral emotion, moral will, and moral behavior), family virtue, professional ethics, and social morality.

The questionnaire contained ten items: items 1 to 4 were to investigate personal morality, items 5 to 6 were about family virtues, items 7 to 8 were to know professional ethics, and items 9 to 10 were related to social ethics. A five Likert-type scale was used and rated as (1) not important at all, (2) unimportant, (3) general, (4) important, and (5) very important. The participants were expected to make adequate evaluations according to the brief statement of the relevant items.

The researchers tested the reliability and validity of the questionnaire. The reliability analysis was carried out using Cronbach α; the coefficient value was 0.736>0.7, which meant the questionnaire was reliable. The validity analysis was carried out using the KMO and Bartlett test, which was 0.731>0.5, and the p-value of the Bartlett test was 0.000<0.05, indicating the questionnaire had good validity.

Participants

According to Dörnyei and Taguchi (2010), the selection of research participants should be emphasized on the scope, sample size, and sampling strategy. A large population of international students in China is distributed in different universities, and they can be distinguished from some common characteristics such as educational background and Chinese language proficiency. A proportional sampling method was used to get the number of samples for the questionnaire survey. There are a total of 380 international students at X University, China. About 15% of them were willing to answer the questionnaire. According to the sampling formula, about 57 students wished to know their moral education status. Taking the 10% to 15% dropout rate and sampling error into account, the sample size of the questionnaire was expanded to 66. Finally, 63 international students from X University, China, were randomly selected as the representatives to participate in this research, with different genders, studying time in China, educational background, and HSK (a Chinese language proficiency test) levels. The specific information is as in Table 1.

Table 1: Basic Information about International Students

Gender	Male	34	54.0%
	Female	29	46.0%
Duration in China	Less than 1 year	13	20.7%
	2 to 3 years	29	46.0%
	3 to 4 years	15	23.8%
	More than 5 years	6	9.5%
Educational background	Undergraduate	56	88.9%
	Postgraduate	7	11.1%
HSK level	HSK-1	2	3.2%
	HSK-2	3	4.8%

HSK-3	20	31.7%
HSK-4	38	58.7%
HSK-6	1	1.6%

There were 34 male students and 29 female students participating in this study. 50 (79.3%) international students studied in China for over two years, and 13 (20.7%) were less than one year old. The participants were mainly undergraduates, accounting for 88.9%. 58 (92%) students had a Chinese language proficiency level above HSK-3 and primarily concentrated in HSK-3 and HSK-4.

Furthermore, WJX (a Chinese data collection instrument) was used to issue the questionnaire. The data recorded were analyzed statistically with SPSS26.0 through models of descriptive statistics, independent sample T-test, and one-way analysis of variance.

Results and Discussion

Overall Status of Moral Education for International Students

Descriptive statistics were obtained to understand the fundamental status of moral education for international students and to test the students' moral status in personal morality, family virtue, professional ethics, and social morality. Moral cognition, emotion, will, and behavior comprised personal morality were analyzed.

Table 2: Descriptive Statistics of Moral Education for International Students

			N	Minimum	Maximum	Mean	Std. Deviation
Personal morality	Moral cognition	The importance of moral character to one's development	63	2.25	5.00	4.02	0.71
	Moral emotion	Views of incivility towards other people					
	Moral will	Facing difficulties and setbacks bravely					
	Moral behavior	Smoking and littering in public					
Family virtue		Respecting parents Helping family members	63	3.0	5.0	4.44	0.63
Professional ethics		Completing assignments or tasks on time The importance of honesty	63	3.5	5.0	4.67	0.42
Social morality		Saying thanks to whom providing help Giving up a seat to others on the bus	63	2.0	5.0	4.77	0.54

The average values of international students' personal morality, family virtue, professional ethics, and social morality are 4.02, 4.44, 4.67, and 4.77, respectively. From the

perspective of personal morality, the average value is 4.02, indicating that students have demonstrated the importance of moral cultivation in all aspects of their lives. Concerning family virtues, the mean value is 4.44, which means students have a strong sense of family virtues. Regarding professional ethics, the mean value of 4.67 states that students can complete the homework or tasks assigned by teachers earnestly and believe that honesty is more important in future work. Moreover, the average value of social morality is 4.77, demonstrating that students often thank those who assist them. Besides, they often give up their seats to the elderly, the sick, the disabled, and pregnant women on the bus. Therefore, the status of moral education for international students is generally in a good state, consistent with Li's (2021) study on 80 international students from Laos, which showed that most international students have good moral education.

From the above analysis, we can see that international students' moral education could be affected by individual, family, college, and societal factors, which indicates that they should endeavor to enhance their moral education. Nevertheless, the mean value of personal morality is the minimum among the four values, reflecting that international students' moral character needs to be improved in some sense. The specific status of moral education is presented in four sections below.

Personal Morality

Personal morality is a person's most basic moral character, which can be deeply revealed from a person's moral cognition, emotion, will, and behavior in daily life.

Table 3: Statistics of Personal Morality

	Moral cognition		Moral emotions		Moral will		Moral behavior	
Scale	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
1	27	42.9	3	4.8	1	1.6	0	0
2	2	3.2	4	6.3	6	9.5	1	1.6
3	4	6.3	6	9.5	10	15.9	1	1.6
4	9	14.3	19	30.2	12	19.0	2	3.2
5	21	33.3	31	49.2	34	54.0	59	93.6

For moral cognition, 47.6% of the students held that moral character was important to their development. Conversely, 52.4% of the students believed that character was unimportant or general to a person, indicating insufficient cognition of moral character. Given such matters, their parents and educational institutions must teach them rich moral knowledge to help them better grow up and integrate into society.

Regarding moral emotion, 79.4% of them were disgusted and very annoyed by uncivilized behavior, which meant they had a strong moral consciousness. In comparison, 20.6% ignored uncivilized behaviors, showing poor moral awareness. Hence, more importance should be attached to improving international students' awareness by conducting different activities.

As for the moral will, 73% thought they could always bravely face difficulties and setbacks in their study and life. It showed they had a strong moral will and could resist frustration. Besides, 15.9% of the students indicated their ability to cope with setbacks was general. In comparison, 10.1% stated they would never or rarely choose to face difficulties and frustration due to their weak will. As such, it is clear that some international students are afraid to encounter trouble, and some even escape from difficulties. Hence, education in moral will should be strengthened to enhance students' willpower.

For moral behavior, 96.8% said they rarely or never smoked or littered in public, which showed that most had good moral awareness and behavior. Another 3.2% of them behaved uncivilized in public, indicating their moral behavior was not sound. Therefore, during the education process, a lifelong education system should be built to guide international students in developing correct values, which should be accomplished by different roles, such as teachers, families, and educational institutions.

In summary, it was found that some international students did not have profound moral knowledge and rich moral emotions but had weak moral will and passive moral behavior, lacking specific moral cognitive abilities and moral judgment abilities. A similar result is found by Wang (2021) that different living customs, cognition, and value orientation lead to a lack of awareness of moral quality, mainly reflected in poor self-discipline, disorganized behavior, poor learning style, easy satisfaction, lack of learning initiative, and even integrity problems. Given this fact, international students should be guided to have correct moral cognition, rational moral emotion, strong moral will, and good moral behavior. Hence, the students need to pay attention to the development of morality in their growth and development because there are certain defects in their thought and behavior, especially in moral cognition.

Family Virtues

To better understand the status of international students' family virtues, the survey and statistics were conducted on respecting parents and helping family members.

Table 4: Statistics of Family Virtues

	Respecting parents		Helping family members	
Scale	Frequency	Percent (%)	Frequency	Percent (%)
1	2	3.2	0	0
2	1	1.6	2	3.2
3	5	7.9	4	6.3
4	20	31.7	16	25.4
5	35	55.6	41	65.1

Regarding family virtue, 87.3% of the students thought they were doing good or very good in respecting parents, 7.9% thought they were doing generally, and another 4.8% thought they did poor or very bad. Conversely, 90.5% of them often or had always helped their families, and 9.5% rarely helped their families.

It was apparent that most students did well in family virtues; they respected their parents and would do some assistance to the family. However, there were still a few numbers of students who showed disrespect to their fathers and mothers, and some of them seldom aided their families, indicating the poor moral literacy of some international students and also their deficiency of family virtues.

As is known, the family is a basic unit of society and the first school for each person. Hence, family virtue plays a vital role in family construction, which affects every family member's healthy development. As such, students need to be correctly educated in knowledge and moral education to know more about family virtues to do better in families and make their families more harmonious. Moreover, the principal responsible unit for family virtue education should be family owing to its role in lifelong education; the educational institutions also significantly influence students' virtue building because students spend much time receiving education from them.

Professional Ethics

Professional ethics were surveyed on completing assignments on time and the importance of honesty.

Table 5: Statistics of Professional Ethics

	Completing assignments on time		Importance of honesty	
Scale	Frequency	Percent (%)	Frequency	Percent (%)
1	0	0	0	0
2	0	0	0	0
3	8	12.7	1	1.6
4	14	22.2	10	15.9
5	41	65.1	52	82.5

Regarding professional ethics, completing assignments on time is the student's responsibility, where 87.3% believed that they would often or had always completed assignments arranged by the teacher within the prescribed time. However, 12.7% showed they sometimes could not complete the assignments or tasks, which has been found in their studying on majors and minors, indicating they still lacked professional ethics. Because of this problem, teachers in higher educational institutions can adopt some measures to urge students to submit their work on time, such as sending reminders, checking their submissions, and rewarding good assignments.

Secondly, honesty, the most crucial quality in professional ethics, was believed important or very important in work by 98.4% of the students. Only a few of them held general ideas on it. It can be seen that honesty is considered very important in future work and an essential criterion for getting along with people. In the current study, most international students thought honesty was critical. At the same time, one student still believed honesty played an ordinary role in professional ethics. Hence, it is essential to cultivate students with integrity education, and educational institutions have to accomplish this task.

Social Morality

Social morality was discussed by saying thanks to those providing help and giving up a seat to others on the bus.

Table 6: Statistics of Social Morality

	Saying thanks to those who provide help		Giving up a seat on the bus	
Scale	Frequency	Percent (%)	Frequency	Percent (%)
1	0	0	1	1.6
2	0	0	2	3.2
3	1	1.6	1	1.6
4	7	11.1	8	12.7
5	55	87.3	51	81.0

As for social morality, 98.4% of students would often thank those who helped them, revealing that most international students maintained the principles of politeness in interpersonal social relationships and established good interpersonal relationships and a harmonious atmosphere between people. Only a few students thought it did not matter to appreciate people who provided help for them, revealing their indifference to others.

On the other hand, 93.7% of students often or always took the initiative to give seats to the old, weak, sick, and disabled on the bus. Nevertheless, there were still 6.3% of the students who may or rarely took the initiative to give up their seats to those needed, indicating that they lacked benevolent love and sympathy, and the social morality awareness was relatively weak. As such, it indicates that international students' social morality education should be strengthened further, which can be conducted by teachers, parents, and social communities.

The above analysis shows that most international students have good personal moral performance, with correct moral cognition, rational moral emotion, strong moral will, and good moral behavior. At home, they respect their parents, often help their parents with things, and pay attention to family virtues. In their studies, they can earnestly complete the tasks and affirm the importance of honesty in professional ethics. In society, they are willing to be a polite and virtuous person.

Besides, it was apparent that various factors affected international students' moral education, such as family, society, higher educational institutions, and individuals. All of these elements are jointly devoted to students' moral development. Therefore, moral education can not be carried out in isolation but in mutual efforts.

As a result, some defects need to be perfected, and teachers should let international students realize the importance of moral education in their personal growth and development, as Zheng (2018) confirmed. Meanwhile, it is also found that organizing students to participate in meaningful social practice activities in line with the purpose of ideological education can bring students together with the same identity and affect their ideological understanding and behavioral norms (Zheng, 2020). Hence, it is vital to make international students develop better and healthier through comprehensive education and cultivate talents who come to China with high cultural literacy.

Differences in Moral Education for International Students

The factors of gender, studying time in China, educational background, and Chinese language proficiency level, which may affect moral education for international students, were analyzed respectively to find out the relationship between them and moral education.

Gender

An independent sample T-test was used to analyze the differences in the current status of moral education for international students of different genders to understand whether there was gender discrimination or inequality between male and female students in the process of receiving moral education.

Table 7: Results of Different Genders

Gender	N	Mean	Std. Deviation	F	Sig.
Male	35	4.403	.413	.000	.994
Female	28	4.357	.414		

From Table 7, it can be seen that there is no significant difference ($p = 0.994>0.05$) in the current status of moral education for international students of different genders. This result is consistent with the findings of Li (2021), who demonstrated that no significant difference was found in moral education on the gender factor among international students. As such, the moral education status of international students has nothing to do

with gender, revealing that in the process of receiving moral education, there is also no gender discrimination or gender inequality between male students and their female peers, which also shows that teachers have the concept of treating students equally in teaching, which significantly shows the professional philosophy of teachers in the new era.

Length of Study Time in China

A one-way analysis of variance was applied to analyze the differences and better understand whether students have various moral quality problems due to studying time in China.

Table 8: Results of Length of Study Time

	N	Mean	Std. Deviation	F	Sig.
Less than 1 year	13	4.431	.4715		
2 to 3 years	29	4.286	.4051		
3 to 4 years	15	4.467	.3904	1.071	.368
More than 5 years	6	4.533	.3327		
Total	63	4.383	.4113		

The one-way analysis of variance of the current status of the moral education for international students in different studying times shows the p-value is 0.240>0.05, indicating no significant difference is recorded in different periods of studying time in China. This result is also proved by Li (2021), who found that studying time did not affect international students' moral education. Given this matter, whether studying time in China is short or long, it plays a small role in international students' moral education. On the other hand, studying time in China does not affect international students' moral education status. Although this result indicates that international students' moral education is relatively less influenced in China, teachers should also educate them on morality and wisdom to improve their moral education level because moral development is a process of social and psychological development that begins at a very early age and continues throughout life (Turiel, 1998).

Educational Background

Furthermore, to clearly understand whether students have various moral quality problems because of their educational levels, an independent sample T-test was used to analyze their differences with different educational backgrounds.

Table 9: Results of Different Educational Backgrounds

	N	Mean	Std. Deviation	F	Sig.
Undergraduate	56	4.368	.421	1.703	.197
Postgraduate	7	4.500	.316		

Table 9 reflects the current status of moral education of international students with different educational backgrounds. The p-value is 0.197>0.05, meaning no significant difference exists between educational backgrounds. A similar result was found in Li's (2021) research that no statistical significance was found in international students'

educational backgrounds. It also reveals that moral education for international students has little to do with the level of education, no matter postgraduates or undergraduates. However, the research results show that students' moral development continues during their early years at university; thereby, moral education should be an important aspect of university life (Silay, 2016). Because of this, higher educational institutions should attach more importance to international students' moral education.

HSK Level

HSK is a test to prove an international student's Chinese language proficiency level. To further understand whether students have various moral quality problems due to the level of HSK, a one-way analysis of variance was applied to analyze the differences in the current status of moral education for international students with different HSK levels.

Table 10: Results of Different HSK Levels

	N	Mean	Std. Deviation	F	Sig.
HSK-1	2	4.950	.070	2.511	.051
HSK-2	3	4.600	.173		
HSK-3	20	4.245	.354		
HSK-4	37	4.392	.424		
HSK-6	1	5.000	.000		
Total	63	4.383	.411		

The p-value of the one-way analysis of variance of international students with different HSK levels is 0.051>0.05, indicating no significant difference in the status of moral education for international students with different HSK levels. Because of this matter, the moral education status of international students is not affected by the students' HSK levels, indicating that HSK levels do not affect the moral education of international students either. On the other hand, the level of Chinese proficiency is only a test of language ability, which does not have a specific impact on the moral education of international students. A high academic grade does not mean students' moral literacy is also high, and a low grade does not mean that the students' moral literacy is low either.

Implications

The study of moral history informs us that it concerns society, teachers, and parents, and there is no exclusive role to any of these (Kumari & Kachoora, 2018). Moral education is going through the whole process of education. It is a fundamental task to foster virtue through education so that international students' education should be included in moral education because they are an organic component of higher educational institutions. As is found previously, moral education for international students, which refers to different aspects, is a long-term work. Thereby, it is implied to be strengthened through various methods.

A moral education community composed of society, family, university, and individuals for international students in China should be built. Universities should formulate systematic and reasonable moral education policies and construct campus moral education and cultural environments to strengthen the moral system for students. The family should

also pay attention to students' moral cultivation because parents play a critical role in their learning and moral cultivation process. Besides, students should constantly improve their moral education ability, taking the initiative to strengthen self-moral education and actively accept moral education. Society should also assist in enhancing moral education for students. Moreover, universities can cooperate with the government and social units to carry out moral education practice activities and organize international students to participate in various social activities such as China's national conditions experience activities, social public welfare activities, and professional practice.

It should be valued for achieving long-term dynamic moral education according to students' different training stages. Attention should be paid to moral education for international students from the beginning of their enrollment, and timely psychological construction and humanistic care should also be given. Then, it is necessary to conduct moral education in their whole studying process and daily management and carry out social practice, volunteer service, and group visits combined with Chinese traditional festivals and national security education. Lastly, social ethics education and professional ethics education in graduation should be conducted to cultivate their moral character of abiding by social order and maintaining the public environment and also guide them to transform the moral theory knowledge into moral practice activities.

It is urgent to combine kinds of education to improve international students' moral education effect comprehensively. As essential members of Chinese higher educational institutions, international students' cognition and compliance with the laws will directly affect the harmony and stability of universities and society; thereby, strengthening legal education for international students is an indispensable part of moral education. Besides, mental health education is integral to moral education for international students in China. Due to the cultural shock, international students will inevitably encounter psychological problems after coming to China. Universities must carry out mental health education, such as psychological and frustration education, to cultivate their optimistic psychological attitude and sound personality characteristics. Therefore, it is urgent and necessary to strengthen moral education from different aspects to promote students' healthy and stable development.

Recommendations

Moral education for international students is a complex and arduous task, requiring not only education from universities and families but also operational improvement of students. Hence, related support could be arranged, and the weight of teaching resources could be modified in the institutional planning.

The first is to raise international students' awareness of moral education. The survey result showed that some international students did not have a profound moral understanding, rich moral emotion, firm moral will, and active moral behavior, and also lacked specific moral cognition abilities and moral judgment abilities. Therefore, the instructors should first guide them to have correct personal morality and, in the meantime, let them realize the importance of moral education in their personal growth and development. This is because the individuals who wish to be taught about morality occupy a significant position. Moral culture publicity and moral practice experience can strengthen their personal experience; societies, social welfare activities, or social practices can enhance their sense of moral responsibility; discussing what kind of influence people who ignore the development of their moral character will influence themselves, their family, career, and society. By conducting such activities, students can further increase their moral awareness.

Next, it is to guide students in establishing correct values. Some students have problems such as incorrect attitude, not being honest enough, not noble enough, and impolite conduct, which may affect their future development if they do not carry out moral education, timely operational guidance, and correction. As such, in guiding international students, the instructors should constantly carry forward positive energy, effectively help them find the moral benchmark, improve moral sentiment, and assist them in establishing a correct outlook on life, world outlook, and values.

Then, it is to strengthen the connotation construction of moral education effectively. In the cultivation of international students' moral quality, enriching the content of moral education and broadening the channels can effectively improve their self-discipline, reduce the incidence of all kinds of emergencies, and form a synergistic effect with professional education, enhance the joint force of education, to effectively improve the quality of talent training and enhance the connotation of construction of the university.

The fourth is to deeply excavate the moral education factors in the teaching materials and consciously infiltrate moral education knowledge into the classroom to cultivate students into talents with overall development. As teaching materials are suitable for all students, they can learn something from them as long as they use them.

Another is to strengthen the construction of teachers for moral education. Teachers' knowledge of cross-cultural and moral education should be strengthened in moral education for international students to better provide them with rich experience in teaching students. In addition, the scale of Chinese language teachers with high cultural quality should be expanded, establishing professional international teacher teams.

Conclusions

It is concluded that moral education for most international students is sound. In contrast, some students perform poorly in personal moral cognition, emotion, will, and behavior, mainly reflected in shallow moral consciousness, weak moral emotion, and poor moral behavior. Besides, no significant differences are recorded in the current status of their moral education with different genders, studying time in China, educational backgrounds, and Chinese language proficiency levels. Hence, it is apparent that gender, duration of study time in China, educational background, and HSK level do not greatly impact international students' moral education status.

It should be mentioned that limited experimental research on moral education for international students in China is recorded in the current literature, which makes the results of this study difficult to compare with the previous studies. Given more and more moral education problems produced by international students in China, such as skipping classes, skipping assignments, dishonesty, bad faith, and disrespect with teachers, this study can reflect international students' true beliefs and their actual status of moral education, which will not only provide references for international education of higher educational institutions but also help administrative managers to formulate corresponding measures and assist teachers to adjust their teaching methods. Besides, this study will also guide international students to improve their moral education level, helping them discover their moral problems and further enhance their self-cultivation. Moreover, it will help international students' families understand the current situation of their family education and thus provide references for improving family virtue education. Therefore, this study will not only enrich the scope of research participants but also make up for the shortcomings of the lack of empirical research, which will provide references for further research.

It is acknowledged that these results were from a relatively small sample of participants in one university and cannot be generalized to the general population of international students in China in some sense. Nevertheless, several previous studies with larger samples have yielded similar results on international students' moral education status. For instance, Li (2021) and Zheng (2020) obtained similar research results in their studies. As more international students come to China for further study, moral education has become essential to college education, requiring more and more importance. Hence, more participants from different universities in China can be organized to better participate in future studies to reflect international students' situations for moral education, which may provide much more comprehensive guidance for college educators in management work references for researchers.

To summarise, Chinese President Xi Jinping emphasizes fostering virtues through education, so all universities should stay engaged in this fundamental task. As a form of special education in higher education, international students' educational content is not related to politics, the education methods are exotic, and the educated are different; such education requires moral education to be generally accepted and abided by the social and moral code of conduct in education. Further, the population of international students in China is large, and high-quality education and teaching are required to help them develop holistically with strong cultural literacy.

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Correlation of emotional intelligence and transformational leadership practices

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Abstract

The purpose of this study is to explore the emotional intelligence (EI) and transformational leadership practices (TLP) of academics in conflict-prone areas (Ambon). This investigation examined whether the segregation of territories due to conflicts had a relationship between emotional intelligence and transformational leadership practices. Studies use a causal relationship approach to describe circumstances. The research sample numbered 200 academics at Islamic religious universities with various backgrounds of authority. Instruments used to measure emotional intelligence (EI) and transformational leadership practices (TLP). The results showed that participants' emotional intelligence (EI) correlated favor of transformational leadership practices (TLP). The vulnerability of conflicts in the Ambon city area does not affect the results of the Emotional intelligence assessment (ESAP) and Leadership practice inventory (LPI), especially the contribution to factors that encourage and enable others to act, shared vision, modeling the way, and challenging the process. In practice, it can be interpreted as regional segregation in Ambon City. This does not interfere with emotional intelligence in academics at Islamic religious universities. The incident that caused the separation of residences based on religion and the relationships that were created cannot be separated from economic and political relations, giving rise to various terms that the government and academics deliberately echo through the term "*ale rasa beta rasa*" which means what you feel, so do I feel this is an important focus that helps develop the cultural intelligence of academics in particular and society in general. A limitation of this study is that it increases the probability of bias over the response received due to the scope of a single self-generated object. The originality of this research is that there is still minimal research on emotional intelligence in academics in conflict-prone environments. Hence, the research findings contribute to advancing the transformational practices of academics at the tertiary level and the intrapersonal development of society in general.

Keywords Emotional intelligence; Transformational; Leadership; academician

Introduction

Research on emotional intelligence (EI) and leadership has attracted many researchers. The main focus of the study is whether emotional intelligence (EI) has an important relationship in determining transformational leadership practices in academic environments with a high susceptibility to conflict. (Hayashi, 2005; Higgs, M. & Aitken, 2003; Lewis & Aldossari, 2022; Wolff, S.B., Pescosolido, A.T. & Druskat, 2002) (Vivian tang dkk, 2009; Antony mckweon, 2012). Many studies have a positive effect of emotional intelligence (EI) on leadership effectiveness

Previous research has also supported that leaders with high emotional intelligence (EI) are associated with transformational leadership. (Barbuto, J.E. & Burbach, 2006; Mandell, B. & Pherwani, 2003; Riggio, R.E. & Riechard, 2008). But from the leadership perspective, it is not in high segregation of conflicts. The environment's vulnerability to ethnic, racial, and religious friction became important in this study's emotional intelligence (EI) and leadership transformation practices. The bloody events that occurred in this city, namely inter-ethnic and religious conflicts from 1999 to 2002, made a separation of life between religion and ethnicity that eventually formed the living conditions of the group. Even so, various public facilities are managed together to eliminate these problems in the government and the private sector. Correspondingly, conflicts and vulnerabilities are still common in the region.

Ambon City State Islamic University is one of the Islamic religious universities in Ambon City, which has a multicultural vision. This can be seen from its openness to students' diverse religious backgrounds, such as students from traditional groups who adhere to ancestral beliefs and other religions. Embedding Islam is not interpreted specifically so that not only Islam but Christianity and various other beliefs have the same opportunity. This also creates challenges for academics in this region. The role of academics in facing heterogeneous challenges forces the development of transformational leadership practices. This is, of course, a problem where almost all academics come from native populations affected by segregation.

The role of academics as catalysts for education provides its breath in implementing heterogeneous organizational performance. Regardless of how important emotional intelligence (EI) is in the leadership literature. Self-awareness is a component of emotional intelligence (EI), and its relationship with leadership practices will differ from culture to culture (Shipper, F., Kincaid, J., Rotondo, D.M. & Hoffman, 2003). Concerning the emotions of academics in the environment of educational institutions, research even shows that when leaders show good emotional intelligence (EI), the behavior of teachers and other academic results of students also lead to better results. The next objective is to determine if emotional intelligence (EI) is significant in leadership practice in areas with conflict vulnerability. Transformational leadership practices are analyzed using a visionary approach (Kouzes, O. & Posner, 1995) and skill-based emotional intelligence (EI) models (Nelson, D.B. & Low, 2003). Emotional intelligence (EI) is measured as a competence related to the perceived transformational leadership practice and causes advances in cultural communication and academic learning development in its environment.

Literature Review

Emotional intelligence (EI) and leadership

Emotional intelligence (EI) in leadership is the concept that emotions and responses to emotions are at the core of leadership (Roberts, S. & Rowley, 2008). Leader involvement includes identifying, integrating, and managing himself and subordinates feelings (Roberts, S. & Rowley, 2008). Leaders who can translate their emotions clearly and accurately are considered more capable of anticipating, overcoming, and responding to changes (Mayer, J.D. & Caruso, 2002). The leader will continue to face the challenge of organizational change, so the leader needs to consider his emotions (Jordan, 2004). Some studies highlighted the impact of emotional intelligence (EI) on organizational change and identified emotional skills that successfully transform the organization. Goleman (2004) reveals about social intelligence, emphasizing the

emotional part of intelligence. Hernon (2007b) also reveals the emotional intelligence (EI) associated with social intelligence. Mayer, J.D. & Salovey (1990) Emotional intelligence (EI) is the ability to monitor the emotions and feelings of a person and others, distinguishing between them and regulating and guiding one's thoughts and actions to solve problems.

From some of the views expressed, the construction of emotional intelligence (EI) is generalized in two models, namely, the basis of the ability of the model and the basis of nature (Conte, 2005; Day, A., Newsome, S. & Catano, 2002). A model with a capability base conceptualized by Mayer, J.D. & Salovey (1990) includes feelings of emotion, using emotions, understanding emotions, and managing emotions. In contrast, the trait-based emotional intelligence (EI) model by Goleman and Bar-On includes components of non-cognitive traits such as empathy, optimism, adaptation, motivation, and warmth (Conte, 2005; Van der Zee, K. & Wabeke, 2004). Even in research, Huiwen et al. (2009) demonstrated a third model by Nelson and Low on emotional learning systems by developing emotional intelligence skills. Daniel Goleman, in his book Emotional Intelligence (EI): Why it Can Be More Important than IQ, reveals that emotional intelligence (EI) is a concept of leadership. Goleman's model reveals the possibility of a person's ability to demonstrate intelligent use of emotions, manage oneself, and work effectively (Boyatzis, R.E., Goleman, D. & Rhee, 1999). For Goleman, the leader has competence and can change styles according to the specified situation (Rossiter, 2006b). The challenge of the leader is to know when he changes the style depending on the circumstances and needs, so the leadership style of Goleman is situational leadership. This gives rise to other research that the competence of emotional intelligence (EI) can be developed (Boyatzis, 2001). Dulewicz, V. & Higgs (2004) reveal that there is evidence that emotional intelligence (EI) can be developed and suggests organizations need to structure programs and design how to develop the emotional intelligence (EI) of their employees.

Studies in America and China prove that interpersonal, leadership, self-managerial, and intrapersonal skills are different factors (Nelson, D.B., Jin, Y. & Wang, 2002). There are 10 emotional intelligence (EI) skills that contribute specifically, such as Statement, Social awareness, Empathy, Leadership, decision-making goals, Time of self-commitment, Self-esteem management, and Stress management. Resonant leadership created by Goleman, D., Boyatzis, R. & McKee (2002b) Related to leadership that in any group, the leader has the power to influence the emotions of others. When the leader encourages the positive emotions of others, he can bring out the best in others. Then, this is what is referred to as the resonance effect (Goleman, D., Boyatzis, R. & McKee, 2002a). That is the resonant effect that the center of one's emotions is in sync positively (Goleman, D., Boyatzis, R. & McKee, 2002b). On the contrary, the opposite of resonance is negative emotions, that is, dissonance (lack of harmony) (Alire, 2007). Leaders who resonate optimistically, energetically, enthusiastically, and empathically during change, especially with the feelings of others. Goleman mentions that emotional intelligence (EI) domains are self-awareness, self-management, social awareness, and relationship management (Goleman, D., Boyatzis, R. & McKee, 2002a).

Emotional intelligence assessment **(ESAP)**

- Assertiveness (Interpersonal skill)
  This assessment includes communicating with others honestly, understandingly, respectfully, and not harming others. You communicate by prioritizing and maintaining a positive and healthy relationship with your interlocutor.
- Comfort (Leadership skill)
  This assessment includes your ability to communicate with others. You build honesty, trust, openness, spontaneousness, and casualness in various situations with your interlocutor. You maintain positive interactions with others, both verbal and non-verbal.
- Self-esteem (Leadership skill)
  You can complete the workload with sincere self-confidence, confidence in the success of completing the work, and always skilled in developing your abilities
- Management stress (Intrapersonal skill)

In stress management, your ability to choose healthy exercise, relaxation, and control your own emotions towards the burden of work stress. You can balance the monotonous intensity of work by dividing your time into your health, work, and work outputs.

- Commitment ethics (Self-management skill)
  This assessment includes the ability to complete work/personal responsibilities. You choose to set standards, goals, and expectations and persistently resolve demands regardless of distractions and other burdens.
- Time management (Self-management skill)
  In completing work/personal responsibilities, you manage a productive schedule effectively, and in this situation, you accept so that there is harmony between daily thoughts, feelings, and behaviors.
- Leadership (Leadership skill)
  You persuade others to influence and direct following goals, creating positive momentum/support.
- Decision-making (Leadership skill)
  This assessment includes your ability to formulate and solve problems by paying attention to the situation and involving others.
- Empathy (Leadership skill)
  The ability to be an active listener, compassionate, non-judgmental, and respond constructively to the feelings and behaviors of other people's thoughts. You prioritize honest communication.
- Aggression (Potential problem area)
  The ability to express emotions by feeling relented, violating, and executing one's own / others' thoughts rather than expressing anger towards others.

Transformational leadership practices (TLP)

Emotional intelligence (EI) has been linked to transformational leadership. A study revealed that emotional intelligence (EI) is significantly linked to transformational behavior and leadership (Harris, P.D. & Crede, 2010). Transformational about how to influence change, transformational leaders are outlining agents because they see the need to move the organization forward (Alire, 2007). Hernon (2006a) also revealed that emotional intelligence (EI) and transformational leadership are needed in managerial leadership. In addition to various leadership theories, the variety of emotional intelligence (EI) is also binding in organizational theory (Giesecke, 2007). An emotionally good leader is a leader who successfully overcomes changes to obtain his organization's goals (Stein, 2009).

Goleman reveals the relationship between leadership style, necessary emotional intelligence (EI) competence, and organizational effectiveness. The following is presented in Table 1.

Emotional intelligence (EI) constructs have become part of the nature of learning, behavior, and leadership competencies/skills. In research using the emotional intelligence (EI) Goleman framework, superior and effective leaders showed higher levels of emotional intelligence than leaders with lower levels of emotional intelligence (EI) (Watkin, 2000). Another study revealed that top leaders score higher than the general population's emotional intelligence (EI). This is based on the trait-based emotional intelligence (EI) of leaders who use the emotional intelligence (EI) Inventory Bar-On. Various literature has found that transformational leadership styles are predictable from trait-based emotional intelligence (EI) (Barbuto, J.E. & Burbach, 2006; Brown, F.W. & Moshavi, 2005; Mandell, B. & Pherwani, 2003; Sosik, J.J. & Megerian, 1999). In another study, he found an important role of emotional intelligence (EI) in the transformational leadership literature (Daus, C.S. & Ashkanasy, 2005).

***Leadership practice inventory-self* (LPI-self)**

- *Challenging the process*

An individual's awareness of doing challenges and having a passion for succeeding in challenges is something that a leader should have. But when the individual feels that he has found something that has failed in its implementation, he is quick to change the situation based on the question in himself, such as what should be achieved and done next. (Kouzes, O. & Posner, 2007; Maxwell, 2002). A leader should not be trapped in the routines and problems he faces. He needs to innovate and play a significant role in creating change by making strategic decisions. He should not fear failure and develop a positive culture for others. It must create a climate where others feel free to create, take risks, and change (Rozeboom, 2008).

- *Shared vision*

In many problems of an organization, vision has not been able to become a communication pattern developed by the leader (Kouzes, O. & Posner, 2007). The strategic key for leaders is attention to the organization's vision (Bennis & Nanus in Rozeboom (2008). When likened, vision is a potential weapon that can unite all resources other than because vision offers hope of success. This vision is not only the leader's vision but also how the leader collects visions from his subordinates/work team so that the decision-making develops the same thoughts of the people in it (Cleveland in Rozeboom (2008).

- *Enabling others to act*

In the past, the existing paradigm was that the leader was the only component that held information and power, but over time, the opposite happened. The leader needs to collaborate and encourage his subordinates so that the subordinate's perception of himself, his credibility in leading, and his teamwork increase (Kouzes, O. & Posner, 2007). Leaders with cooperative and committed relationships are considered more competent than competitive and independent leaders (Rozeboom, 2008). Trust is the key determinant of an individual's satisfaction with the organization in which they work (Lencioni, 2005).

- *Modelling the way*

In several studies over the years, subordinates tend to follow superiors who have consistency between words and deeds (Kouzes, O. & Posner, 2007). "Action is better than words". This paradigm becomes important in improving the integrity and credibility of the leader. Small successes will be the hope for others, higher achievements, and eventually building commitment (Giulani, 2002).

- *Encouraging the heart*

The leader needs to be skilled at being a positive individual and helping his subordinates to constantly develop their subordinates to achieve something greater (Seligman in Rozeboom (2008). The leader is aware of celebrating success and appreciates any contributions from his subordinates (Kouzes, O. & Posner, 2007).

The relationship between emotional intelligence (EI) and leadership

A defensible methodology is necessary to prove the emotional validity of intelligence in leadership (Antonakis, 2003; Locke, 2005). However, many studies confirm the important role of emotional intelligence (EI) in the leadership literature (Walter, F. & Bruch, 2007). Emotional management of oneself and those around is important for a leader. Anticipating certain things in the organization's context will allow a change's effectiveness (Mayer, J.D. & Caruso, 2002). Through emotional intelligence (EI), a person can understand the feelings of oneself and others to solve problems and regulate their daily behavior (Mayer, J.D. & Salovey, 1990). Leadership determines and drives an organization's success (Mullins, J. & Linehan, 2005a). This is based on the results

of respondents' studies related to leadership. Everyone has the potential to lead. This is also confirmed in the study by Stephens, D. & Russell (2004) that all employees must be seen and can be developed to become leaders.

Method

Sample

Two hundred academicians are targeted to be research objects at state Islamic religious universities in Ambon City. The research population includes the head of the institute, the faculty dean, the study program head, and lecturers within the university's scope. The choice of research was carried out at state Islamic universities because, in practice, universities do not limit the number of students who adhere to one particular religion. Still, other religions and adherents of traditional beliefs originate from ancestors, so the practice of transformational leadership in the academic environment is quite developed. This is an important consideration for researchers investigating how cultural intelligence in academic settings is implemented in transformational leadership.

Group differences are used as illustrations in determining whether to be chosen randomly. Gall, M.D., Gall, J.P. & Borg (2003), at least 30 participants must establish the presence and absence of relationships/contacts. The total response rate was 70% (140 out of 200). The Ambon City religious college sample consists of academic leaders evenly distributed in various fields on campus. The level of education of the research sample participants consisted of masters (55%) and doctoral (45%) with an average age of >42 years and an average duration of 10 years as academic lead experience.

Design and procedure

Instrument selection is a crucial issue that can result in incorrect data and incorrect interpretation in research (Thomas, 2007). The study used expert recommendations per Peter, M. & Passchier (2006) to avoid this. The Pearson correlation was used to determine the relationship between emotional intelligence (EI) and transformational leadership practices (TLP) variables.

Measurement

In variable measurement, instruments are used to measure emotional intelligence (EI) and transformational leadership practices (TLP). Measurement of transformational leadership variables using Leadership practice inventory-self (LPI-self) and measuring emotional intelligence (EI) through a measuring instrument called emotional intelligence assessment (ESAP). Leadership practice inventory-self (LPI-self) is the result of transformational leadership theory. Transformational leadership practices (TLP) has indicators as a framework of practice concepts: 1) Enabling other to act/EnOA, 2) Modelling the way/MoW, 3) Shared vision/SV, 4) Challenging the Process/CP, and 5) Encourage the heart/EnH (Kouzes, O. & Posner, 1995) through triangulation of qualitative and quantitative research approaches, and in-depth interviews on leadership best experiences. Leadership practice inventory-self (LPI-self) contains 5 transformational leadership practices (TLP) variable keys with a 5-variable Likert scale.

Response Scale	5. Very Often 4. Quite Often	3. Sometimes 2. Rarely	1. Never

Meanwhile, emotional intelligence (EI) is measured using emotional intelligence assessment (ESAP), which contains 10 assessment indicators: empathy, decision-making, leadership, aggression, time management, ethics/commitment, stress management, self-esteem, comfort, and assertiveness. This emotional intelligence assessment (ESAP) uses a Likert scale with 3 measures.

Response Scale	1. Least Like	2. Like	3. Like Very Much

Emotional intelligence assessment (ESAP) is used. After all, it is valid and reliable because it is used by US and Southeast China researchers and in several studies. (Nelson, D.B., Jin, Y. & Wang, 2002; Stottlemyre, 2002; Vela, 2003). In determining the criteria for Leadership practice inventory-self (LPI-self), researchers refer to Aiken and Groth-Marnat (2006), that question items with a coefficient of .>0.2 are already able to predict existing performance criteria. This emotional intelligence assessment (ESAP) and transformational leadership practices (TLP) study considers age and length of service as necessary factors when using the instrument. Emotional intelligence assessment (ESAP) indicators are significantly related to transformational leadership practices. Age and length of work influence this analysis and should be important considerations. In some relevant studies regarding emotional intelligence assessment (ESAP), ethnicity, gender, and socioeconomic level may also be significant factors. But ideally, researchers use emotional intelligence assessment (ESAP) for purposes and objectives they want to develop according to the interpretation and planning of research development.

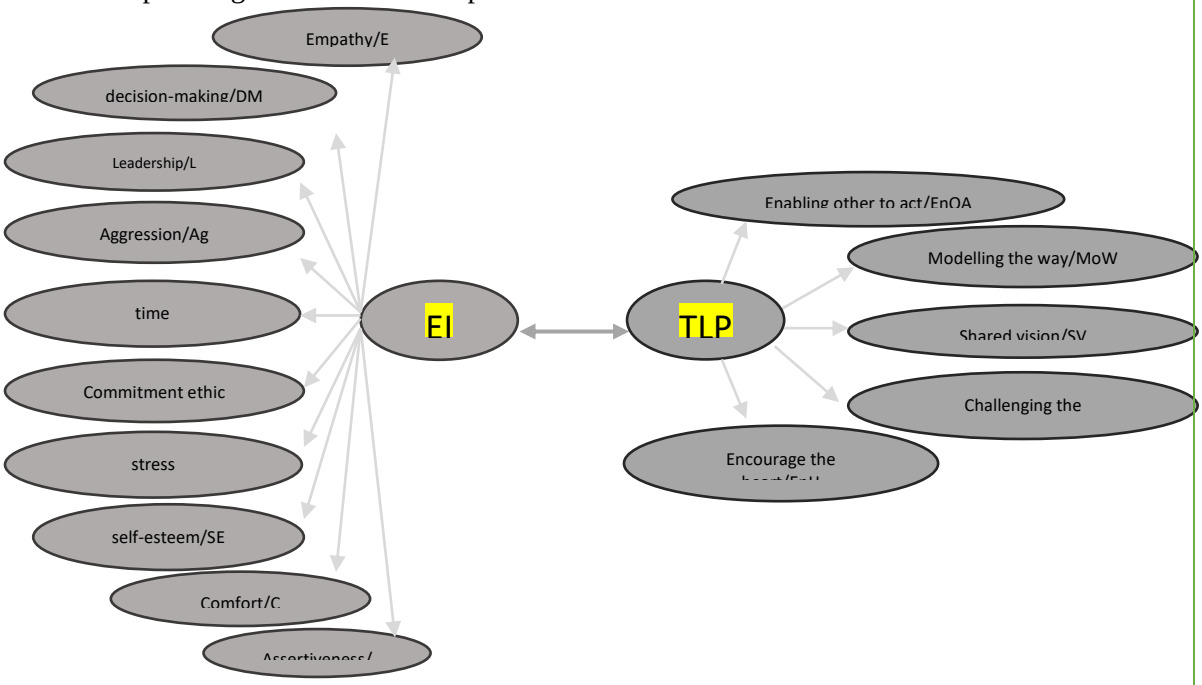


Figure 1: Framing Correlation EI & TLP. Source : Nelson, D.B., Jin, Y. & Wang, 2002; Stottlemyre, 2002; Vela, 2003; Kouzes, O. & Posner, 1995)

Result

In this research, validity and reliability testing was carried out regarding the variables studied before further testing.

Validity Coefficients

The correlation coefficient in emotional intelligence assessment (ESAP) consisting of 10 indicators contains 4 factors, namely 1) leadership, II) Intrapersonal skills, III) Self-management skills, and IV) Potential problem areas. The emotional intelligence assessment (ESAP) correlation coefficient in this study is presented in Table 1 below:

Table 1: Emotional Intelligence Assessment (ESAP) Validity Factor

Indicator	Sym.	I. Leadership	II. Intrapersonal Skill	III. Self-management skill	IV. Potential problem areas
Empathy	E	.47			
Decision Making	DM	.68			
Leadership	L	.59			
Aggression	Ag				1
Time management	TM			.59	
Commitment ethic	CE			.69	
Stress management	SM		.68		
Self-esteem	SE		.70		
Comfort	C	.33			
Assertiveness	A		.51		

N = 140. Source: Result SPSS, 2023

Reliability Coefficient

Internal consistency is split in half, and stability in Emotional intelligence assessment (ESAP) can be seen in Table 2 below:

Table 2: Emotional Intelligence Assessment (ESAP) Reliability

Indicator	Sym.	a	Split half
Empathy	E	.65	.28
Decision Making	DM	.64	.36
Leadership	L	.65	.29
Aggression	Ag	.64	.35
Time management	TM	.66	.22
Commitment ethic	CE	.68	.02
Stress management	SM	.66	.19
Self-esteem	SE	.65	.34
Comfort	C	.67	.11
Assertiveness	A	.66	.25

N = 140. Source: Result SPSS, 2023

As a result of the validity and reliability calculation study, information was obtained that the variable indicators could be continued in factor analysis calculations.

Based on factor analytic studies in the academic community of state Islamic religious colleges samples, a four-factor solution best describes emotional intelligence assessment (ESAP) scale corrections. In Stottlemyre's (2002) research in schools, the emotional intelligence assessment (ESAP) Indicator is divided into several factors such as I. Leadership, II. Motivation, III. Interpersonal, IV. Self-management needs. The factors researchers identified also adopted from Nelson, D.B. & Low (2003), namely I. Leadership, II. Self-management skills, III. Intrapersonal skills, IV. Potential problem areas.

Table 3: Emotional intelligence assessment (ESAP) Validity Empirical

Indicator	Sym.	Modelling the way (MoW)	Shared vision (SV)	Challenging the Process (CP)	Enabling others to act (EnOA)	Encourage the heart (EnH)
Empathy	E	.51	.96*	.45	.48	.72*
Decision Making	DM	.58	.74*	.66*	.39	.83*
Leadership	L	.75*	.49	.90*	.92*	.46
Aggression	Ag	.77*	.98*	.48	.86*	.67*
Time management	TM	.10	.02	.22	.21	.27
Commitment ethic	CE	.19	.70*	.92*	.26	.97*
Stress management	SM	.30	.35	.39	.66*	.59

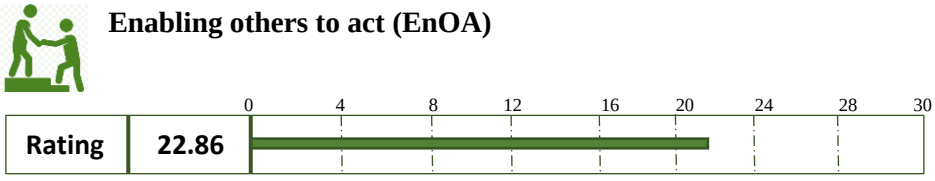
Self-esteem	SE	.32	.26	.79*	.54	.95*
Comfort	C	.44	.91*	.74*	.97*	.82*
Assertiveness	A	.45	.15	.70*	.56	.78*

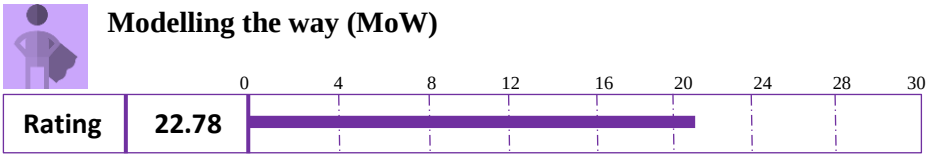
N = 140 (t-test = 0.67). Source: Result SPSS, 2023

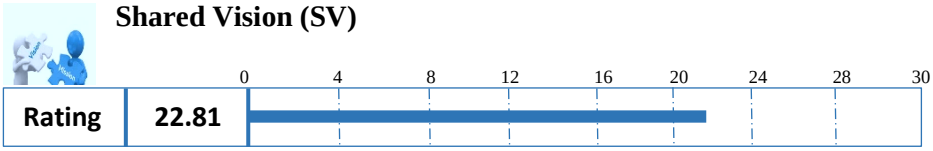
Modeling the way (MoW) of emotional intelligence assessment (ESAP) indicators correlates significantly with leadership and aggression. Empathy, decision-making, time management, commitment ethic, stress management, self-esteem, comfort, and assertiveness are negatively correlated**. Shared Vision (SV)** indicators correlate significantly with empathy, decision-making, aggression, commitment ethic, and comfort. Leadership, time management, stress management, self-esteem, and assertiveness are negatively correlated. **Challenging the process (CP)** indicators significantly correlates with decision-making, leadership, commitment ethics, self-esteem, comfort, and assertiveness. Empathy, aggression, time management, and stress management are negatively correlated. **Enabling others to act (EnOA)** These indicators correlate significantly with leadership, aggression, stress management, and comfort. Empathy, decision-making, time management, commitment ethics, self-esteem, and assertiveness are negatively correlated**. Encourage the Heart (EnH)** indicator correlates significantly with empathy, decision-making, aggression, commitment ethic, self-esteem, comfort, and assertiveness. Leadership, time management, and stress management are negatively correlated**.**

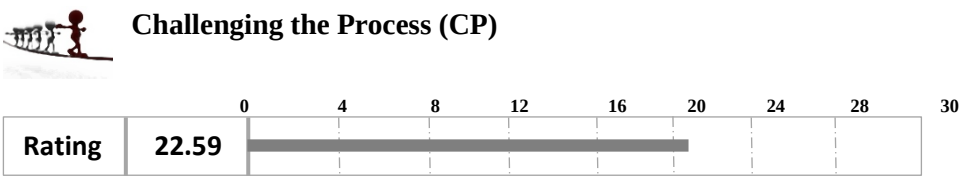
Leadership practice inventory-self (LPI-self) Analysis

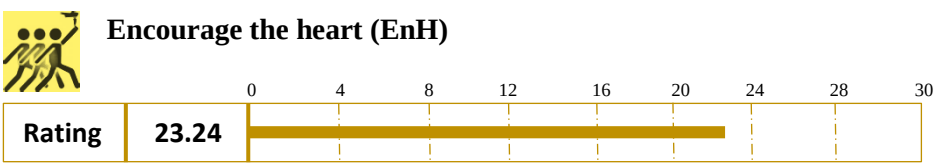
This measurement is based on 30 respondents' questions divided into 5 indicators. The response to this transformational leadership practice can be seen from the bar chart of each indicator. The average total response can range from 8 to 30, representing the respondent's score (1 = never to 5 = very often) for each indicator of 6 questions.











The leaders and observers who make up the Leadership Practice Inventory-self (LPI-self) database include a mix of males and females at all levels, from type academician in all programs, and from all who serve in the religious state universities of Ambon city. This page compares each respondent to all Observer responses for other leaders with experience as organizational leaders. The table below explains the results that are very frequent to never from the 30 leadership questions answered by respondents.

Table 4: Leadership practice inventory-self (LPI-self) ranking

		Component LPI	Rating
6	My leadership philosophy is clear and understandable to others	**Modelling**	5
27	I make sure people receive achievement for the success they do	**Encourage**	5
30	I give a lot of achievements to a team member for his contributions	**Encourage**	5
20	I usually actively listen to opinions from various perspectives of others	**Enabling**	5
26	I try to raise the confidence of others	**Encourage**	5
8	I offer an interesting overview of future successes	**Shared**	5
1	I set an example for others to follow what I hoped	**Modelling**	5
5	I build support in carrying out the vision of the organization/institution.	**Modelling**	5
29	I have a way of celebrating the achievements of organizations/institutions	**Encourage**	5
28	I can recognize people who are committed to the organization	**Encourage**	5
22	I usually respect other people's decisions	**Enabling**	4
23	I usually give others freedom and choice in getting the job done	**Enabling**	4
25	I commend others who did a great job	**Encourage**	4
19	I can establish cooperation with people who are on 1 team with me	**Enabling**	4
12	I give sincere assurance about the meaning and purpose of the success of the organization/institution.	**Shared**	4
7	I am talking about future trends in carrying out work that may affect organizations/institutions.	**Shared**	4
11	I give an overview of success in solving the demands of organizations/institutions.	**Shared**	4
16	I ask, "What can we learn?" when things don't go as expected	**Challenge**	4
21	I usually treat others with dignity and respect	**Enabling**	4
18	I dare to experiment and risk even if there is a chance of failure	**Challenge**	4
15	I use methods outside the formal organization/institution to improve my abilities.	**Challenge**	3
9	I urge others to continue to pursue the dream of the organization/institution/institution in the future.	**Shared**	3
10	I show others how to realize their success by coming together in the vision of the organization/institution.	**Shared**	3
14	I challenge others to use new/innovative ways of working	**Challenge**	3
13	I'm looking for more challenging opportunities to test my skills	**Challenge**	3
17	I make sure that we put together a planned schedule and program	**Challenge**	3
24	I make sure others thrive in their work by allowing themselves to develop.	**Enabling**	3
4	I always ask for feedback on my actions	**Modelling**	3
3	I keep the promises and commitments I make	**Modelling**	3
2	I make sure others work according to established procedures and standards.	**Modelling**	3

Response Scale	5. Very Often	3. Sometimes	1. Never
	4. Quite Often	2. Rarely	

Source: Result SPSS, 2023

Discussion

Based on the study's findings, researchers are framing the correlation between emotional intelligence assessment (ESAP) and Leadership practice inventory self (LPI-self) analyses whose results support many of the study's previous findings. When observed, the respondents who became objects were the average ones who grew up in conflict-prone areas since the 1999 tragedy

that led to territorial separation between religious people and sensitive tribal conflicts in the region. The practice of being exemplary in any current and past academic leadership experience is an intrinsic factor in addition to his experience leading.

Establishing the ability of emotional intelligence (EI) academics in leadership skills such as persuading subordinates and influencing subordinates to carry out according to the goals of the leader- is estimated to be increasingly honed. However, in this study, we did not trace how this skill attitude appeared. Whether this skill departs from situational or the attitude already exists from within the individual. This study is more inclined to observe the correlation of the existence of emotional intelligence (EI) (leadership and aggression), which correlates with the exemplary attitude of individuals when carrying out transformational leadership practices. Aggression skills also improve as exemplary practices are brought in. The respondent stated that being an example in leadership is the result of his emotional intelligence (EI) drive, through his skills to ward off negative emotions, such as expressing one's own/others' thoughts in a positive way rather than expressing anger at others, understanding ways to express emotions more effectively and on target.

The shared vision indicator is one of the indicators in third place among other indicators that respondents often carry out. Vision becomes a communication pattern that is an important consideration for leaders in achieving the goals of the organization's vision. This practice correlates with respondents' emotional intelligence (EI) with the ability to express thoughts positively to others (aggression), have a high empathy attitude, comfort, decision-making ability, and good ethical commitment. When likened, sharing the vision is a potential weapon that can unite organizational resources, and this is driven by the respondent's ability to collect the vision of his subordinates/team so that with empathy, comfort, and commitment ethic, he can make decisions rather than think with the people in it. (Rozeboom, 2008)

Individual awareness in the face of challenges is part of the transformational practice of leaders that emerged from the practice of academics in the city of Ambon. Unfortunately, this indicator is in last place among other indicators. The practice of awareness of facing these challenges arises and correlates with the respondent's emotional intelligence (EI), namely leadership, decision-making, commitment ethics, self-esteem, comfort, and assertiveness. When encountering difficulties, they quickly change the situation based on questions such as what to achieve and do next. This aligns with the research (Kouzes, O. & Posner, 2007; Maxwell, 2002). It is also expressed by Rozeboom (2008) that leaders should not be afraid of failure and should create a climate of change with their ability to make strategic decisions. Enabling others to act (EnOA) ranks second in practice that many respondents practice. This is an advance for academics formed from conflict-prone areas in 1999 – 2004 Ambon City.

There is openness and space that respondents are trying to build to form cooperative relationships and a desire to collaborate with their subordinates. In the past, the paradigm of thinking was still tribal, sacrosanct to input, and identic with paternal family life so that all life problems were carried out based on customary law and desires was superior to others. However, based on this research, a new pattern can be seen where, over time, this paradigm gradually fades, and there is growing harmony between tribes, maturity of society, and the development of leadership, aggression, stress management, and comfort attitudes. This perspective supports the research findings in Table 2. In practice, it can be interpreted as regional segregation in Ambon City. This does not interfere with emotional intelligence in academics at Islamic religious universities. Regional segregation in Ambon City was a major tragedy that occurred during Indonesia's independence, especially due to issues of religion and race, which divided the unity of the people of Ambon City. The incident that caused the separation of residences based on religion and the relationships that were created cannot be separated from economic and political relations, giving rise to various terms that the government and academics deliberately echo through the term "*ale rasa beta rasa*" which means what you feel, so do I feel this is an important focus that helps develop the cultural intelligence of

academics in particular and society in general. Limitations regarding follow-up to this understanding still require further investigation.

Conclusion

The emotional intelligence assessment (ESAP) and Leadership practice inventory-self (LPI-self) scales can significantly be used for academic construction, such as overcoming negative emotions and improving constructive thinking, especially in transformational leadership practices in the sensitive area of Ambon City. There are emotional intelligence (EI) connections from Assertiveness (Interpersonal skill), Comfort (Leadership skill), Self-esteem (Leadership skill), Management stress (Intrapersonal skill), Commitment ethics (Self-management skill), Time management (Self-management skill), Leadership (Leadership skill), Decision making (Leadership skill), Empathy (Leadership skill), Aggression (Potential problem area) in the predictor of transformational leadership practices. However, all scales of follow-up action need to focus on assisting respondents to apply proactive rather than reactive skills that trigger conflict repetition in these areas. Emotional intelligence assessment (ESAP) shows that respondents need to increase challenges and become role models in facing demands effectively in the work environment. Encouraging the development of these skills will help improve academic success and reduce friction in the long run.

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Anxiety and Digital Phenotypes as Diversity Markers for Selected Filipino University Students

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ABSTRACT

With the considerable multitude of distinct characteristics and backgrounds within the student population, their learning needs manifest in diverse forms. Apart from the commonly identified factors contributing to student diversity, such as age, ethnicity, language, and socio-economic status, this quantitative research examined anxiety and digital phenotypes as potential markers of diversity. The study investigated the relationship between these possible diversity markers and the demographic variables of gender, degree of higher education, living arrangement, and student employment status. The analyzed data came from 103 Filipino university students who successfully completed a self-report on anxiety and two-week recordings of smartphone activities. Results showed that the students' living arrangements are the most critical demographic variable. Anxiety and digital phenotypes may be diversity markers for students' living arrangements. In light of these findings, educational institutions should determine and implement inclusive strategies to further safeguard their students' mental health, particularly those living alone.

Keywords: student diversity, smartphone, post-pandemic, mobile applications

Introduction

Learners, being the central focus of any educational process, possess individual differences that contribute to student diversity. Although there is a multiplicity of definitions, the concept of 'diverse students' generally pertains to individuals from different racial, cultural, ethnic, linguistic, and socio-economic origins (Hishan et al., 2020). Current perspectives on diversity markers among students imply that learners exhibit inherent differences in their ancestral roots, attributes, way of life, dialects, and social strata, resulting in varying learning needs. The idea behind diversity has grown more all-encompassing, looking at it through wider lenses. According to Pineda and Mishra (2023), "diversity in itself is a broad and continuously evolving concept...the understanding of diversity has differed from an emphasis on race/ethnicity and gender to including religion, income, family characteristics, disabilities, chronic health conditions, and sexual orientation" (p. 865). These qualities, combined with students' lived experiences, may contribute to the persistent evolution of diversity markers.

For the last few decades, academic and social discussions on diversity markers have seen a noticeable increase. In higher education institutions, studies have already been undertaken to scrutinize the concept of diversity and its acceptance among students (Veccaro in Trolian & Parker III, 2022). The overwhelming conclusion from these studies is that there is a strong need for strategies to assist students in becoming more cognizant of and tolerant of their differences. For instance, Trolian and Parker III imply that higher education institutions should also be proactive in determining diversity markers, exploring beyond the commonly mentioned student backgrounds and characteristics. Likewise, for a more enhanced student learning experience, it is incumbent upon educators to acknowledge diversity markers to foster inclusivity in the classroom.

Diversity markers are identifiable attributes of learners that contribute to each of their unique learning experiences. These identifiable and measurable markers also establish a varying range of learning needs, and as Pozas et al. (2020) asserted, diverse learning needs call for an inclusive instructional approach that effectively incorporates varying strategies and methods. It suggests that educators, irrespective of the level of education they are entrusted with teaching, must give significant thought to student diversity, particularly to the educational demands arising from their unique characteristics and associated diversity markers. In this paper, we expand the concept of diversity markers by looking into student anxiety and digital phenotypes, or smartphone activities, to nurture greater learning comprehensiveness.

Local and global reports mention the upsurge in the number of anxiety-related cases among students (Acob et al., 2021; Jehi et al., 2022; Radwan et al., 2021; Son et al., 2020) and

smartphone usage (Mella-Norambuena et al., 2021; Serra et al., 2021), this research investigated potentially new diversity markers to help students thrive in post-pandemic times. This study focused on anxiety and digital phenotypes among selected university students as they made the necessary shift in learning modes. To achieve this, the researchers aim to find answers to the following research inquiries:

1. What is the level of anxiety of the participants?
2. What are the patterns of digital phenotypes of the participants, specifically in terms of:
   a. amount of time spent on smartphones and
   b. most frequently used mobile applications?
3. Are there significant differences in the level of anxiety of the participants when grouped according to the following demographic variables:
   a. gender;
   b. degree of higher education;
   c. living arrangement, and
   d. student employment status?
4. Is there a correlation between anxiety and each of the demographic variables?
5. Is there a correlation between digital phenotypes and each of the demographic variables?
6. Is there a correlation between anxiety and digital phenotypes of the participants?

Literature Review

Anxiety as a Diversity Marker

Recent research on student diversity highlights the importance of implementing additional mechanisms in universities and colleges that aim to support the psychological welfare of students, recognizing anxiety as an emerging diversity marker. As a diversity marker, anxiety manifests in different ways and causes varying degrees of psychological unease and fear among university students, stemming from numerous reasons and factors. Individuals aged 18 to 24 experience the most mental health conditions, particularly during the pandemic (Panchal et al., 2023). Just as undergraduate and graduate students are individually unique regarding their academic abilities and learning potential, so are their responses to anxiety. A study by Basheti et al. (2023) describes a marked abnormality in the anxiety scores of university students, especially among female participants, younger students, and those on medication. Given the rising prevalence of student anxiety, there is a need for differentiated support and instruction (Liu & Shi, 2023). Comparably, Hall (2022) emphasized the significance of

seeking the assistance of mental health professionals, taking pauses, and engaging in self-care activities to improve one's mental condition.

Digital Phenotypes as Diversity Markers

To gain a better understanding of an individual's emotional and mental states, such as anxiety, digital phenotyping or smartphone behavior analysis is used as a contemporary and naturalistic mode of analysis since the "smartphone may be an unprecedented opportunity to measure real-world functioning and potentially to offer just-in-time interventions" (Insel, 2018). This enables digital phenotyping to be a novel way to facilitate more accurate identification and effective management of mental health conditions (Martinez-Martin et al., 2018). According to Onnela (2021), digital phenotyping centers on continuous observation and data collection from a digital device such as a smartphone without interrupting natural or actual behaviors. This makes smartphone behaviors the digital manifestations of an individual's environment, genotype, and phenotype (Harvard School of Public Health, 2019), thus representing the collection of continuously monitored digital behaviors throughout a timeframe. Hence, digital phenotyping becomes a diversity marker for learners because of the smartphone's feature of real-time monitoring of the user's digital behaviors and likely reflects the user's state of mind.

One coping strategy during the pandemic was to engage more with smartphones. The uses and capabilities of mobile technology, specifically that of mobile phones and smartphones, have grown exponentially in proportion in the past 40-plus years. Due to its omnipresence and popularity, these devices are used for a diverse roster of functions for longer periods of screen time (Kemp, 2020). In a recent survey, internet users, particularly the younger generation, have become more attached to their mobile phones due to lockdown effects (Sebire, 2020). This increased smartphone activity during the pandemic can indicate the need for information and the desire for any semblance of normality (Nortajuddin, 2020).

In a survey of ASEAN Post in 2020, mobile phone users in the Philippines are reported to spend more time on social media than in any other country, and compared to the global average of 47%, 64% of Filipinos in this survey claimed that their 'social time' has grown (Nortajuddin, 2020). Furthermore, during the initial lockdowns in the Philippines, during which social and psychological distress was high, Filipinos spent 9 hours daily on social media looking for information and breaking news. The increased smartphone use may have promoted strong well-being and made people feel more connected to others. An earlier study by Cho (2015) concluded that decreased levels of loneliness and increased sentiments of social capital can be linked to smartphone communication applications. This is supported by the

research of David and Roberts (2021), which concludes, among others, that using a smartphone reduces the detrimental effects of isolation on well-being and social connectedness.

The literature reviewed for this study led the researchers to develop a conceptual framework, presenting the two main variables in Figure 1—anxiety and digital phenotypes.

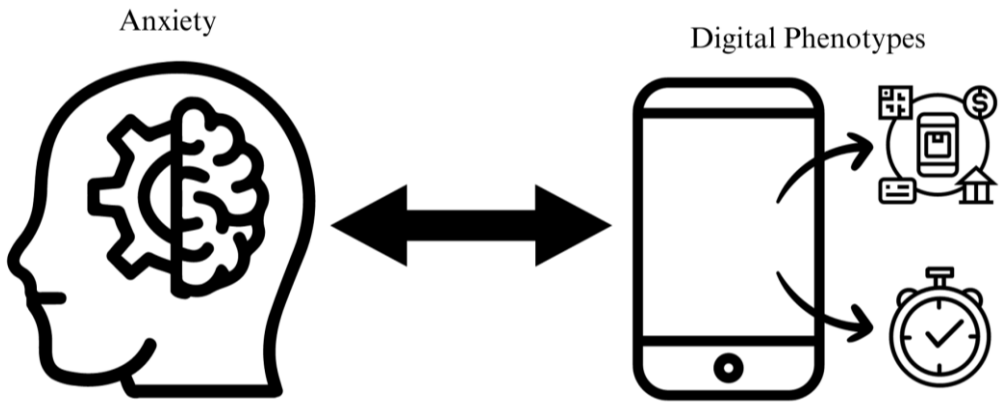

Figure 1: Conceptual Framework for Anxiety and Digital Phenotyping as Diversity Markers

Anxiety is an emotional experience exemplified by feelings of tension and worried thoughts, as well as accompanying physical changes. The digital phenotype, which arises from the interface between a person's cognitive and emotional processes and modern technology, refers to the digital manifestation of smartphone behaviors (in terms of time spent and the nature of mobile applications utilized) as influenced by a person's mental state. We hypothesize that anxiety and smartphone behaviors influence one another, wherein anxiety is manifested by the amount of screen time and type of mobile application one engages with as forms of checking or reassurance behaviors. Conversely, screentime duration and the nature of mobile applications used are affected by anxiety; likewise, anxiety leads to increased screentime and frequent use of specific mobile applications.

Methodology

Research Participants

The participants were selected Filipino university students who had satisfied the following inclusion criteria: (1) must be enrolled in any higher education institution in the Philippines; (2) must be between 18 and 35 years old; and (3) must own a mobile device that has (at least) Android operating system (AOS) version 10 or (at least) iOS version 13, which is capable of monitoring digital footprints. The term 'university students' refers to undergraduate and

graduate students enrolled in a Philippine higher education institution during the data collection period. To note, no specific Philippine university was specifically targeted in determining the sample size for this study, as long as the participant fits the inclusion criteria.

Research Instruments

Digital Phenotypes: Measurements of smartphone behaviors, particularly frequency of smartphone usage (in terms of minutes) and types of frequently used mobile applications, were recorded during a two-week period, which coincides with the timeframe covered by GAD-7.

Generalized Anxiety Disorder Assessment-7 (Spitzer et al., 2006): The GAD-7 is a self-report measure of clinically significant anxiety experiences for the past two weeks. GAD-7 includes seven components with equivalent points: nervousness, inability to stop worrying, excessive worry, restlessness, difficulty relaxing, easy irritation, and fear of something awful happening. Upon completing the assessment, the points for the seven components were totaled. To note, cutoff scores are 5, 10, and 15 for mild, moderate, and severe levels, respectively, while scores lower than 5 are categorized as minimal.

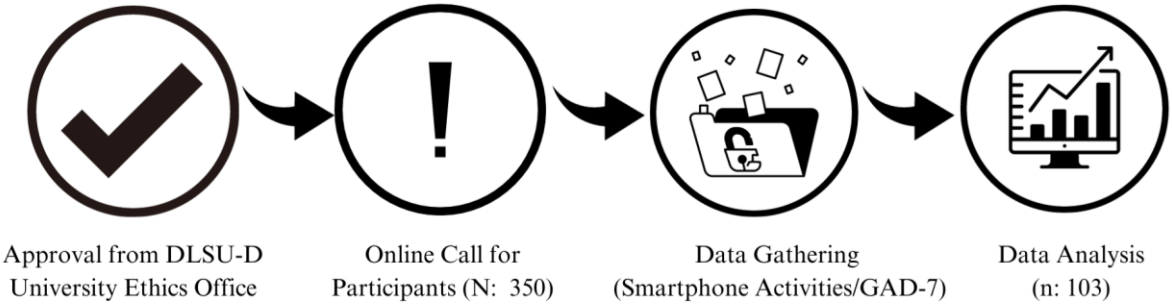

Figure 2: Research Framework

Data Gathering

A seven-month online call for university participants, both undergraduate and graduate students, was posted from October 2022 to May 2023. For the utmost protection of the participants, the researchers secured Informed Consent from them and an Ethics Certification from the Ethics Review Committee before data gathering. The consent obtained from the participants contains protocols for voluntary participation, potential risks and benefits, confidentiality, and the right to withdraw without any penalty. Participants who fulfilled the qualifications were given online access to a questionnaire for demographic profiling. They were requested to provide screenshots of their recent two-week smartphone activities, monitored using the Digital Well-Being (Android smartphones) or Screen Time (iOS smartphones) applications. Participants answered the GAD-7 on the day they submitted the completed two-week screenshots. Out of the 350 online participants who participated in the call, the researchers analyzed data from 103 participants who had successfully submitted the

required two-week screenshots and completed GAD-7.

Data Analysis

Software programs, specifically *jamovi* Statistical Software and Microsoft Office Excel Software Data Analysis Toolpak, were utilized for data analysis. Descriptive statistics were used for the demographic description of the participants. Frequencies, means, and standard deviations were calculated to characterize GAD-7 anxiety scores and digital phenotypes. Mode identified participants' most frequently used applications. A t-test for independent samples and one-way analysis of variance (ANOVA) were used to determine significant differences between variables. Correlational statistics, specifically Pearson product-moment correlation (r), was applied to explore the links between GAD-7 scores and the average weekly smartphone usage. Point-biserial correlation (rpb) was used to check associations between demographic variables and anxiety scores and b) average weekly smartphone usage. Additionally, the associations between anxiety levels, demographic variables, and the category of applications used by the participants were determined by calculating the chi-square test of independence and the computation of Cramer's V for effect sizes.

Result

Table 1: Demographic Profile of the Participants (n: 103)

Variable	Frequency	GAD-7		
		M	SD	SE
1. Gender				
a. Male	76	8.87	5.40	0.62
b. Female	23	9.39	5.95	1.24
c. Others	4	9.00	4.32	2.16
2. Degree of Higher Education				
a. Undergraduate	82	9.12	9.00	5.53
b. Graduate	21	8.48	9.00	5.23
3. Living Arrangement				
a. Alone	5	13.80	6.38	2.85
b. With Family Members	96	8.92	5.24	0.53
c. With Others	2	0.50	0.71	0.50
4. Student Employment Status				
a. Non-Working	74	9.18	5.47	0.64
b. Working	29	8.52	5.47	1.02

The summary of the 103 participants' demographics is presented in Table 1. The gender of "Others" covers participants who identify themselves as non-binary. "Degree of education" refers to participants who are either taking up their bachelor studies (undergraduate) or pursuing a Master's or Doctorate degree (graduate). "Living with others" describes participants with non-relatives, such as friends and other students. "Student employment status" pertains to whether or not the participant is a full-time (non-working) or a part-time (working) student.

The majority of participants were males (73.79%), undergraduate students (79.61%), living with family members (93.20%), and non-working or studying full-time (71.84%). In terms of GAD-7 anxiety scores, the highest mean scores were obtained by female participants (mild to moderate range), undergraduate students (mild to moderate range), participants living alone (moderate to severe), and non-working or full-time students (mild to moderate).

Research Question 1: What is the level of anxiety of the participants?

Table 2 shows the frequencies of scores based on GAD-7's anxiety severity levels. The average score of the participants was 8.99 (SD=5.45; 38.8%), with a median of 9. This is equivalent to a minimal level of anxiety. As seen in Table 2, most participants (83.49%) experienced less severe anxiety symptoms.

Table 2: GAD-7 Anxiety Levels of the Participants

Level	Frequency	M	SD	% of Total	Cumulative %
Minimal	40	3.45	1.81	38.83	38.83
Mild	24	8.88	0.95	23.30	62.13
Moderate	22	12.45	1.18	21.36	83.49
Severe	17	17.71	2.02	16.50	100.00

Research Question 2. What are the patterns of digital phenotypes of the participants, specifically in terms of time spent on smartphones and most frequently used mobile applications?

Table 3: Time Spent Using Smartphones in Minutes

	Week 1							Week 2						
Day Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	463	472	474	485	508	518	533	521	506	500	496	507	487	400
Mdn	466	469	491	497	501	530	499	508	485	486	480	465	489	411
SD	229	216	217	223	214	226	234	224	219	212	222	212	198	199
Minimum time	0	0	0	0	0	0	0	0	0	0	0	19	65	32
Maximum time	957	954	915	1057	1162	1080	1440	1440	1440	1440	1440	988	970	899

Table 3 displays the number of minutes participants spent being engaged on their smartphones, including the time range spent per day (minimum and maximum time). Weekly, they spent an average of 3,458 minutes (57.63 hours) for Week 1 and 3,417 minutes (56.95 hours) for Week 2 on their mobile devices. The two-week total time spent was 6,870 minutes (114.58 hours). The daily average mobile phone usage was 490.71 minutes (8.18 hours).

Table 4: Most Frequently Used Mobile Applications

Nature of Mobile Applications (Sample Applications)	Counts	% of Total	Cumulative %
1. Social Media (e.g., Facebook, Twitter, Instagram)	2000	38.19	38.19
2. Communication (e.g., Messenger, Messages, Viber)	838	16.00	54.19
3. Entertainment (e.g., YouTube, Spotify, Netflix)	723	13.81	68.00
4. Productivity (e.g., Clock, Drive, Notes, Office)	412	7.87	75.86
5. Browser (e.g., Chrome, Safari, Google)	294	5.61	81.48
6. Games and Apps (e.g., Clash of Clans, Call of Duty)	293	5.59	87.07
7. Creativity (e.g., Capcut, Canva)	187	3.57	90.64
8. Reading and News (e.g., Manga Reader, Wattpad)	153	2.92	93.57
9. Shopping (e.g., Lazada, Shoppee)	117	2.23	95.80
10. Education (e.g., NEO LMS, Cerebro LMS)	25	0.48	96.28
11. Dating and Networking (e.g., Bumble, Grindr, Tinder)	20	0.38	96.66
12. Health and Fitness (e.g., Fitcoach, Home Workout)	20	0.38	97.04
13. Transportation (e.g., Grab, Lalamove)	16	0.31	97.35
14. Finance (e.g., GCash, Maya)	9	0.17	97.52
15. Food (e.g., Foodpanda)	8	0.15	97.67
16. Religion and Spirituality (e.g., Bible)	3	0.06	97.73
17. Other	39	0.74	98.47
18. None	80	1.53	100.00
Total	5237	100.00	

"Counts" indicate the number of times participants accessed and used the mobile applications listed. According to Table 4, participants interacted with the listed applications 5,237 times and were monitored using Digital Well-Being or Screen Time applications. The top three frequently used applications fell under social media, communication, and entertainment—the least used applications related to finance, food, religion, and spirituality.

Research Question 3. When grouped according to demographic variables, are there significant differences in the participants' anxiety levels?

Table 5: One-Way ANOVA for Anxiety and Gender

	F	df1	df2	p-value
GAD-7 Total	0.0658	2	8.22	0.937

Table 5 presents one-way ANOVA results regarding whether there are significant differences in anxiety levels when grouped according to the four demographic variables. When grouped according to gender, it was determined that there is no significant difference at the $p<.05$ level for the three gender groups ($F[2, 8.22]=0.0658$; $p=.937$).

Table 6: T-Test for Independent Samples for Anxiety and Degree of Higher Education

	Statistics	df	p-value
GAD-7 Total	0.483	101	0.630

To determine if there is a significant difference in the level of anxiety between undergraduate and graduate student participants, a t-test for independent samples was used. Table 6 shows no significant difference in their anxiety levels ($t[101]=0.483$; $p=.630$).

Table 7: One-Way ANOVA for Anxiety and Living Arrangement

	F	df1	df2	p-value
GAD-7 Total	63.9	2	5.66	<.001

When grouped according to living arrangement, significant differences in the anxiety scores were noted in Table 7 using ANOVA ($F[2, 5.6]=63.9$; $p< .001$). As per the breakdown of the demographic profile in Table 1, participants living by themselves had the highest mean anxiety score ($M=13.80$; moderate to severe levels), followed by those living with family members ($M=8.917$; mild to moderate levels), and, lastly, those living with others aside from family members ($M=0.500$; minimal level).

Table 8: T-Test for Independent Samples for Anxiety and Student Employment Status

	Statistics	df	p-value
GAD-7 Total	0.550	101	0.584

As presented in Table 8, based on the t-test for independent samples, no significant difference in the anxiety level was noted between working and non-working students (t[101]=0.550; p=.584).

Research Question 4. Is there a correlation between anxiety and each of the demographic variables?

Table 9: Correlation Matrix of Anxiety and Demographic Variables

		GAD-7	Gender	Living Arrangement	Higher Education	Employment
GAD-7	*rpb*	—				
	p-value	—				
Gender	*rpb*	0.025	—			
	p-value	0.804	—			
Living	*rpb*	-0.284**	0.001	—		
Arrangement	p-value	0.004	0.991	—		
Higher	*rpb*	-0.051	0.314**	-0.222*	—	
Education	p-value	0.612	0.001	0.025	—	
Employment	*rpb*	-0.055	0.068	-0.180	0.485***	—
	p-value	0.584	0.492	0.069	< .001	—

Point-biserial correlations were computed to determine the association between the demographic variables and anxiety scores. As seen in Table 9, there are no significant relationships between anxiety scores and three of the variables, specifically gender (rpb=0.025), degree of higher education (rpb=-0.051), and student employment status (rpb = -0.130). A significant relationship exists between anxiety scores and living arrangements (rpb=-0.284), implying that students living alone tend to report higher anxiety.

Research Question 5. Is there a correlation between digital phenotypes and each of the demographic variables?

Table 10: Correlation Matrix of Digital Phenotype-Time Spent and Demographic Variables

		TS W1	TS W1+W2	Gender	Living Arrangement	Higher Education	Employment
TS W1	*rpb*	—					
	p-value	—					
TS W1+W2	*rpb*	0.938***	—				
	p-value	< .001	—				
Gender	*rpb*	0.034	0.083	—			
	p-value	0.736	0.404	—			
Living	*rpb*	-0.022	0.005	0.001	—		
Arrangement	p-value	0.826	0.962	0.991	—		
Higher	*rpb*	-0.094	-0.135	0.314**	-0.222*	—	
Education	p-value	0.349	0.175	0.001	0.025	—	
Employment	*rpb*	-0.232*	-0.235*	0.068	-0.18	0.485***	—
	p-value	0.019	0.017	0.492	0.069	< .001	—

Note. W1=Week 1; W1+W2= Weeks 1 and 2; *p< .05; **p< .01; ***p< .001

A point-biserial correlation was used to explore whether relationships exist between time spent and demographic variables. Looking at one-week smartphone usage, Table 10 shows no significant relationships between time spent on mobile phones and gender (rpb=0.034), degree of higher education (rpb= -0.094), or living arrangement (rpb= -0.022). However, a significant correlation exists between time spent and student employment status (rpb= -0.232).

Similar relationships were found for two weeks of smartphone use. No significant relationships existed between time spent on mobile phones and gender (rpb=0.083), degree of higher education (rpb= -0.135), or living arrangement (rpb=0.005). Nonetheless, a significant correlation exists between time spent and student employment status (rpb= -0.235).

Table 11: Chi-Square Test of Independence for Digital Phenotype-Most Frequently Used Applications and Demographic Variables

	Value	df	p-value
Gender			
X^2	179.4852	34	0.000
N	5237		
Higher Education			
X^2	96.27	17	0.000
N	5237		
Living Arrangement			
X^2	130.76	34	0.000
N	5237		
Employment Status			
X^2	233.32	17	0.000
N	5237		

In Table 11, a chi-square test of independence was performed to assess the relationship between the commonly used applications and demographic variables. It was found that significant relationships exist between the applications and demographic variables. Significant but weak relationships were found between most commonly used applications and gender (X^2[34; N=5237]=179.49; p=0.000; V=0.131) and higher education (X^2[17; N= 5237]=96.27; p=0.000; V=0.136). A moderately significant relationship exists between most commonly used applications and student employment status (X^2[17; N=5237)=233.32; p=0.000; V=0.211). Lastly, there is a strong correlation between commonly used applications and living arrangements (X^2[34; N=5237]=130.76; p=0.000; V= 0.764).

Research Question 6. Is there a correlation between anxiety and digital phenotypes of the participants?

Table 12: Correlation Matrix of Anxiety and Digital Phenotype-Time Spent

		GAD-7	TS W1	TS W1+W2
GAD-7	Pearson's r	—		
	p-value	—		
TS W1	Pearson's r	0.014	—	
	p-value	0.890	—	
TS W1+W2	Pearson's r	0.070	0.938***	—
	p-value	0.483	< .001	—

Note. W1=Week 1; W1+W2= Weeks 1 and 2; *p< .05; **p< .01; ***p< .001

Digital phenotypes are categorized into time spent on smartphone usage and the nature of frequently used mobile applications. Table 12 presents the correlation matrix for anxiety and time spent during one week and two weeks of smartphone usage. A Pearson product-moment correlation was computed to determine the presence or absence of a significant relationship between the two variables. Based on Pearson correlation coefficients, no significant correlations were found between anxiety and time spent on the mobile device in both one-week (r=0.014) and two-week (r=0.070) data.

Table 13: Chi-Square Test of Independence for Anxiety and Digital Phenotype-Most Frequently Used Applications

	Value	df	p-value
X^2	343.945155	51	0.000
N	5237		

A chi-square test of independence was used to determine the relationship between anxiety and the type of mobile applications used. Table 13 shows a statistically significant relationship between the variables. However, after applying Cramer's V to determine the effect size of this relationship, it was determined that the association between anxiety and frequently used mobile applications, although significant, is weak (X^2[51; N=5237)=343.94; p=0.000; V=0.148).

Discussion and Implications

Our study aimed to identify possible learning diversity markers among selected university students in the post-pandemic times, specifically anxiety and digital phenotypes or smartphone behaviors regarding the amount of time spent and most used mobile applications.

Anxiety as a Diversity Marker

In recent years, there has been a surge in scholarly investigations that center on anxiety among students in higher education and its associated determinants, such as gender, level of education, and residence (Jehi et al., 2022). While the general level of anxiety varies among our study participants, it nonetheless shows that higher education students experience anxiety. This pattern of anxiety is supported by Eisenberg et al. (2023) for the years 2021 and 2022.

Three of the four demographic variables we focused on, namely gender, degree of higher education, and student employment status, were not correlated with anxiety. It implies that our student participants generally experience similar anxiety levels regardless of these variables. Although we did not find evidence of an association between "student employment status" and anxiety, participants who identified as non-working or full-time students nevertheless obtained higher anxiety mean scores. Since most of the participants in this employment status category were relatively early in their university education and came from varying socio-economic backgrounds, they might not have fully adjusted to college life. Additionally, the pandemic hit as they were starting or about to begin their tertiary education, which might have compounded their adjustment challenges.

"Living arrangement" was found to have an inversely significant correlation with anxiety. Students who live alone or alone are prone to higher levels of anxiety, while students who live with their families or others tend to experience lower anxiety levels. According to Edwards et al. (2022), living situation significantly predicts anxiety levels. Support from peers, family, and other social individuals plays a significant role in predicting the level of anxiety (Ortenburger et al., 2021). As Edwards et al. (2022) and Szkody et al. (2020) stated, having a

support system may be a mitigating factor in safeguarding a better state of mental health. In addition, it is important to emphasize the influence of residing in solitary living arrangements or possessing limited social support systems on cautiousness and outlook toward danger (Szkody et al., 2020). Thus, Philippine educators must consider students' living arrangements as part of their learning experience. MacDonald and Schermer (2021) examined the relationship between the subjective experience of social isolation, loneliness, and technology. They also looked into anxiety as a potential predictor variable. After evaluating how dwelling situations are associated with experiences of social isolation, they concluded that people living alone tend to experience higher levels of loneliness than those living with roommates or family members.

Digital Phenotypes as Diversity Markers

Similar to recent studies on the ubiquitousness of smartphones in day-to-day functioning, smartphone usage has become a crucial part of participants' daily routines, as seen in the temporal patterns of digital behaviors, whether daily or weekly. In our study, the reported daily average time spent on smartphones, which is 8.18 hours, is close to the range mentioned by Lacificar (2019), which is 5 to 8 hours. Our research data shows a significant and weak relationship between the average time spent and student employment status. Correspondingly, the significance of time allocated to smartphone engagement emphasizes the need to find a balance that allows them to engage in other important offline activities.

Furthermore, data provided by participants' Digital Well-Being or Screen Time applications presented valuable insights into their preferences for mobile applications. Social Media applications, such as Facebook and Instagram, had the highest frequency of engagement, suggesting the weighty role these applications have in their daily lives. Meanwhile, the second and third-highest frequencies were observed for Communication and Entertainment applications, respectively, indicating the importance of messaging platforms like Messenger and video content like YouTube. These top three mobile applications potentially impact participants' social interactions, information consumption, and overall well-being. This is supported by the similar findings of Lacificar (2019). Additionally, Pajarillo-Aquino (2019) mentions that a greater percentage of Filipino university students utilize their mobile devices to communicate with their peers and teachers. Cabrera et al. (2019) noted that many Filipinos use Facebook or Messenger applications regularly.

Frequently used mobile applications have significant and weak correlations with gender, degree of education, and employment status. Buctot et al. (in Albursan et al., 2022) have pointed to the existence of a gender disparity when it comes to the types of mobile

applications. In contrast, Filipino male students use their smartphones for entertainment, such as playing games. Filipino female students prefer using smartphones to foster connections through social networks and engage with multimedia applications. In terms of the degree of education, undergraduate students appear generally more inclined towards intensive utilization of smartphone technology when juxtaposed with older social groups, presumably with higher educational attainment. Albursan and colleagues (2022) looked into smartphone addiction among university students and found a higher mean score for undergraduate students than for graduate students.

The most notable and robust correlational finding is between participants' living arrangements and their preferred mobile application category. Participants who lived alone were more engaged in using mobile applications, primarily social media, followed by communication and entertainment. While social media and communication applications focus on connecting people, sharing information, and initiating and maintaining social connections, entertainment applications (such as gaming, video streaming, and music) highlight leisure activities and relaxation.

Correlation Between Anxiety and Digital Phenotypes

Our initial hypothesis is that anxiety and digital phenotypes, or smartphone behaviors, affect one another. Findings are split in support of this hypothesis. Based on data collected regarding time spent with smartphones, there is no significant correlation between anxiety levels and the amount of smartphone usage time. This result adds to the growing scientific consensus that screen time does not reflect the state of mental health among university students (Rozgonjuk et al., 2018; Shaw et al., 2020), inferring that using screen time or smartphone usage as a stand-alone tool to determine anxiety may not be beneficial.

On one hand, a significant, albeit weak, relationship was found between anxiety and the type of mobile application used. This implies that participants tend to gravitate toward certain mobile applications when feeling anxious. According to Ryu et al. (2021), individuals experiencing clinical anxiety demonstrated higher levels of engagement with social networking applications than communication applications, as observed in their investigation of social media usage patterns during the pandemic. This finding supports our data that participants living alone (with the highest level of anxiety) have higher engagement with social media and communication mobile applications.

Conclusion

The living arrangements of the university students participating in this study appear to be the most critical demographic variable. Anxiety and digital phenotypes may be diversity markers for students' living arrangements. In light of these findings, educational institutions should adopt more inclusive strategies, such as regular monitoring, peer support, teacher-student mentoring programs, and remote counseling services, to promote their students' mental health, particularly those living alone. Moreover, anxiety or digital phenotypes may or may not universally affect individuals within varied demographics. Still, higher education institutions need to foster an atmosphere that nurtures the success of all students, regardless of their unique or generalized responses to anxiety or patterns of digital engagement. Although screen time or time spent with smartphones was not associated with anxiety, it might be better to consider the type of mobile applications used since this digital phenotype was correlated with anxiety.

Recommendations

Life in a tertiary educational institution can be daunting, especially after the pandemic. Students from all levels must maneuver academic requirements, mental health challenges, and adjustments. Since it has been established that mental health affects academic performance, it would benefit higher learning institutions to invest in their students' psychological and emotional well-being. Mental health programs should be consistently implemented to monitor student well-being, particularly paying special attention to those considered most vulnerable psychologically. Since results show that social media and communication mobile applications are the top digital applications, mental health program developers may consider incorporating such applications for monitoring and as an additional and reliable mechanism that students needing psychological assistance may explore. Furthermore, helping students build more self-awareness can better inform them of their mental health status and make them more cognizant of how their well-being and digital behaviors impact one another.

There is a need to further examine the link between mental health and digital phenotypes to obtain a more balanced perspective on the role of smartphones among university students. Continued research efforts should be considered to involve more diverse populations, explore other variables, and scrutinize specific contexts when mobile devices can positively impact mental health. These future research endeavors may similarly hold practical significance for

scholars, advocates, mental health professionals, and university instructors who intend to promote the welfare of students in an ever-growing digital society.

Limitations

Due to the sample size and characteristics of the participants, generalizability is limited. In addition, smartphone behaviors were monitored using specific smartphone versions, and therefore, there is a bias toward those who can afford the more current smartphone models. The study did not explore other serious mental health consequences of excessive smartphone use, such as smartphone addiction. While the study did not delve into the benefits and drawbacks of smartphone usage, the findings can inform the development of essential mechanisms to promote healthier and more balanced smartphone usage habits.

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Analyzing Differences and the Relationship Model between Learning Satisfaction and the Willingness of International Students: A University of Technology in Taiwan

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ABSTRACT

Owing to the low number of births in Taiwan, the shortage of students has reached a new peak, which is a severe problem in higher education. To attract international students, the internationalization of higher education has become a necessary trend. Moreover, qualified services and support enable international students to remain at the same school and share a good reputation with students in their countries. Therefore, this research examines the disparities in learning satisfaction and willingness among international students from diverse backgrounds at the University of Technology in Taiwan. Furthermore, it analyzes the impact of learning satisfaction and motivation on students' willingness. The research design used a questionnaire comprising two questionnaires concerning learning satisfaction and willingness to study. A total of seventy-two valid samples participated in the study. The quantitative analysis of the questionnaires was conducted through descriptive statistics, t-test, ANOVA, and structural equation modeling (S.E.M.). The findings revealed significant disparities in learning satisfaction and willingness to study across international students at different program levels. Specifically, graduate-level international students demonstrated higher satisfaction and willingness to study than their undergraduate counterparts. Concerning the medium of instruction, English medium of instruction (E.M.I.) programs demonstrated higher levels of satisfaction than Chinese-medium instruction in the sub-factors of learning satisfaction and willingness to study. Specifically, in the sub-factors of "life function," "course materials," and "teaching methods and assessment" of learning satisfaction, as well as the "willingness to study" factor, E.M.I. showed significantly higher scores than the Mixed teaching in English and Chinese. The outcomes of the study further demonstrated that "learning satisfaction" was positively and significantly influenced by factors such as "life function," "learning environment," "course materials," "teaching methods and assessment," "teacher teaching," and "administrative support." Moreover, it was found that "willingness to study" was positively and significantly affected by "learning satisfaction." This research can aid Taiwanese universities in enhancing their competitiveness and attracting and retaining international students.

Keywords: E.M.I., internationalized higher education, student satisfaction

Introduction

The selection of Taiwan as the preferred destination for higher education among international students has shown a consistent upward trend (Moslehpour et al., 2020). From 2013 to 2021, the number of international students in Taiwan steadily increased from 57,920 to 92,963 (Statista, 2023). This surge in international student enrollment is particularly significant because of the student shortage faced by Taiwanese educational institutions due to declining birth rates (Moslehpour et al., 2020). The shortage of students reached a new peak in 2022 (Taipei Times, 2022), with Taiwan's population experiencing its third consecutive year of decline, primarily attributable to a record-low number of births (Taiwan News, 2023).

In 2018, international students accounted for 10% of the total number of university and college students in Taiwan, with enrollment figures increasing yearly (DeAeth, 2019). As the demand for studying abroad continues to increase, higher education institutions have recognized the importance of understanding international student satisfaction and fostering loyalty (Kéri et al., 2022), prompting many universities to prioritize enhancing student satisfaction and their reputation to attract top international students (Moslehpour et al., 2020).

In recent years, the internationalization of higher education has become a focal point of research interest (Buckner & Stein, 2020; Garwe & Thondhlana, 2021; Ghazarian, 2020). Empirical evidence consistently demonstrates that higher satisfaction levels reduce negative word-of-mouth communication and complaint behavior while increasing repurchase intentions (Richins, 1983; Smith & Bolton, 1998; Andreassen, 2001; Szymanski & Henard, 2001). However, international students may transfer and build an unfavorable reputation owing to negative learning attitudes such as depression or frustration (Tran et al., 2023). From an institutional research perspective, it is important to investigate strategies that meet the essential needs of international students for enhancing university retention and enrolling potential peers. Recognizing these critical factors is substantially significant. However, limited literature explores the relationship between learning satisfaction and the intention to continue learning. Consequently, this study aims to establish a framework for investigating the impact of learning satisfaction on the willingness of international students to study in Taiwan. The objectives of this study are as follows:

1. To compare the differences in learning satisfaction and willingness to study among international students based on different factors, such as program level and medium of instruction.
2. To explore the causal relationship between learning satisfaction and willingness to study.

This study seeks to provide valuable insights into the factors influencing the learning satisfaction of international students and their subsequent willingness to pursue higher education in Taiwan.

Literature Review

Learning Satisfaction

Shahsavar and Sudzina (2017) provided an elaborate definition of student satisfaction, characterizing it as the subjective evaluation of the perceived value of educational content and services acquired in exchange for the invested time and resources of the student. The concept of learning satisfaction draws inspiration from the notion of customer satisfaction proposed by Cardozo (1965). Scholars such as Greiner (2000) and Knight (2002) have emphasized the interrelation between the quality of service, teaching, and engagement within the learning environment and students' overall satisfaction, ultimately leading to successful learning outcomes. Holford and Patkar (2003) expound this by identifying five crucial factors of students' overall satisfaction: the quality of facilities, learning process, service provided, curriculum, and implementation of teaching. Correspondingly, Wu et al. (2015) have conducted a comprehensive investigation of learning satisfaction and identified five influential factors: teaching methods, course content, learning environment, encounters with administrative services, and the convenience of learning, all exhibiting significant associations with learning satisfaction.

Zhu et al. (2020) focus on evaluating online learning satisfaction among university students, from first-year students to seniors. Their research reveals that several factors primarily influence student satisfaction. They include the introduction of courses, learning objectives, teacher-student interaction, the transmission of positive values, the attention given by teachers to students' progress, the construction of a comprehensive knowledge system, and the cultivation of independent learning abilities. Considering these findings, this study aims to investigate learning satisfaction as a *dependent variable* across six key factors, which are the independent variables: life function (Wu et al., 2015), learning environment (Greiner, 2000; Knight, 2002; Wu et al., 2015), course materials (Wu et al., 2015), teaching methods and assessments (Wu et al., 2015), teacher teaching (Greiner, 2000; Knight, 2002; Zhu et al., 2020), and administrative support (Holford and Patkar, 2003; Wu et al., 2015). Building on this premise, the following hypotheses are proposed:

H1: Life function positively affects learning satisfaction.

H2: Learning environment positively affects learning satisfaction.

H3: Course materials positively affect learning satisfaction.

H4: Teaching methods and assessment positively affect learning satisfaction.

H5: Teacher teaching positively affects learning satisfaction.

H6: Administrative support positively affects learning satisfaction.

Furthermore, numerous scholars have highlighted the significant influence of individual characteristics on the learning satisfaction of international students, with particular attention given to factors such as gender (Chen, 2022; Li et al., 2020; Russell et al., 2010; Sauer, 2003), educational level (Li et al., 2020; Sauer, 2003), and language skills (Mori, 2000; Russell et al., 2010; Shery, Thomas, & Chui, 2010). Thus, the present study seeks to analyze the differences in learning satisfaction and willingness to study among international students from diverse backgrounds.

Willingness to Study

Drawing on insights from social psychology literature, willingness to study can be understood

within the customer loyalty framework, where customers' intentions to repurchase and their inclination to refer an institute or brand to others are considered key dimensions (Martensen et al., 2000). Loyalty initially conceptualized as synonymous with satisfaction and customer retention (Reichheld & Teal, 1996; Reichheld & Sasser, 1990), is influenced by factors such as the quality of teaching and students' learning satisfaction (Hennig-Thurau et al., 2001), indicating their significance in maintaining students' loyalty.

To assess learning satisfaction and continuing learning intentions, Wu et al. (2015) employed the SERVPERF (service performance) scale developed by Cronin and Taylor (1992) to measure service quality. Their study revealed a significant relationship between learning satisfaction and the intention to continue learning. Moslehpour et al. (2020) identified student satisfaction as a mediator between service quality and institutional reputation. Pedro et al. (2020) found that loyal students were willing to give back to the University. Building on these empirical findings, this study proposes the following hypothesis:

H7: Learning satisfaction positively affects willingness to study.

Methodology

Research Design and Framework

Based on an extensive review of the previous literature, a conceptual framework was developed for this study, as presented in Figure 1. The framework integrates various theoretical perspectives and empirical findings to understand the research topic comprehensively.

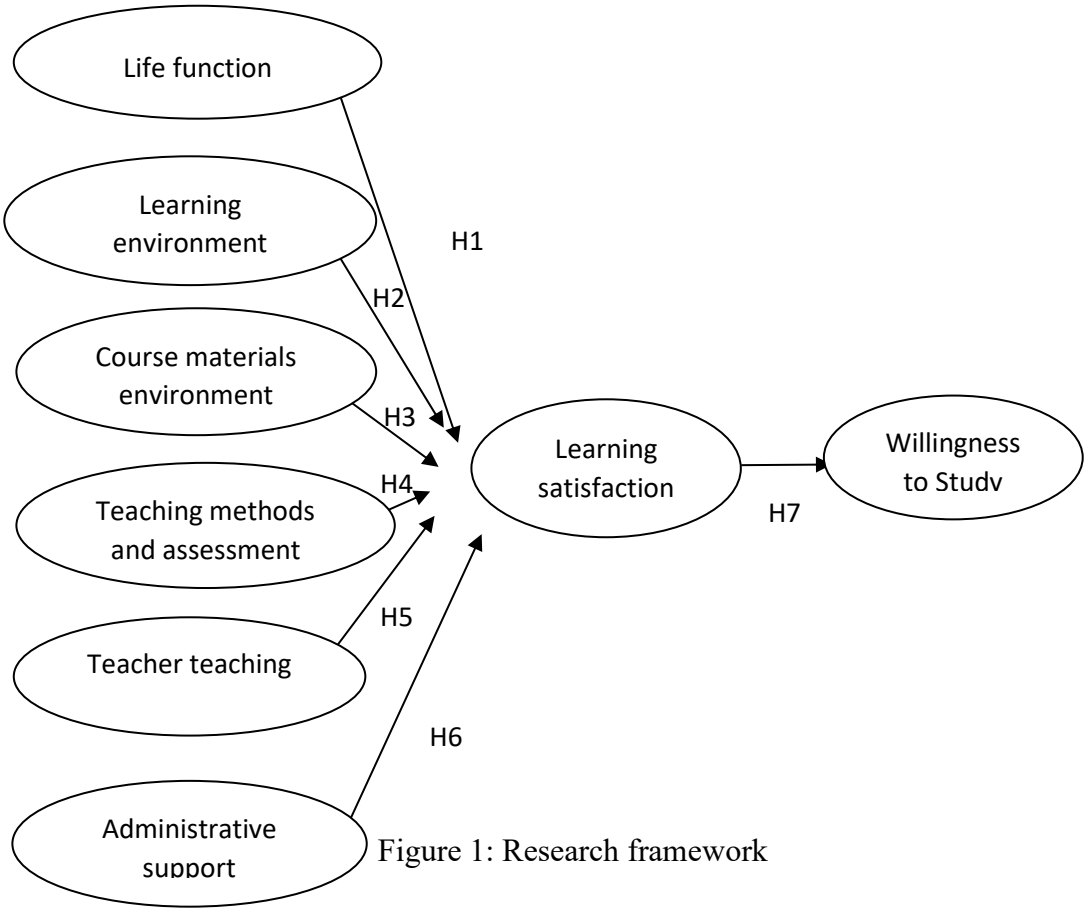


Figure 1: Research framework

Instruments

The instruments used in this study were developed based on a comprehensive review of previous research on learning satisfaction and willingness to study. During the conceptualization stage of the scale tool, this research initially distilled the definition of international students. Subsequently, it synthesized diverse dimensions for measuring their demands, as evidenced by the contents presented in Table 1.

Table 1: Research-aspect operational definition

Construct	Definition	Number	Indicator	Reference sources
Life function	The school's geographical location, service facilities, and physical equipment	8	The school is in a great location; The school has convenient transportation functions; Meal service hours provided by the school; The quality of the food served in the restaurant; Provides a safe and comfortable accommodation environment; Clear rental information; Provides comprehensive sports and leisure facilities; The University's signs are identified.	Parasuraman et al. (1988); ; Cheng & Wang (2007); Deng & Li(2007)
Learning environment	The teaching space environment and equipment resources provided by the school	5	The classroom's quantity and space; Teaching equipment update; E-learning and information environment; The school provides sufficient library resources; Internationalized learning environment	Beattie and Collins (2000); Chang(2011)
Course materials	The content of teaching materials provided by the school	7	Clear teaching objectives; Online query of teaching materials; Abundant elective courses; Well-planned professional courses; Good cohesion between courses; Innovation of course content; Meaningful "Labor Education" training	Branch (1994); Beattie and Collins (2000); Chang(2011)
Teaching methods and assessment	Course selection and assessment criteria provided by the school	4	Flexible and reasonable course arrangement; Public learning content of the course before choosing the course; Clear and easy-understanding teaching methods; Reasonable evaluation criteria	Beattie and Collins (2000); Cheng & Wang (2007); Chang(2011)
Teacher teaching	Course majors provided by teachers to students and interaction with students	6	Teacher's professional knowledge; Frequency of teacher-student interaction; Serious attitude of teachers' teaching; Encouraging students to discuss; Caring about student learning; Teaching assistant system Teacher's professional knowledge; Frequency of teacher-student	Beattie and Collins (2000); Branch (1994); Cheng & Wang (2007); Chang(2011)

			interaction; Serious attitude of teachers' teaching; Encouraging students to discuss; Caring about student learning; Teaching assistant system	
Administrative support	The school provides friendly administrative assistance so that students can study with peace of mind	8	Sufficient information that the school had provided me before I came here; Good mannered administrators; Club activities offered by the school; After-school academic tutoring service provided by the school; Counseling services provided by the school; For international students' activities organized by the Office of International and Cross-Strait Cooperation (ICSC); The information of part-time campus jobs provided by the school; The information of scholarships provided by the school	Beattie and Collins (2000); Cheng & Wang (2007); Chang(2011)
Learning satisfaction	The reaction of international students to positive or negative feelings after attending school	-	Consists of six dimensions (life function, learning environment, teaching materials, teaching methods, and assessment, teacher teaching, administrative support)	Binner et al.(1994); Ting et al. (2011); Tsai et al.(2012)
Willingness to Study	The actual feelings of international students towards the school determine the willingness of international students to return to school and recommend school	3	If you can choose again, you will choose the school again. You are willing to promote its advantages for the school to attract other students (s). Based on your experience at this school, you would not recommend friends or family members to attend this school (R)	Wu et al. (2015); Astin (1993); Ting et al. (2011); Tsai et al.(2012); Deng & Li(2007)

R: Reverse question

To enhance the questionnaire's face validity and content validity, three experts were invited to review its semantics: the director of the office of institutional research, an international student tutor, and an educational research teacher. A pre-test analysis was conducted based on the relevant questionnaire items using a sample of international students selected from a university in Taiwan. The primary methodology of this study is an online questionnaire.

The learning satisfaction scale comprised 38 items, all measured using a 5-point Likert-type scale ranging from very dissatisfied (1 point) to very satisfied (5 points). The willingness to study scale consisted of three questions, measured using a 5-point Likert-type scale, with responses ranging from strongly disagree (1 point) to strongly agree (5 points).

The survey was conducted between February 14, 2023, and March 2, 2023, and 38 international students participated in the preliminary test. However, 8 questionnaires were deemed invalid, leaving 30 valid questionnaires for further analysis of the reliability of the individual variable. After their feedback was received, the questionnaire was revised. Additionally, a pilot study was

conducted before the actual test to enhance the validity of the questionnaire. The reliability scores, indicated by Cronbach's alpha, ranged from 0.7 to 0.9 for all constructs, signifying the satisfactory measurement of the variables of interest. This adherence to Nunnally and Berstein's (1994) recommendation suggests that Cronbach's alpha should exceed 0.7 in more mature studies. Through expert interviews and extensive pilot testing, we established confidence in the face and content validity of the final instrument.

Population and Sample

The formal survey used a convenience sampling method. Data were collected from international students enrolled at a university in Taiwan. The Google online questionnaire survey was administered from March 14, 2023, to April 17, 2023. After excluding 19 incomplete surveys, 72 valid questionnaires remained for analysis (Table 2).

The sample comprised undergraduate students, representing the most popular program choice among international students (69.4%). This was followed by Ph.D. programs (23.6%) and Master's programs (7.0%). Regarding the duration of their stay, 47.2% of the international students had been in Taiwan for one year, 27.8% for two years, 12.5% for three years, and 12.5% for four or more years. The majority of respondents were female (62.5%). Regarding age distribution, 62.5% were within the age range of 18–24, 19.4% were aged 25–30, and 18.1% were over 31. Regarding the medium of instruction, 50.0% of the international students reported Chinese, 36.1% indicated English, and 13.9% reported a mixed teaching approach involving both English and Chinese.

Table 2: Respondents' profile

Demographics	Level	Count	Percentage
Program Level	Master's program	5	7.0
	Ph.D. program	17	23.6
	Undergraduate program	50	69.4
Grade	1 year	34	47.2
	2 years	20	27.8
	3 years	9	12.5
	4 or more years	9	12.5
Gender	Female	44	61.1
	Male	28	38.9
Age	18–24	45	62.5
	25–30	14	19.4
	above 31	13	18.1
Medium of Instruction	Chinese	36	50.0
	English	26	36.1
	Mixed teaching in English and Chinese	10	13.9

Data Analysis

Quantitative data analysis was conducted using SPSS 25.0. SmartPLS 3.0 software was also employed specifically for the partial least squares path analysis, as Ringle et al. (2015) recommended. The statistical methods employed in this study were as follows.

1. Descriptive statistical analysis: Using measures such as mean and standard deviation, the characteristics of the sample were examined, providing insights into the average levels and variability of students' learning satisfaction and willingness to study.
2. Independent sample t-test: Independent t-test analyses were conducted to detect significant differences among various categories concerning international students' learning satisfaction and willingness to study, including program level. To ensure an adequate number of samples for analysis, the program level was divided into two groups: Master's degree or above (including Master's and Ph.D. programs; this group comprises 30.6% of all respondents, with 23.6% of the respondents being Ph.D. students); and undergraduate programs.
3. Analyses of variance (ANOVA): ANOVA was used to detect significant differences among mediums of instruction.
4. Structural equation modeling (S.E.M.): S.E.M. was a comprehensive approach to analyzing measurement and structural models. This facilitated exploring the causal relationships between learning satisfaction and willingness to study.

Finding and Discussion

Analysis of the Average Learning Satisfaction and Willingness to Study

Upon close examination of Table 3, it becomes evident that the average score for each item measuring the learning satisfaction of international students surpassed 3 points, with a maximum score of 5 points. Several items demonstrated exceptional satisfaction levels, scoring 4 points or higher. These items include "8. The university logo is clear" (M = 4.01), "12. The school provides adequate library resources" (M = 4.17), "25. Teachers' professional knowledge" (M = 4.07), "27. Teacher's serious attitude toward teaching" (M = 4.10), "28. Encouraging students to discuss" (M = 4.17), and "29. Caring about student learning" (M = 4.04).

However, it is imperative to direct attention to aspects and specific items with average scores below 3.5, as they may indicate areas of concern. In particular, one notable area that requires further attention is the aspect of "Life Function": "1. The school is well located," which received an average score of 3.39.

Table 3: The average score of each item for learning satisfaction (n = 72)

Facts	Item	M	SD
Life Function	1. The school is in a great location	3.39	1.157
	2. The school has convenient transportation functions	3.67	1.101
	3. Meal service hours provided by the school	3.81	1.070
	4. The quality of the food served in the restaurant	3.63	0.971
	5. Provide a safe and comfortable accommodation environment	3.74	1.007
	6. Clear rental information	3.58	1.045
	7. Provide comprehensive sports and leisure facilities	3.72	1.129
	8. The University's signs are identified	4.01	0.896
Learning Environment	9. The classroom's quantity and space	3.74	1.151
	10. Teaching equipment update	3.78	1.038
	11. E-learning and information environment	3.67	1.035
	12. The school provides sufficient library resources	4.17	0.888
	13. Internationalized learning environment	3.54	1.113
Course Materials	14. Clear teaching objectives	3.81	1.016
	15. Online query of teaching materials	3.68	0.990
	16. Abundant elective courses	3.69	0.988
	17. Well-planned professional courses	3.79	1.047
	18. Good cohesion between courses	3.78	1.010
	19. Innovation of course content	3.74	0.979
	20. Meaningful "Labor Education" training	3.53	1.048
Teaching Methods and Assessment	21. Flexible and reasonable course arrangement	3.79	0.934
	22. Public learning content of the course before choosing the course	3.61	1.042
	23. Clear and easy-understanding teaching methods	3.85	0.974
	24. Reasonable evaluation criteria	3.83	0.949
Teacher Teaching	25. Teacher's professional knowledge	4.07	0.954
	26. Frequency of teacher-student interaction	3.97	0.934
	27. Serious attitude of teachers' teaching	4.10	0.825
	28. Encouraging students to discuss	4.17	0.856
	29. Caring about student learning	4.04	0.911
	30. Teaching assistant system	3.78	1.051
Administrative Support	31. Sufficient information that the school had provided me before I came here	3.60	1.195
	32. Good manners of administrators	3.83	1.061
	33. Club activities offered by the school	3.71	0.911
	34. After-school academic tutoring services provided by the school	3.63	0.985
	35. Counseling services provided by the school	3.69	0.959
	36. Foreign students' activities organized by the Office of International and Cross-Strait Cooperation (ICSC)	3.97	0.919
	37. The information on part-time campus jobs provided by the school	3.68	0.962
	38. The information on scholarships provided by the school	3.85	1.002

Upon carefully examining Table 4, it is apparent that the average score for each item assessing foreign students' willingness to study exceeds 3 points. Except for the reverse question in item 41, which fell slightly below the 3.5-point threshold, the remaining two questions surpassed the 3.5-point mark. These findings indicate that international students are willing to pursue further studies and have a favorable intention to recommend their educational experience to others.

Table 4: The average score of each item of willingness to study (n = 72)

Facts	Item	M	SD
Willingness to Study	39. If you have the opportunity to choose again, you will choose the school again	3.72	0.953
	40. You are willing to promote its advantages for the school to attract other students	3.67	0.993
	41. Based on your experience at this school, you would not recommend friends or family members to attend this school(R)	3.44	0.963

R: reverse question

Analysis of Differences in Learning Satisfaction and Willingness to Study

a) **Program Level:** Through t-test analysis, it was determined that the average scores for the sub-factors of learning satisfaction and willingness to study among international students with a master's degree or above were notably higher than those of undergraduate students. This significant difference, with a *p*-value of less than 0.01, was observed across all sub-factors, as shown in Table 5. The t-values of the "Teaching Methods and Assessment" and "Teacher Teaching" factors were higher than 4.5 for graduate students, and the professional teachers had the highest satisfaction scores.

Table 5: t-test analysis table for different program levels

Factors	Group	n	M	SD	t
Life Function	Undergraduate program	50	3.45	0.76	−4.29**
	Master's degree or above	22	4.26	0.69	
Learning Environment	Undergraduate program	50	3.58	0.83	−2.97**
	Master's degree or above	22	4.24	0.96	
Course Materials	Undergraduate program	50	3.46	0.79	−4.36**
	Master's degree or above	22	4.31	0.69	
Teaching Methods and Assessment	Undergraduate program	50	3.45	0.76	−5.80**
	Master's degree or above	22	4.51	0.61	
Teacher Teaching	Undergraduate program	50	3.77	0.73	−4.51**
	Master's degree or above	22	4.58	0.64	
Administrative Support	Undergraduate program	50	3.56	0.73	−3.11**
	Master's degree or above	22	4.16	0.83	
Willingness to Study	Undergraduate program	50	3.43	0.67	−3.13**
	Master's degree or above	22	4.02	0.84	

* $p < 0.05$, ** $p < 0.01$

Medium of Instruction: Table 6 shows the average scores for different teaching languages. It was determined that the international students instructed in English (English-medium instruction or E.M.I.) manifest the highest average scores across the sub-factors encompassing learning

satisfaction and willingness to study. Expanding upon these revelations, ANOVA was conducted to ascertain the impact of E.M.I. on international students' learning satisfaction and t willingness to study. As detailed in Table 7, the ANOVA outcomes affirm the substantial implications of E.M.I., evoking statistically significant differences among international students' learning satisfaction levels and willingness to study. Therefore, a post-hoc test using the Scheffé method was conducted. Levene's test for homogeneity of variance in the "Course Materials" sub-factor was significant among these tests. Thus, the Dunnett's T3 method was employed. The results indicated that E.M.I. led to significantly higher scores than Chinese-medium instruction in the sub-factors of learning satisfaction and willingness to study. Specifically, in the sub-factors of "Life Function," "Course Materials," and "Teaching Methods and Assessment" of learning satisfaction, as well as the "Willingness to Study" factor, E.M.I. showed significantly higher scores than the Mixed teaching in English and Chinese.

Table 6: The average scores for different teaching languages

Factors	Chinese (n=36)		Mixed teaching in English and Chinese (n=10)		English (n=26)	
	M	SD	M	SD	M	SD
Life Function	3.54	0.76	3.15	0.61	4.11	0.82
Learning Environment	3.57	0.86	3.42	0.65	4.20	0.94
Course Materials	3.55	0.83	3.30	0.51	4.12	0.85
Teaching Methods and Assessment	3.51	0.72	3.38	0.36	4.17	0.87
Teacher Teaching	3.79	0.80	3.80	0.53	4.43	0.71
Administrative Support	3.66	0.74	3.23	0.55	4.07	0.86
Willingness to Study	3.58	0.69	3.38	0.41	4.18	0.69

Table 7: ANOVA analysis table for different teaching languages

Factors	Sum of Squares	F	df	Sig.	Post-hoc test
Life Function	8.31	7.17	2	0.001**	EMI>M, EMI> C
Learning Environment	7.49	4.96	2	0.010*	EMI > C
Course Materials	6.91	5.38	2	0.007**	EMI>M, EMI> C
Teaching Methods and Assessment	8.12	7.28	2	0.001**	EMI>M, EMI> C
Teacher Teaching	6.80	6.22	2	0.003**	EMI > C
Administrative Support	5.69	4.87	2	0.010*	EMI > C
Willingness to Study	7.16	8.16	2	0.001**	EMI>M, EMI> C

* $p < 0.05$, ** $p < 0.01$

E.M.I.: English-medium instruction; M: Mixed teaching in English and Chinese; C: Chinese-medium instruction

Data Analysis and Assessment of Reliability and Validity

According to the suggestion of Bagozzi and Yi (1988) regarding using three commonly employed indicators, the reactivity indicators were evaluated in terms of the measurement mode, as presented in Table 8.

1. Reliability of individual items: This assessment examined the constituent burden of potential variables within the measurement variables. The average value of all constituent burdens in this study was 0.5, which was statistically significant. The constituent burden for the sample ranged from 0.552 to 0.941, which aligned with the values recommended by Hair et al. (2006).
2. Component reliability (C.R.) value of the potential variables reflects the reliability of all measurement variables that constitute a particular construct. This measures the internal consistency of the construct indicators, with high values indicating high internal consistency. Chin (1998) suggested a threshold of 0.7 or higher. In this study, the C.R. values ranged from approximately 0.840 to 0.946, indicating good internal consistency within the research model.
3. Average variance extracted (AVE) of the potential variables: This measure calculates the variance explanatory power of each measurement variable within the potential variables. High values indicate the potential variables' high discriminant and convergent validity. Fornell and Larcker (1981) recommended a minimum threshold of 0.5 for the AVE values. In this study, all the AVE values exceeded 0.5, with the potential variables ranging from 0.647 to 0.764.

These indicators collectively demonstrate the reliability, internal consistency, and validity of the measurement models used in this study.

Table 8: Construct reliability results

Construct	Items	Loadings	CR	AVE
Life Function	The school is in a great location (S1)	0.739	0.929	0.651
	The school has convenient transportation functions (S2)	0.787		
	Meal service hours provided by the school (S3)	0.743		
	The quality of the food served in the restaurant (S4)	0.825		
	Provide a safe and comfortable accommodation environment (S5)	0.788		
	Clear rental information (S6)	0.811		
	Provide comprehensive sports and leisure facilities (S7)	0.825		
	The University's signs are identified (S8)	0.786		
Learning Environment	The classroom's quantity and space (S9)	0.941	0.941	0.764
	Teaching equipment update (S10)	0.904		
	E-learning and information environment (S11)	0.710		
	The school provides sufficient library resources (S12)	0.903		
	Internationalized learning environment (S13)	0.893		
Course Materials	Clear teaching objectives (S14)	0.899	0.946	0.717
	Online query of teaching materials (S15)	0.786		
	Abundant elective courses (S16)	0.858		
	Well-planned professional courses (S17)	0.914		
	Good cohesion between courses (S18)	0.910		

Construct	Items	Loadings	CR	AVE
	Innovation of course content (S19)	0.884		
	Meaningful "Labor Education" training (S20)	0.641		
Teaching Methods and Assessment	Flexible and reasonable course arrangement (S21)	0.934	0.940	0.796
	Public learning content of the course before choosing the course (S22)	0.836		
	Clear and easy-understanding teaching methods (S23)	0.913		
	Reasonable evaluation criteria (S24)	0.882		
Teacher Teaching	Teacher's professional knowledge (S25)	0.836	0.944	0.739
	Frequency of teacher-student interaction (S26)	0.893		
	Serious attitude toward teachers' teaching (S27)	0.882		
	Encouraging students to discuss (S28)	0.839		
	Caring about student learning (S29)	0.859		
	Teaching assistant system (S30)	0.847		
Administrative Support	Sufficient information that the SCHOOL had provided me before I came here (S31)	0.837	0.937	0.651
	Good manners of administrators (S32)	0.718		
	Club activities offered by the school (S33)	0.837		
	After-school academic tutoring services provided by the school (S34)	0.853		
	Counseling services provided by the school (S35)	0.862		
	Foreign students' activities organized by the Office of International and Cross-Strait Cooperation (ICSC) (S36)	0.803		
	The information on part-time campus jobs provided by the school (S37)	0.829		
	The information on scholarships provided by the school (S38)	0.701		
Willingness to Study	If you have the opportunity to choose again, you will choose the school again (W1)	0.888	0.840	0.647
	You are willing to promote its advantages for the school to attract other students (W2)	0.920		
	Based on your experience at this school, you would not recommend friends or family members to attend this school (W3)(R)	0.552		

R: Reverse question

Structural Model and Hypothesis Test

A structural model was used to estimate the path relationships within the research framework, and all seven path relationships specified in the model were examined to test their statistical significance at a significance level of $\alpha = 0.05$. The results indicated that all relevant assumptions associated with the path relationships reached a significant level. The path coefficients obtained from the structural model, as depicted in Table 9, are as follows: life function → learning satisfaction (0.243), learning environment → learning satisfaction (0.169), course materials → learning satisfaction (0.216), teaching methods and assessment → learning satisfaction (0.124), teacher teaching → learning satisfaction (0.169), administrative support → learning satisfaction (0.232), and learning satisfaction → willingness to study (0.762).

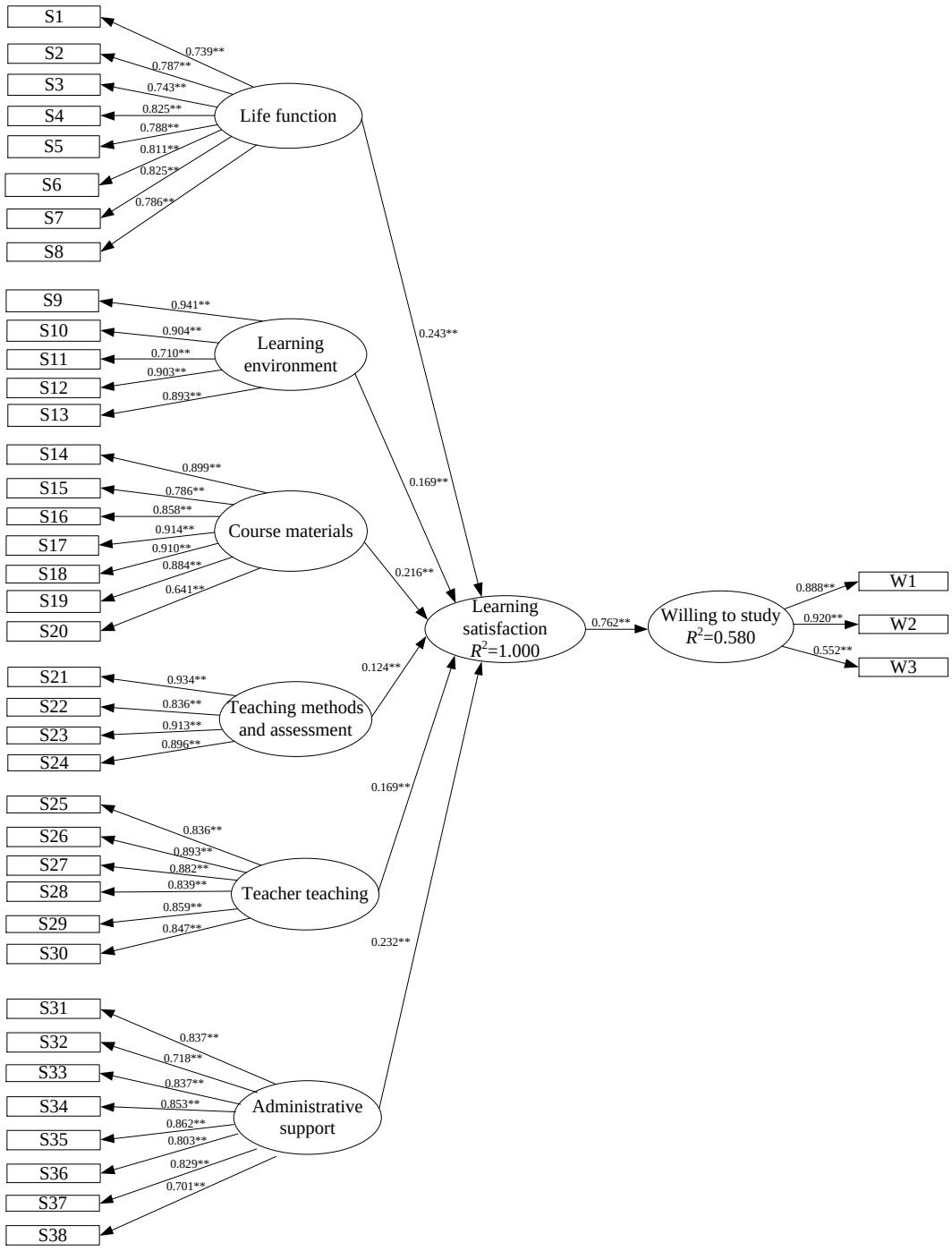
These findings reveal that "learning satisfaction" is positively and significantly influenced by factors such as "life function," "learning environment," "course materials," "teaching methods and assessment," "teacher teaching," and "administrative support," with all effects being statistically

significant. The combined explanatory power, as measured by the coefficient of determination (R^2), for "learning satisfaction" was 1.00, indicating a high level of variation explained by the factors mentioned above. Moreover, the results indicate that "willingness to study" is positively and significantly influenced by "learning satisfaction," with the variance explanatory power (R^2) for "willingness to study" reaching 0.58 (as illustrated in Figure 2).

Table 9: Hypotheses testing results

Hypotheses	Path	Path coefficients	t-value	Result
H1	Life Function > Learning Satisfaction	0.243	17.038**	Supported
H2	Learning Environment > Learning Satisfaction	0.169	20.541**	Supported
H3	Course Materials > Learning Satisfaction	0.216	19.442**	Supported
H4	Teaching Methods and Assessment > Learning Satisfaction	0.124	14.758**	Supported
H5	Teacher Teaching > Learning Satisfaction	0.169	20.575**	Supported
H6	Administrative Support > Learning Satisfaction	0.232	20.389**	Supported
H7	Learning Satisfaction > Willingness to Study	0.762	14.758**	Supported

* $p < 0.05$, ** $p < 0.01$



* $p < 0.05$, ** $p < 0.01$

Figure 2: Path coefficients for the learning satisfaction and willingness to study model

Discussion and Conclusion

Using a theoretical model constructed based on an extensive literature review, along with the implementation of the S.E.M. and appropriateness tests, it was determined that the sub-factors of

learning satisfaction positively influence overall learning satisfaction, which positively impacts the willingness to study. Based on these findings, the following conclusions were drawn:

1. Significant differences existed in learning satisfaction and willingness to study among international students at varying program levels. The results indicated that graduate-level international students exhibited higher satisfaction and willingness to study than undergraduate students. This finding aligns with Li et al.'s (2020) and Sauer (2003) findings.
2. Noteworthy differences existed in international students' learning satisfaction depending on the instruction language. The results revealed that students in E.M.I. programs demonstrated higher satisfaction levels than Chinese-medium instruction in the sub-factors of learning satisfaction and willingness to study. Specifically, in the sub-factors of "Life Function," "Course Materials," and "Teaching Methods and Assessment" of learning satisfaction, as well as the "Willingness to Study" factor, E.M.I. showed significantly higher scores than the Mixed teaching in English and Chinese.
3. Each sub-factor of learning satisfaction significantly influenced the overall learning satisfaction, providing empirical support for Hypotheses 1 to 6. These findings corroborate the work of Greiner (2000), Knight (2002), Holford and Patkar (2003), Wu et al. (2015), and Zhu et al. (2020).
4. The higher the learning satisfaction among foreign students, the more positively and significantly it impacts their willingness to study. This finding supported Hypothesis 7 and was consistent with the research conducted by Hennig-Thurau et al. (2001), Moslehpour et al. (2020), and Kéri et al. (2022).

An empirical analysis involving a sample of international students showed that the structural equation model exhibited a good fit, supporting the proposed theoretical model. Consequently, this study confirmed the existence of significant relationships among the seven factors under investigation.

Implications

The present study has significant academic and practical implications based on these theories. The overall outcomes indicate that "learning satisfaction" is positively and significantly influenced by factors such as "life function," "learning environment," "course materials," "teaching methods and assessment," "teacher teaching," and "administrative support." Consequently, international students' satisfaction with their educational experience is crucial in shaping their willingness to study further. This University has brought in numerous internationally renowned scholars with master-level expertise to instruct and guide graduate students in their research endeavors. Consequently, faculty members have received the highest ratings in terms of graduate student satisfaction. Moving forward, the University can sustain its recruitment of top-tier international scholars and foster collaborations with academics from various countries to entice more international students seeking to pursue their studies here.

Besides, universities can focus on addressing areas of low satisfaction, such as improving the convenience of transportation by providing additional buses to alleviate concerns related to the item "The school is well located." Similarly, offering more training activities centered around "Meaningful 'Labor Education' training" can enhance students' understanding and appreciation of

labor education. Moreover, assessing the sufficiency of the internationalized learning environment can help international students integrate into academic pursuits and Taiwanese culture seamlessly. Finally, ensuring clear and readily available rental information can effectively support foreign students in finding suitable accommodations and facilitating their adjustment to life in Taiwan.

Additionally, the study revealed that international students with Master's degrees and above exhibit higher levels of learning satisfaction and willingness to study than international students with undergraduate degrees. Notably, each dimension attains average scores exceeding 4 points. This discrepancy may arise because first-year college students, who are international students entering the University for the first time, encounter a lower degree of adaptation to the school environment than undergraduate students. As a potential solution, universities can establish an "international partnership" initiative involving undergraduate students who have successfully acclimated to the school environment and demonstrate high levels of learning satisfaction and willingness to study. This collaboration aims to assist undergraduate international students in swiftly integrating themselves into academic and social fabrics, enhancing their learning satisfaction and willingness to pursue further studies.

Furthermore, this study identified the differential impacts of the medium of instruction, particularly in English, on learning satisfaction. This finding underscores the significance of language media in shaping students' learning performance in educational settings. Consequently, schools have been encouraged to provide more E.M.I. courses, offering international students a broad range of academic options. To broaden the scope of available courses for international students, schools can collaborate with language centers to provide language training and certification services. This endeavor involves training additional educators proficient in delivering content in English. Ultimately, this preparation will facilitate the introduction of a greater selection of future E.M.I. courses for international students.

Limitations

The main strength of this study is that it represents a comprehensive examination of international students' learning satisfaction and willingness to study in higher education institutions. However, this study has some limitations that require further exploration.

The first limitation of the current study pertains to the assessment employed. Using a Likert scale to gauge the respondents' perceptions of each variable necessitates reliance on subjective judgments and retrospective completion. Consequently, the data collected in this study may exhibit divergences and deviations. To address this, conducting qualitative interviews with international students would provide a more comprehensive understanding of their perspectives and evaluations of the various services offered by the educational institution, thereby aligning the empirical findings of the research more effectively with practical requirements.

The second limitation is the time constraint imposed on the study. Owing to time limitations, longitudinal data collection was not feasible; therefore, cross-sectional data were utilized as the empirical foundation. Consequently, temporal deviations in the data generated in this study are possible.

The third limitation is the international student divisions of the spring and fall semesters. For students undertaking off-campus internships, tracking their responses may be challenging, which

could reduce the number of respondents. The fourth limitation is the analysis of differences in groups was constrained by the sample size, which resulted in a combined analysis, such as for program level (which includes master's and Ph.D. programs). However, these two groups of students' learning satisfaction and willingness to study may differ.

Recommendations

This study offers several recommendations for future research. First, questionnaires were administered to investigate and refine a comprehensive theoretical model. Subsequent researchers could explore the inclusion of alternative measurement methods or additional significant dimensions and indicators from different literature sources to enrich the model for further analysis. For example, learning satisfaction can be used as a measurement variable, establishing a more comprehensive theoretical framework.

Moreover, this study primarily focused on comparative analyses of schooling systems and language teaching. A larger sample comprising individuals from diverse backgrounds is recommended to enhance the breadth and depth of future studies. To increase the sample size of international students for a more representative research outcome, the school could consider offering incentive measures to boost the number of questionnaire responses. By employing a multi-way analysis of variance, researchers can delve deeper into the test data of students from various backgrounds, for example, analyzing Ph.D. students and Master's students separately, thereby gaining a comprehensive understanding of the influence of different backgrounds on international students' learning satisfaction and willingness to pursue their studies. This endeavor will aid in uncovering the crucial factors that shape the learning satisfaction and willingness of international students from distinct backgrounds.

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Assessing Omani EFL College Students' Production of Consonant Clusters in Inflectional Suffixes

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Abstract

Current empirical studies indicate that Omani EFL learners encounter crucial challenges when pronouncing consonant clusters in the final position. To further seek in this line of research, the current study set out to develop a test to assess Omani EFL college students' production of consonant clusters found in the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'. Twenty-five EFL college students from Oman consented to read words and sentences aloud with the different kinds of inflectional suffixes containing consonant clusters while audio-recorded. Results showed that the atomistic evaluation method offers an objective and particularly thorough assessment of the phonetic components involved. However, it takes a lot of time and requires repeated listening to samples for many students. Results also revealed that Omani EFL college students struggle to pronounce consonant clusters in inflectional suffixes. Differences in how participants pronounced (insertion of an additional vowel), as a repair method, in word ending position to make the difficult clusters easier to pronounce were revealed. This can be linked to the mother tongue's impact because Arabic phonotactics forbid consonant clusters from appearing in the word-final position.

Keywords: inflectional suffixes; consonant clusters; atomistic testing method; phonemic production.

Introduction

Most studies acknowledge that languages have very solid limitations on what and not a real syllable of the language contains (Gashaw,2016; Roach, 2001). Choosing which consonants and vowels can occur in syllables is a crucial component of phonology (Roach, 2001). In English, consonants occur in sequences or clusters in one syllable or between the syllables without any vowel insertion (Al-Yami et al.,2021). However, mastering the pronunciation of consonant clusters is one of the difficulties in learning English as a foreign language. A major difficulty in learning the production of English consonant clusters might be caused by the way words are formed and how the main word classes take inflections as prefixes and suffixes (Fudeman,2011; Lardiere, 2006).

Looking at the Omani EFL context, it is clear that Omani English learners experience pronunciation difficulties when adding inflectional suffixes to words to create new words (Thakur,2020). For this group of learners, the phonological feature of English suffix ability is the most challenging and perplexing to learn, and this is reflected in their inability to pronounce English consonant clusters correctly and usually tend to insert vowels into these clusters (Ibid.). The inflectional suffix is typically appended with English nouns to denote the plural, third-person singular, and possession subclass. Inflection also distinguishes between the grammatical forms of a verb's past and present tense by adding the suffix "-ed" to indicate the past tense (Carstairs-McCarthy, 2002).

However, developing a valid assessment instrument following a specific testing method is important to obtain reliable results. Concerning EFL pronunciation assessment, two methods are described: atomistic and holistic, depending on the assessment's goal. Hence, since the current study entails speaking out loud phonemic opposition word lists and provides a detailed marking scheme of a specific aspect of pronunciation, i.e., the pronunciation of consonant clusters in inflectional suffixes, the atomistic testing method was found appropriate to be used for the pronunciation assessment of this study.

Thus, this study aims to:

- Develop a test (CCPT consonant clusters pronunciation test), following the atomistic testing method of pronunciation assessment, to assess Omani EFL college students' phonemic production of the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'.
- Identify and address Omani EFL college students' pronunciation issues with English consonant clusters of inflectional suffixes.

Research Questions

Q1: To what extent does the employment of the atomistic testing method of pronunciation assessment effective in assessing Omani EFL college students' phonemic production of the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'.?

Q2: What pronunciation issues do Omani EFL college students encounter with English consonant clusters of inflectional suffixes?

Significance of the Study

No initiative attempting to develop a pronunciation test to assess Omani EFL college students' phonemic production of the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed' was found in the extant literature. However, some similar studies have been conducted on the intelligibility of Omani EFL learners have probed this issue (Al-Humaidi & Al-Belushi, 2014; Al Yaqoobi et al., 2016; As-Sammer, 2010; Thakur, 2020 AL-Kinany,2022).

This action research was started based on the assumptions that the phonological system of the English language, unlike the Arabic language, does not allow for a one-to-one correspondence between the spelling and pronunciation of those spellings and that different languages exhibit syllable structure patterns differently as presented in the conceptual framework of this study, as shown in figure 1.

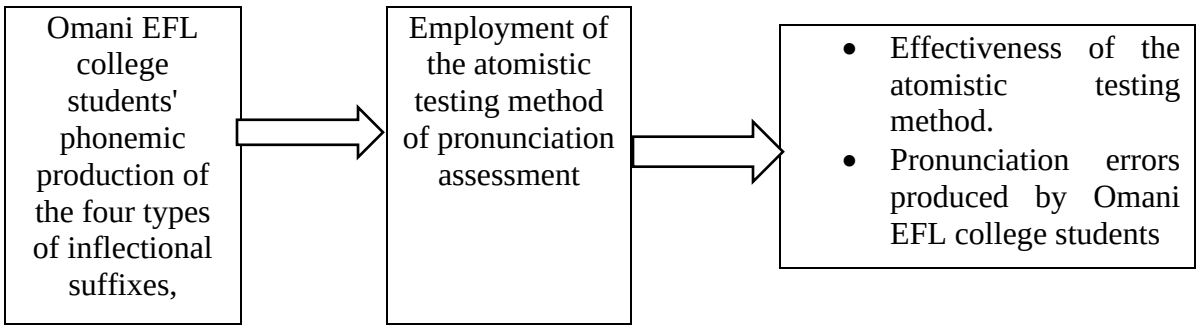

Figure 1: The Conceptual Framework

Literature Review

Pronunciation Assessment

Pronunciation tests are based on both production and reception. Reception may be examined and measured by counting the correct answers on a test. However, production is more difficult to assess because it entails assessing speaking or reading, which, from the listener's point of view, comprise many other aspects of communication and not just pure sounds. Determining the dependability of pronunciation production assessment is a tough undertaking because it is virtually always subjective. It has no choice except to rely on the assessor's opinion. As a result, it's crucial to be precise when outlining the process and the evaluation. Depending on the objective of the assessment, two techniques for evaluating pronunciation are described: atomistic and holistic (Nguyen,2018).

a- Pronunciation Atomistic Testing

According to Sebestova (2007, p. 19), an atomistic approach necessitates "a detailed marking scheme in which specific aspects of pronunciation are evaluated separately." It entails reading aloud word lists based on phonemic oppositions brief phrases with few pairs, or it also allows assessing sentences' proper accentuation, emphasis, and intonation. This method is very objective as it exclusively evaluates certain speech segments, such as vowels, consonants, stress, rhythm,

intonation, etc. The demands on the assessor are this approach's disadvantages, though. It takes a lot of time because the learners' speech samples must be recorded and listened to repeatedly.

b-Pronunciation Holistic Testing

The "intelligibility and acceptability of the learner's performance" are tested at a higher level of attainment (Sebestova, 2007, p. 21). Examiners are required not to pay too much attention to a specific pronunciation aspect of a candidate's performance but rather to judge its overall effectiveness. The benefit of this method is that it can be applied to big groups and takes less time than the atomistic method. This approach is applied in many international exams in English, where pronunciation is included in the so-called intelligibility and acceptability of the candidate's speaking performance(Nguyen,2018). Holistic assessment may include re-telling a story, description of a picture, or using maps. These speaking activities require the students to generate sentences depending on the clues provided in each activity. At a higher attainment level, the learner's performance is phonetically assessed. (Ibid.).

Consonant Clusters

Bouchhioua (2019) stated that English has a complicated syllable structure because it permits complex codas and onsets. In English, a syllable's onset (consonants preceding the vowel) can have up to three consonants, while the coda can have up to four codas (consonants after the vowel). For example, three consonants [skj] come before the vowel /u/ in the monosyllabic word skew [skju:], whereas four consonants [skss] come after the vowel /i/in the word sixths [skss]. Yaslam (2019), on the other hand, studied the phonological structure of Arabic and mentioned that Arabic has a straightforward syllable structure that primarily consists of CV (consonant-vowel) or CVC (consonant-vowel-consonant) syllables in both standard and dialectal forms.

However, learners whose native languages do not allow the consonant clusters' structures and have simpler syllable structures frequently struggle with these complicated onsets and codas (Avery & Ehrlich, 1992). Egyptian Arabic speakers are known to break up consonant clusters and make articulation easier by adding an epenthetic non-phonemic vowel to the difficult onsets and codas of English words (Broselow, 1980, 1983, 1984; Galal, 2004). For instance, they pronounce words like break and place as /brek/ and /ples/, respectively. This type of sound changing is known as epenthesis, and it typically depends on the allowable sound sequences and syllable structures in the user's native language. To break a two-consonant cluster (CC), a vowel is frequently inserted between consonants in this sort of error by making words like "plight" sound polite. Yemeni EFL learners usually pronounce English consonant clusters wrongly. According to Kharma and Hajjaj (1989), they add a vowel before or between the start and final clusters to make it easier to produce disyllabic and polysyllabic English words. They produce wrong consonant cluster pronunciation. Watson (2008) outlined the distinctions between English and the Yemeni dialect's syllable structure. He (Ibid.) stated that Yemeni learners find pronouncing English words with initial and ending consonant clusters challenging. To pronounce English more easily and produce consonant clusters, Yemeni learners adopt the syllable structure patterns of their first language. Vowel insertion reduces the effectiveness of precise English pronunciation (Al-Shuaibi, 2006; Broselow, 1983; Kharma & Hajjaj, 1989). Arnold (2010) helped four Kuwaiti students overcome their challenges with English consonant clusters by having them practice speaking, listening, and imitating native speakers for six months. They also recorded their pronunciation for self-evaluations. Arnold (2010) observed that English consonant cluster generation has gotten closer to the pronunciation of native speakers. He (Ibid.) mentioned that learning proper English

pronunciation is difficult. Knowledge limits and training activities must come before it. EL-Halees (1986) researched the phonological knowledge of EFL Arab teachers. They discovered that these teachers had very limited knowledge of the English and Arabic sound systems, which harms the students they teach. The Arab English curricula rarely include phonological teachings and exercises, crucial for helping English language learners pronounce words more clearly (El-Halees, 1986; Al-Shuaibi, 2006). As a result, Arab students encounter numerous challenges while effectively communicating with others (Al-Shuaibi, 2006).

However, EFL learners whose mother tongue is not Arabic also encounter serious problems pronouncing the various consonant clusters. Spanish EFL speakers frequently add a vowel to the start of a consonant cluster that begins with the letter /s/. Thus, the pronunciation of the word school is /esku:l/ (Avery & Ehrlich, 1992). In contrast, Korean EFL learners add the vowel /i/ to the end of the syllable (Jenkins, 2000). Italian English speakers frequently add a final vowel to English words ending in consonants and exhibit a similar pattern of behavior. Since Italian does not allow any word-final consonants, this form of output is frequently explained by the effect of the speakers' native tongue (Avery &Ehrlich, 1992).

Suffixes

A suffix, such as -ly, -er, -ist, -s, -ed, -dom, -size, and so forth, is an element that is appended to the end of a base (Carstairs-McCarthy, 2002; Robinson, 2003). English has both derivational and inflectional suffixes (Bauer, 1983). Suffixes can be added cumulatively to form more complicated words. This is concatenative morphology in which different morphemes are strung together like beads (Plag, 2002; Lardiere, 2006). Suffixes belong to a certain word class; they are, therefore, referred to as Sffs for nouns, verbs, and adjectives. (Quirk et al.,1985) Often, an Sff is a basic addition that is not highlighted.

Grammatical contrasts exist in all languages, such as singular against plural and past versus non-past. The grammatical subclass to which this contrast belongs is frequently marked by inflection: the base to which an inflectional affix is appended is occasionally referred to as a stem. With English nouns, the inflectional suffix "-s," as in "chair-chairs," "find-finds," and "the bedsheets," is typically appended to denote the plural, third person singular, and possession subclass. On the other hand, inflection distinguishes between the grammatical forms of a verb's past and present tense by adding the suffix "-ed" to indicate the past tense, as in "talk-talked," or it can be claimed that inflections are just grammatical variants of a single lexis (Carstairs-McCarthy, 2002).

Methodology

The study aims to develop a test (CCPT), following the atomistic testing method of pronunciation assessment, to assess Omani EFL college students' phonemic production of the four types of inflectional suffixes, including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'. And to identify and address the pronunciation issues Omani EFL college students have with English consonant clusters of inflectional suffixes.

This study employed qualitative research. Qualitative research is distinguished by its objectives, which involve comprehending a particular aspect of social life, and its methodologies, which produce words rather than numerical data for analysis (Riadil & Yosintha,2021).

The population is Omani EFL students at the University of Technology and Applied Sciences/Nizwa College of Technology/level foundation program. The researchers chose 25 students based on the following criteria:

1) EFL students' willingness to take part in the research;
2) being concerned with the learning of English pronunciation.

The participants were male and female adult students, ranging in age between 20 and 22, who had learned English solely in a classroom EFL context. None of the participants had the opportunity to travel to English-speaking countries. Therefore, they represent typical Omani Arab EFL learners whose exposure to English is restricted to limited classroom instruction.

During the planning and implementation of the study, the researchers had a face-to-face meeting. Informal interviews with students, classroom observations, and teachers' reflections before the implementation suggested that students' low pronunciation competency might be related to the impact of their mother tongue, as they did not consider communication through English a real or useful possibility in their future lives. In this study, the researchers acted as participant-observers, which involved their performance of various functions, specifically the following: instructing participants, developing instructional materials, and implementing the (CCPT).

Instrumentation

This study aims to follow the atomistic method of pronunciation assessment to develop a test (CCPT) that assesses Omani EFL college students' phonemic production of the four types of inflectional suffixes that form consonant clusters, i.e., including plural 's', 'third person singular 's', possessive 's', and verbs in the past or participle formation of 'd' or 'ed'.

The purpose of developing the (CCPT) is to evaluate how well Omani EFL college students can pronounce the fundamental kinds of consonant clusters in the final position, i.e., when forming inflectional suffixes, and to determine if they can pronounce all of the included inflectional suffix types with the same level of intelligibility.

The researchers developed the (CCPT) in which 156 tokens were selected carefully to include all types of syllables that may occur in consonant clusters of inflectional suffixes, i.e., monosyllabic (words of one syllable), disyllabic (words of two syllables) and polysyllabic (words of more than two syllables) and all 24 English consonant phonemes were incorporated. Tokens were designed according to the manners of articulation of English phonemes, such as stops, fricatives, nasals, gliding, and lateral. The design of the (CCPT) and the phonemes used are displayed in appendices 3, 4,5, and 6.

To avoid reading deficiencies, the researchers used tokens within the sample's language competency (as approved in the experts' validity). However, to achieve the phonetic validity of the (CCPT) and make sure that they are all within the scope of the study, the researchers phonetically transcribed all tokens according to PR. English. Initially, Omani EFL college students' difficulties pronouncing English consonant clusters of inflectional suffixes were identified through their oral performance in the (CCPT).

Validity of the Instrument

To achieve the first objective of the current work, it is significant to obtain the content validity of the (CCPT); the (CCPT) was given to a group of specialists in Linguistics, Phonetics, Testing, and ELT who work as lecturers teaching at the University of Technology and Applied Sciences/Nizwa College of Technology/level four-foundation program. The experts are either native or semi-native speakers of English with more than 7 years of teaching experience in the Omani context. The (CCPT) was given to this group of experts to examine and comment on its validity to be used as an instrument. The researchers developed an assessment rubric of the Likert scale for the experts to rate their perceptions of the validity of the (CCPT). The (CCPT) was judged valid by the experts using the percentage of agreement, which means 100% agreement. The researchers modified the (CCPT) according to the experts' comments.

Procedures

The researchers first created a friendly rapport with the participants to reduce the students' anxiety. Students were assured that their participation in the (CCPT) would not affect their grades, and their performance would not be shared with anybody else except for research purposes, with the participants' identities remaining anonymous. Next, they were asked to look at the tokens of the (CCPT) and read them aloud while audio-recorded. The recordings were done individually in a friendly atmosphere. After the data were collected, the researchers listened to each recording carefully a few times and transcribed the problematic consonant clusters based on their phonetic training and teaching experience. However, to ensure more reliability, an educated native speaker of English was also asked to listen to the recordings and rate the students' mispronunciation of inflectional suffixes. The participants were given an equivalent amount of time to produce tokens. Both groups spent 180 minutes in one week organized into three sessions. They received no verbal corrective feedback or clarification from the instructor regarding their target consonant cluster pronunciation production of inflectional suffixes.

Each student read all the tokens found in the (CCPT). Therefore, each of the 25 participants produced all of the target test's items. There were 109 words and 23 phrases in all that were examined. All (CCPT's) tokens were examined to interpret the data. Therefore, the recordings were subject to a double-blind error analysis based on auditory analysis. The study involved paying close attention to the recordings to identify how the target tokens were produced and determine if epenthesis was present (Bouchhioua, 2017; Derwing & Munro, 1997; Gordon et al., 2013). Figure 2 presents the steps followed in the methodology of this study.

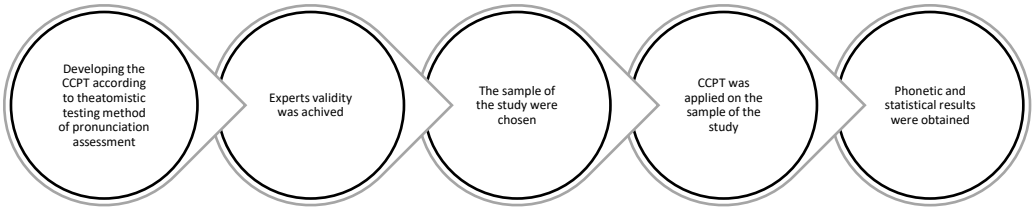

Figure 2: Steps in the methodology of this study.

In this section, the three assessors (the two researchers and the native speaker were to listen and phonemically transcribe the recorded data. They were also to rate the production of every token based on their phonemic accuracy, i.e., very weak, weak, acceptable, good, very good, as follows: B, D, A, C, and E.

Findings and Discussion

The current research found that the atomistic testing method is suitable for the pronunciation assessment of students' performance. Regarding reliability, the atomistic tests were very reliable for diagnostic purposes when two assessors carried out the scoring. This method of testing pronunciation provided the researchers with a detailed evaluation that was = objective and specific to the phonetic components involved. However, it was time-consuming and required repeated listening to samples for many students. Thus, the researchers assume that it would be very difficult to apply it to big samples.

Reading aloud is a frequently utilized method of pronunciation testing. A point considered when the (CCPT) was applied is that students were instructed to use natural language. Recording the students' performances allowed them to listen to them again and compare. Before reading aloud for assessment, students had enough time to read the words silently. The (CCPT) instructions allowed for natural sounding. It also provided excellent control and the measurement of nearly every speech signal, including vowels, consonants, and consonant clusters. The sample students tried their best to read the words as they did in natural contexts.

From the data collected, it is obvious that Omani EFL college students face major difficulties in pronouncing English consonant clusters of suffixes. The patterns of phonological phonotactics of two and three-consonant clusters occur when adding the plural 's', possessive 's', and third-person singular' s'.The sequence is off (CC), according to Roach (2001). Omani EFL college students tend to insert vowel sounds in consonant clusters, resulting in incorrect consonant sequences in English syllables of the pattern (CVC).

However, when it comes to the past tense of adding /d/ to the verbs, analysis of students' results showed that the majority of sample students mostly produced the final /d/ sound as /id/ as in 'proved 'and sneezed', they pronounced them as /pru:vid/ and/sini:zid/.Moreover, they replaced the final /t/ phoneme in the inflectional suffix in 'laughed' and 'missed' and pronounced them as /lɑ:fid/ and /misid/. What makes their pronunciation worse is that they tend to use the syllable structure of their first language with that of English, which breaks consonant sequences in English syllables. In that case, a large number of the tested sample made two pronunciation mistakes when pronouncing the consonant clusters of suffixes of the past tense formation of verbs as they frequently produced the final phoneme/d/ either as /id/ or/d/, they could not pronounce it as /t/ at all. In addition to that, they inserted a vowel in the formation of the consonant clusters of suffixes, for example:

They pronounced the verb 'liked' as /laikid/ and the verb' blessed' as /blessed/

Another major obstacle that Omani EFL college students encountered when producing suffixes is when producing words that contain problematic final phonemes in their base forms, i.e., a phoneme that does not exist in Omani Arabic, for instance:

They tended to pronounce the word 'caves' as /kefis/,

They replaced the/v/ sound with /f/ and inserted a vowel in the consonant cluster.

And 'pip's' as /bibiz/,

They replaced /p/ sound with /b/ and inserted a vowel in the consonant cluster.

Sample students also pronounced 'escaped' as/iskabid/ and 'judged' as/ gugid/, and this is due to the effect of the phonemic structure of their mother tongue.

The samples' pronunciation got even worse regarding the suffixes of three consonant clusters. Clear syllabification problems were found in their recorded production. Omani students produced the given tokens with wrong syllabification, for example:

They pronounced 'the tent's pin' as / ðə *ten tiz bin/.*

Table 1: Mispronunciation of consonant clusters in inflectional suffixes

Types of problems	**Number of students who pronounce them correctly**	**Number of students who mispronounce them**
Difficulties related to phonemes that are not found in students' mother tongue.	5	20
Difficulties related to the production of wrong stress placement.	2	23
Difficulties inserting the short vowel phoneme/i/ in all consonant clusters included.	1	24

As shown in Table 1, it is clear that three major issues are observed in Omani EFL college students' mispronunciation of consonant clusters of suffixes; first, they had difficulty pronouncing the phonemes that are not found in their mother tongue, specifically, when found in consonant clusters of suffixes. Second, they tended to produce stress placement wrongly in words, consequently having the wrong syllabification for the given words. Finally, students inserted the short vowel phoneme/i/ in all consonant clusters included in the (CCPT). Hence, they did not produce any consonant sequences.

Mother tongue impact is great on Omani EFL college students' pronunciation of inflectional suffixes. The findings of this study demonstrated that the sample had difficulty pronouncing some English consonant and vowel sounds. As shown in table 2:

Table 2: Problematic phonemes for sample student

consonants: /tʃ/, /ŋ/, /p/, /ʒ/, /v/ &/dʒ/
vowels: /o/, /e/, /ɔɪ/, /eə/, /3:/ ,/ʌ/& /ʊə/
Problematic minimal pairings that Omani EFL college students struggle with the most: i. /f/ and /v/ ii. /p/ and /b/ iii. /g/ and /dʒ/ iv. /dʒ/ and /ʒ/ v. /ʃ/, /ʒ /, /tʃ/ and /dʒ/ vi. /e/ and /i/ vii. /o/and/u/

Conclusions

One common technique for checking pronunciation is reading aloud. The fact that students use natural language is a basic factor to be considered in this regard. Since reading involves more areas that need to be examined simultaneously, recording the sample's performances enables you to listen to and compare them again. The atomistic testing method works well for diagnosing pronunciation problems of EFL learners, especially when multiple assessors are involved in the scoring process. The atomistic evaluation method can thoroughly and objectively assess the phonetic components involved. However, it is time-consuming and needs listening to samples several times.

Omani English learners face challenges pronouncing consonants, consonant clusters, vowels, diphthongs, and words in connected speech. Significant mother tongue interferences with English phonation are revealed (Thakur, 2020). English and Arabic are two languages that differ specifically in terms of their phonetic systems. Both languages have phonological traits, some of which are similar and some of which are different. The distinctive features come from their segmental alphabet or phonotactic principles (Al Kinany, 2021; Al Hosni, 2014). A survey of the literature on Omani Arabic (OA) dialects revealed that there aren't many studies on Omani EFL learners' pronunciation (AL-Kinany, 2021,2022; As-Sammer (2010), Holes (1989, 1991,1996, 2004, 2007, 2011, 2013, 2014), and other researchers have looked into specific aspects of the phonology, morphology, and grammar of the (OA) dialects. The phonetics, phonology, and morphology of the Omani dialects differed greatly in contrast to their essentially identical grammar. These studies show that Omani college students learning English as a foreign language (EFL) have substantial pronunciation problems, both in the segmental and suprasegmental aspects. Several English orthographic systems, irregular spelling and pronunciation correspondences, and

differences between the Arabic and English sound systems are attributed as the main causes of these difficulties (AL-Kinany,2022).

Mother tongue impact is great on Omani EFL college students' pronunciation of inflectional suffixes. The findings of this study demonstrated that the sample had difficulty pronouncing some English consonant and vowel sounds. This indicates that Omani EFL college students encounter serious pronunciation problems when pronouncing the base of the words that contain the mentioned phonemes. Undoubtedly, the problems get bigger when pronouncing these words with syllables of consonant clusters in suffixes.

These results are consistent with the conclusions and explanations made by AL-Kinany et al. (2021, 2022) because there are no such oppositions in Arabic. Zabia (2017) also connected Libyan EFL students' mispronunciation of consonant clusters to inter-lingual phonemic qualities or interference from the learner's first language, i.e., Arabic.

In the end, the vowels that Omani EFL college students inserted to separate the consonant clusters positions of syllables led to pronunciation errors. The sample students tended to produce stress placement wrongly on words, consequently having the wrong syllabification for the given words. These findings align with the findings obtained by Thakur (2020), in which he (Ibid.) found out that the insertion of the vowel phoneme in the consonant clusters changed the structure of the cluster as well as stress placement. (Al Mafalees,2020 AL-Jarf, 2019), Nurfitriani (2019) examined Yemeni, Saudi, and Sudanese EFL learners' production of consonant clusters and suggested that the subjects unintentionally insert a vowel sound in English syllables to break up consonant clusters as the reason why learners tend to insert vowel sounds to break up the consonant clusters. Arabic native speakers learning English as a foreign language may experience pronunciation issues due to the phonological variations between Arabic and English systems.

After reviewing the findings of this study and contrasting them with those of earlier research that examined the production of consonant clusters by EFL students from Arab nations other than Oman, such as Egypt, Kuwait, Libya, Yemen, Saudi Arabic, and Sudan, it appears that most Arab EFL students do experience difficulties in the production of consonant clusters, and this is primarily because there is no phonemic category for a sequence of consonants without a vowel in between in Arabic.

Implications

The results and findings of the current study have numerous consequences that can be emphasized. Reading aloud is effective as a technique of pronunciation assessment. One fundamental consideration in this regard is that the sample must produce natural language. EFL learners' pronunciation issues can be accurately diagnosed using atomistic testing, particularly when numerous assessors are engaged in the scoring process. Thus, this method of pronunciation assessment, though it is time-consuming as the assessors are required to listen and compare a considerable amount of the sample's production data, is recommended when assessing specific EFL pronunciation components.

The developed tests (CCPT) have been statistically and educationally demonstrated to be valid and reliable instruments for evaluating the production of consonant clusters of EFL students at the college level. Moreover, to prevent inter-lingual problems, it is advised that students study English phonetics and phonology at earlier stages of studying English and be given more practice with

pronunciation. Special attention should be paid to phonemes and phonetic features absent from the students' mother tongues.

A point to note is that it is very useful to assess phonetic data by assessors who are native speakers of English and native speakers of the language of the sample students involved. This process might pave the way to specifically realize if the sample students' pronunciation errors and obstacles are due to the impact of their mother tongue or not. On the other hand, this can also help to find out to what extent is the oral production of the sample students intelligible to native speakers of English.

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Development of a Forecasting Model of Teaching Effectiveness

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Abstract

This research project aims to utilize Python programming and machine learning algorithms to design a predictive model for assessing faculty effectiveness. The model considers various factors such as teaching effectiveness, course management, course materials, class openness, and course management. By analyzing these factors and testing the various model's performance against standard metrics, the collected data is processed and analyzed using regression analysis and decision trees, enabling the development of a predictive model. This model may provide estimates of future performance, allowing for the identification of high-performing faculty members, areas for improvement, and optimal resource allocation.

The study results demonstrate that Naive Bayes, Random Forest, and Decision Tree algorithms are particularly effective in predicting faculty performance based on the provided data. These findings promise to inform the development of strategies and policies that enhance faculty effectiveness and contribute to institutional excellence. By employing a data-driven approach, this study offers valuable insights into the utility of different machine learning algorithms and their predictive capabilities in assessing faculty performance within the context of higher education.

Keywords: faculty effectiveness, predictive model, data-driven approach, machine learning

Introduction

Faculty evaluation systematically assesses a faculty member's performance, teaching effectiveness, research contributions, and overall professional competence. Faculty evaluation aims to ensure accountability, enhance teaching quality, promote faculty development, and maintain high academic standards within educational institutions. One of the key advantages of faculty evaluation is that it provides valuable feedback to faculty members, helping them identify areas for improvement and refine their teaching methodologies (Ching, 2019). It also allows institutions to recognize and reward exceptional faculty members, promoting a culture of excellence. Additionally, faculty evaluation can contribute to the overall enhancement of student learning experiences by fostering a supportive and engaging academic environment.

Research Background and Review of the Literature

Faculty evaluation plays a crucial role in identifying and addressing poor performance among faculty members. By systematically assessing their teaching effectiveness, research contributions, and professional competence, institutions can pinpoint areas of weakness and take appropriate corrective actions. Through the evaluation process, faculty members who consistently demonstrate subpar performance can be identified, allowing institutions to implement targeted interventions, such as mentoring programs, professional development opportunities, or performance improvement plans. This proactive approach ensures faculty members receive the necessary support and guidance to enhance their skills and meet the institution's expectations, ultimately promoting overall academic quality and student success.

However, this exercise is not without limitations. One of the challenges is ensuring the use of fair and unbiased evaluation criteria and processes. Subjective judgments, potential biases, and inconsistency among evaluators can undermine the reliability and validity of the evaluation results. Another concern is the potential emphasis on quantitative metrics, which may overlook qualitative aspects of teaching and fail to capture the full scope of faculty contributions (Theall & Franklin, 2010). Another limitation is the time in the evaluation process, which usually takes months or even years to complete. The evaluation process and interpretation become more complicated for a large institution with a large faculty roster. Automating these procedures is a welcome innovation, and the adoption of an automated prediction and/or forecasting is a big help (Munford, 2021; Liu et al., 2020; Martin et al.,2019)

Predictive analysis is the process that involves data analysis, machine learning, artificial intelligence, and statistical models to find patterns that might predict future behavior and outcomes (Google, n.d.). Teacher evaluation is a study of great interest where numerous efforts converge to establish models from the association of heterogeneous data from academic actors (Ordoñez-Avila et al., 2023). Machine Learning is one sector generating exciting undertakings regarding teacher evaluations (e.g., Lin, 2021; Xia & Yan, 2021).

Data Mining and Machine Learning are similar since both gather an extensively enormous amount of data (also known as Knowledge Discovery Databases or KDD) from one or more sources for analysis to discover hidden knowledge, new trends and patterns to make predictions (Vijayalakshmi et al., 2020; Yağcı, 2022), however, for machine learning, it learns from its

previously executed tasks by analyzing and predicting and improving based on the gathered data (Ray, 2019).

Machine learning algorithms used in predictive analysis utilize regression, classification, clustering, control, time series, neural networks, and decision tree techniques in choosing the appropriate predictive model. Machine learning algorithm is divided into four (4) types: (1) supervised learning, such as classification and regression; (2) unsupervised learning, such as clustering and association; (3) semi-supervised learning, such as clustering and classification. And lastly, (4) reinforced learning such as control and classification. There are numerous examples of machine learning algorithms, and among the popular ones are: (1) Naive-Bayes, (2) K-Nearest Neighbors, (3) Random Forest, (4) Support Vector Machine, and (5) Decision Tree (Kathiroli & Vijayalakshmi., 2020; Ray, 2019). This research will only focus on these five (5) algorithms.

The Naive Bayes algorithm is a simple yet powerful classification algorithm based on the 20 principles of Bayes' theorem and conditional probability. It assumes that the features in a dataset are independent, hence the term "naive." Naive Bayes calculates the probability of a given instance belonging to a specific class by considering the probabilities of its features. It uses training data to estimate these probabilities and builds a probabilistic model. When classifying new instances, the algorithm calculates the likelihood of each class based on the observed features and selects the class with the highest probability. Despite its feature independence assumption, Naive Bayes often performs remarkably well in various real-world applications, particularly in text classification, spam filtering, and sentiment analysis, where it has demonstrated efficiency and scalability.

This classification algorithm can be applied to faculty evaluation. It uses conditional probability and assumes feature independence to predict the likelihood of a faculty member's performance based on various indicators. By analyzing training data, Naive Bayes estimates the probabilities of different performance levels and builds a predictive model. This algorithm is often used in tasks such as classifying faculty performance levels or identifying factors contributing to teaching effectiveness. Naive Bayes provides a straightforward and efficient approach to evaluating faculty members' performance and can be a valuable tool in the assessment process (Kumar et al., 2018; Lalata et al., 2019; Pacol & Palaoag, 2021).

The K-Nearest Neighbors (KNN) algorithm is a classification algorithm that stores and generates new data points based on a defined similarity measure. Unlike the Naive Bayes algorithm, KNN is considered non-parametric as it makes no assumptions about the data or its distribution. This characteristic allows KNN to be flexible and adaptable to different datasets. In a recent study by Yağcı (2022), the utility of KNN in the research was evident.

The Decision Tree is a non-parametric approach employed in supervised learning for classification and regression tasks. It is capable of handling output variables that are either continuous or categorical. The classification process of a decision tree consists of two steps: learning and prediction. In the learning stage, the model is trained using the provided training data, while in the prediction step, the trained model is used to predict responses for new, unseen data. This allows decision trees to make accurate predictions based on the learned patterns (Navlani, 2018).

In the Random Forest technique, the final prediction in a model is derived by aggregating the results from multiple decision trees. Random Forest is a supervised learning approach that utilizes an ensemble of decision trees to generate more accurate predictions than other algorithms. It effectively addresses the problem of overfitting and can be applied to both linear and non-linear models. Each decision tree within the Random Forest contributes to the overall classification process. By training different models and employing multiple decision trees, a variety of outputs are produced. Through careful analysis of these results, a final output is generated. The decision-making process for each sample is guided by constructing a decision tree (Reinstein, 2017).

Support Vector Machine (SVM) is a machine learning algorithm initially introduced by Cortes and Vapnik in 1995. SVM finds applications in both regression and classification tasks. The SVM classifier aims to separate different example classes while maximizing the distance between the nearest cleanly separated examples. This is achieved by constructing a maximum-margin hyperplane in a transformed input space. The support vectors are the data points located on the boundaries, and the optimal hyperplane is determined as the center of the margin. The parameters of the solution hyperplane are obtained through a quadratic programming optimization problem. Further insights into SVM and its optimization methods can be found in the work of Shmilovici (2009).

Machine learning transforms faculty evaluation and teaching assignments by leveraging large datasets and advanced algorithms. These models analyze performance indicators and patterns, enabling data-driven assessments and identification of areas for improvement. Machine learning also optimizes teaching assignments by considering faculty expertise, course requirements, and student preferences. However, challenges include training data quality, decision-making fairness, and ethical considerations (Lalata et al., 2019).

The Faculty Assessment Scale is a systematic evaluation instrument employed within educational organizations to assess the performance and efficiency of faculty members. Typically, it encompasses a range of criteria or facets against which faculty members' teaching, research, service, and broader contributions to the institution are gauged. These criteria are frequently assessed using a rating scale with descriptors ranging from "Poor" to "Outstanding," which quantifies and communicates faculty performance, assisting in decisions about tenure, advancement, and career growth captured in the organization's different manuals and policies.

In the case of XYZ College, the faculty assessment scale's existence can be traced back to its establishment in 1998, wherein academic advising, Student Instructional Report (SIR), and Peer Evaluation Form (PEF) served as the basis for faculty assessment. To address whether evaluating teaching performance in the institution meets the standards and requirements of a sound evaluation, a study was conducted in 2006 following the meta-evaluation techniques by Stufflebeam (2000). The study found that the measures lacked the accuracy standard of the meta-evaluation checklist, resulting in its overhaul (Magno, 2009). Based on this evaluation and the tendency of the respondents to select the midpoints and avoid extreme responses on Likert scales (Grandy, 1996; Wang et al., 2008; Pornel & Saldaña, 2013), a new instrument called Students' Teacher Assessment Report (STAR) was crafted and implemented in 2007 which measures the framework of *preparation and planning*, *classroom environment*, *instruction*, and *professional responsibilities* (Danielson, 1996).

It should be noted that the reference scale and its interpretation of the old faculty assessment (see Table 1) are already enshrined in the various operational manuals. The STAR utilizes a 4-point scale which throws off the assessment's computation and interpretation. Suffice it to say that various stakeholder consultations are thus made to account for this peculiarity, and institutional adjustments and solutions are implemented. A new component (*learner-centered practices*) is included in AY 2008-2009 as a quantitative measure for "effective learner-centered teaching" to conform to its reference in the faculty manual. It is fully utilized beginning in AY 2009-2010. Following technological advancements and societal upheaval in 2019 necessitates its repurposing to Learners' Assessment of Teachers and Courseware in a Hybrid Environment (LATCH), giving rise to Effectiveness Of Teachers (EOT), Online Course Management (OCM), Effectiveness Of Courseware (EOC), Promotion Of Openness (POO), and Promotion Of Deep Learning (PODL) measures.

In XYZ College, faculty teaching loads are assigned every trimester, factoring in their most recent evaluation. In other words, there is at least a month for corrective actions by the college to assign competent facilitators to a subject offered. Predicting the faculty's performance as a factor in course and subject offerings justifies the investigation of the different machine learning models. This research aims to supplement decision-making processes, resource allocation, and teaching quality by addressing the question: "Which machine learning algorithm can deliver the most accurate predictive model based on the evaluation dataset?".

Methods

Data. The data comprises 3203 teacher evaluations by students spanning four (4) years beginning in 2019. EOT is measured using thirteen (13) items, OCM with four (4) items, EOC with eight (8) items, POO with two (2) items, and PODL with three (3) items are used using XYZ College's faculty evaluation for every academic year. These evaluation values are averaged and categorized according to the equal-width discretization model, which preprocesses continuous numerical data into discrete intervals of identical width. By identifying the data range, choosing the most suitable number of bins, calculating the width of the bin, creating new bins based on the calculated bin width, assigning data points to the bin, and finally, depicting the data within each bin with a single value, the proponents came to create the performance category for interpreting the outcome.

Conforming with Table 1 necessitates the creation of a faculty efficiency index (FEI) column, which is utilized in interpreting the performance category. The decision to establish wider ranges for categories 1 and 2 in contrast to the other categories can be attributed to a multifaceted rationale to capture a nuanced spectrum of performance within these tiers. This deliberate choice accounts for various factors contributing to the varying proficiency levels or inadequacy present in the lower performance bands. The broader span allotted to categories 2 (Needs Improvement) and 1 (Poor) aligns with understanding the developmental potential, acknowledging that individuals within these ranges may exhibit diverse degrees of room for improvement. This approach recognizes that faculty performance within these categories may encompass varying levels of subpar accomplishment, accommodating scenarios where individuals' skills might range from moderately below standard to significantly underperforming.

The broader range approach also accommodates the diversity inherent in these lower-performance tiers. In contexts involving individuals with distinct backgrounds, experiences, or learning challenges, the wider range acknowledges that disparities in performance can arise due to many factors. This inclusive perspective allows evaluators to consider a more diverse circumstance while categorizing performance. Moreover, the broader range facilitates the emphasis on improvement within these categories. This reflects an educational ethos that categorizes individuals and provides constructive feedback for growth and development (Isoré, 2009; Tufts University, n.d.).

The Panda library scales the data and removes outliers, unnecessary data points, and missing values, producing the most relevant inputs to the models. Feature selection involves reducing the number of variables used to predict the outcome to boost model interpretability, lower complexity, improve the algorithms' computing efficiency, and avoid overfitting. This process results in the inclusion of school code and program code variables in the active dataset.

Table 1: Categorization of Criteria

Category	Criteria	Interpretation
1	Between 1.0 and 1.99	Poor
2	Between 2.0 and 2.99	Needs improvement
3	Between 3.00 and 3.33	Satisfactory
4	Between 3.34 and 3.66	Very satisfactory
5	Between 3.67 and 4.00	Outstanding

Models. Predictive modeling involves developing a model by utilizing data that has known outcomes. Subsequently, this model forecasts result values for datasets without known outcomes. Various forecasting models such as Naive-Bayes, K-Nearest Neighbor, Random Forest, Support Vector Machine, and Decision Tree are employed to enhance efficiency and accuracy. These machine-learning techniques autonomously generate models correlating input data with the desired target values in supervised optimization scenarios. The model's performance is assessed using metrics derived from the confusion matrix alongside other evaluation metrics. Given the existing literature (e.g., Asif et al., 2017), it is recognized that there is no universally superior classifier for result prediction. Hence, examining and identifying the most researched classifiers suitable for the analyzed data is crucial. The Python code used in the examinations is found in Appendix A.

The research employs the Python Programming Language, specifically utilizing JupyterLab as an interactive development environment for coding and data analysis. Python is an open-source language freely available for personal and commercial use. It is versatile, running on various operating systems, and finds applications in web development, scientific computing, software development, and more. To leverage Python's capabilities in scientific computing, the researchers utilized the Pandas library, which provides powerful data processing, analysis, and manipulation functionalities (Welcome to Python.Org, n.d.). For machine learning tasks, the researchers relied on the scikit-learn (*sklearn*) library, which offers a wide range of classification, regression, and clustering algorithms (Pedregosa et al., 2011). In addition, *numpy*, *seaborn*, and *matplotlib* libraries for data visualization are utilized. These tools were instrumental in data cleansing, splitting the data into train and test datasets (80% and 20%, respectively), loading the data into the

selected machine learning algorithms, and evaluating the performance of each algorithm and its results.

Evaluation Metrics. The evaluation metrics common to these algorithms are *accuracy* (expressed as a percentage with a higher value indicating better performance), *precision* (ranges from 0 to 1 with the latter indicating perfect precision), *recall* (ranges from 0 to 1 with the latter indicating a perfect recall), and *F1 score* (the harmonic mean of precision and recall with 1 indicating the best possible score). The Receiver Operating Characteristic (ROC) curve and the Area Under the ROC Curve (AUC-ROC) are not evaluation metrics since several classifiers do not have the boundary values to generate the curve.

The Faculty Effectiveness Index (FEI) data frame is divided into train and test data. A machine learning technique was used to train the machine based on the knowledge learned from the train set. The needed attribute will be predicted for the test set using an algorithm and the information learned from the training set. The train set must be larger than the test set to ensure superior data learning (Brownlee, 2020; Galarnyk, 2022). Normally, eighty percent (80%) of the dataset comprises the train set, and twenty percent (20%) of the observations are for testing. According to Tokuç (2021), since there is no single rule of thumb in splitting the dataset into train and test sets, a 70:30 train and test ratio is used if the dataset is relatively small (n<10,000), while a 99:1 train and test ratio is used if the dataset is very large (n>=1,000,000). In this instance, the Train set consists of 1,249 records, and the Test set, which comprises the remaining 641 records, is 20% of the total.

Results

The model's performance was evaluated with a confusion matrix, accuracy, precision, recall, and f-score (F1) metrics. The confusion matrix shows the current situation in the dataset and the number of correct/incorrect predictions of the model. The number of correctly and incorrectly classified instances calculates the model's performance. In the succeeding tables, the rows show the real numbers of the samples in the test set, and the columns represent the estimation of the model. The table is a 3x3 matrix that shows the number of instances correctly predicted on the diagonal. The other numbers in the table represent the number of errors made in the predictions.

Table 2: Confusion matrix of the KNN algorithm

kNN		**Predicted**			
		Needs Improvement	Outstanding	Poor	*Sum*
Actual	Needs Improvement	97	15	0	112
	Outstanding	0	504	0	504
	Poor	0	5	20	25
	Sum	97	524	20	**641**

Table 2 displays the confusion matrix of the KNN algorithm. It shows that 20 (86.6%) of those with actual "Poor" ratings, 504 (100%) of those with "Outstanding" ratings, and 97 (80%) of those with "Needs Improvement" ratings were predicted correctly.

Table 3: Confusion matrix of the Naive Bayes algorithm

Naive Bayes		**Predicted**			
		Needs Improvement	Outstanding	Poor	*Sum*
Actual	Needs Improvement	112	0	0	112
	Outstanding	0	504	0	504
	Poor	0	0	25	25
	Sum	112	504	25	**641**

The confusion matrix for the Naive Bayes algorithm is shown in Table 3. It demonstrates that all predictions for 112 (100%) actual "Poor" ratings, 504 (100%) actual "Outstanding" ratings, and 25 (100%) actual "Needs Improvement" ratings were accurate.

Table 4. Confusion matrix of the SVM algorithm

SVM		**Predicted**			
		Needs Improvement	Outstanding	Poor	*Sum*
Actual	Needs Improvement	102	10	0	112
	Outstanding	0	504	0	504
	Poor	0	25	0	25
	Sum	102	539	0	**641**

Presented in Table 4 is the confusion matrix for the Support Vector Machine algorithm. It demonstrates that 102 (91.1%) of the actual "Poor" ratings, 504 (100%) of the actual "Outstanding" ratings, and 0 (0% of the actual "Needs Improvement" ratings) were properly forecasted.

Table 5: Confusion matrix of the Random Forest algorithm

RF		**Predicted**			
		Needs Improvement	Outstanding	Poor	*Sum*
Actual	Needs Improvement	112	0	0	112
	Outstanding	0	504	0	504
	Poor	0	0	25	25
	Sum	112	504	25	**641**

The confusion matrix shown in Table 5 is about the Random Forest algorithm. It demonstrates that 112 (100%) of those who received "Poor" evaluations, 504 (100%) of those who received "Outstanding" ratings, and 25 (100%) of those who received "Needs Improvement" ratings had their ratings accurately identified.

Table 6: Confusion matrix of the Decision Tree algorithm

DT		**Predicted**			
		Needs Improvement	Outstanding	Poor	*Sum*
Actual	Needs Improvement	112	0	0	112
	Outstanding	0	504	0	504
	Poor	0	0	25	25
	Sum	112	504	25	**641**

The confusion matrix for the Decision Tree method can be seen in Table 6. It reveals that 112 (100%) of the actual "Needs Improvement" ratings, 504 (100%) of the "Outstanding" ratings, and 25 (100%) of the "Poor" ratings were accurately determined.

Table 7: Predictive data mining models' performance evaluation

Model	Accuracy	Precision	Recall	F1 Score
KNN	0.969	0.970	0.969	0.968
Naive Bayes	1.000	1.000	1.000	1.000
SVM	0.945	0.910	0.945	0.926
Random Forest	1.000	1.000	1.000	1.000
Decision Tree	1.000	1.000	1.000	1.000

Based on the findings presented in Table 7, it was observed that the Naive Bayes, Random Forest, and Decision Tree algorithms achieved the highest accuracy value of 100%. This indicates a strong correlation between the predicted and actual data, demonstrating that all samples were correctly classified. The results highlight the effectiveness of these algorithms in accurately predicting and classifying the data under consideration.

Discussion

In this study, the primary focus was evaluating the efficiency score of faculty members at XYZ College using various machine learning algorithms. The algorithms tested included Naive Bayes, KNN, Random Forest, SVM, and Decision Tree on the faculty evaluation data collected spanning four years from 2019 onwards.

The results obtained from the confusion matrices indicated that Naive Bayes, Random Forest, and Decision Tree achieved the highest accuracy, followed by KNN and SVM. Specifically, Naive Bayes, Random Forest, and Decision Tree algorithms exhibited 100% accuracy, precision, recall, and F1 scores, indicating a strong correlation between the predicted and actual data. KNN exhibits an accuracy of 96.9%, precision of 97%, recall of 96.9%, and an F1 score of 96.8%. At the same time, SVM had the lowest prediction performance, with an accuracy of 94.5%, precision of 91%, recall of 94.5%, and an F1 score of 92.6%. These findings align with the results of Meyer et al. (2003) and Sun et al. (2002). However, they contradict the study conducted by Yağcı (2022), which

found KNN to have the lowest classification accuracy in predicting final student grades while SVM achieved high accuracy in classification tasks.

Despite the compelling findings presented in this study, several limitations warrant consideration when interpreting the results. Firstly, the high accuracy, precision, recall, and F1 scores achieved by certain algorithms, particularly Naive Bayes, Random Forest, and Decision Tree, might raise concerns regarding potential overfitting to the specific dataset. Further investigation into the generalization capacity of these models is recommended, possibly through cross-validation and testing on external datasets. Additionally, the achieved prediction performance of KNN and SVM might be contingent on the selected hyperparameters, distance metrics, and kernel functions. The study acknowledges that KNN exhibited favorable metrics but outperformed other algorithms. Thus, systematically exploring hyperparameters for KNN and SVM and assessing alternative distance metrics and kernel functions could provide insights into further optimizing their performance.

Furthermore, the faculty evaluation dataset from XYZ College, though spanning multiple years, might introduce temporal biases or institutional peculiarities that influence the algorithms' performance. Machine learning algorithms are only as good as the data they are trained on. If the data used for evaluation is biased or incomplete, it can lead to biased or unfair evaluations. The potential impact of such factors on the generalizability of the results necessitates caution when extending the findings to other academic institutions or contexts.

Several recommendations can guide future research in this domain based on the results and limitations identified in this research. Firstly, the study encourages a more robust evaluation framework that includes cross-validation techniques to assess the stability and generalization capacity of the models. This will mitigate concerns regarding overfitting and ensure that the reported performance metrics indicate the models' true predictive abilities. Additionally, for algorithms like KNN and SVM that exhibited comparatively lower prediction performance, the study suggests conducting an extensive hyperparameter search to identify the optimal configurations that may enhance their predictive accuracy. Exploring various distance metrics and kernel functions could address the observed disparities and elevate their performance to align with the other algorithms. Moreover, considering the varying results reported in related studies, the field would benefit from larger-scale comparative analyses across different institutions and datasets. This would contribute to a more comprehensive understanding of the algorithms' generalizability and effectiveness in diverse educational settings.

For educational institutions, faculty members, and the overall standard of education, developing a predictive model for evaluating faculty effectiveness can have substantial implications. A methodology like this might shed light on how well a faculty member is performing and can be a guide to professional development that contributes to better student outcomes. Predictive models objectively evaluate faculty performance, reducing bias and subjectivity in the assessment process. These can also be used to make more informed decisions when hiring new faculty members and considering tenure and promotions. Insights from the model can inform curriculum development and ensure alignment with effective teaching methods. Also, by identifying effective faculty members, institutions can learn from their practices and potentially implement strategies that lead to higher student satisfaction and better learning outcomes. Moreover, schools can establish a

continuous improvement and transparency culture, where faculty members are encouraged to reflect on their teaching practices and adjust based on the model's feedback. Lastly, educational institutions can use the model to maintain and improve the overall quality of education they provide, ensuring that faculty meet or exceed defined effectiveness standards.

Conclusion

Predicting faculty performance is a crucial aspect in academia as it allows for the identification of high-performing individuals who can be recognized and rewarded, as well as the identification of mid and low-performing individuals who can be provided with opportunities and training for improvement. By repeatedly utilizing prediction models, educational institutions can continuously enhance education quality and improve student outcomes and performances. Effective performance prediction will enable educational managers and faculty to allocate resources and instruction more accurately.

This research proves that Naive Bayes, Random Forest, and Decision Tree effectively predict faculty performance on the given data. Implementing these algorithms in the faculty evaluation process is still being evaluated, pending publication, dissemination, and scrutiny of the results to the major stakeholders. As such, this report does not present the specific model deployment on new and unseen data using the existing or the development of new application systems and the monitoring and maintenance process.

In conclusion, this study has significant room for improvement and expansion. One avenue for enhancement lies in including additional variables within the machine learning algorithms, such as results of peer evaluations, attendance reports, and faculty research outputs. These supplementary data sources promise to provide a deeper and more comprehensive understanding of faculty performance. Furthermore, exploring a wider array of machine learning algorithms, including supervised, unsupervised, semi-supervised, reinforcement, and deep learning methods, can offer valuable insights and enable comparative analysis. Adopting ensemble methods like bagging, boosting, and stacking can be considered to refine the study's methodology. These techniques leverage the collective predictive power of multiple models to enhance accuracy. Additionally, conducting an in-depth Error Analysis is crucial in advancing machine learning models. By thoroughly investigating the sources of model errors and discerning their underlying causes, we can refine and fine-tune the models, thus improving their overall performance.

Finally, while this study provides valuable insights into applying machine learning algorithms for faculty evaluation, it is imperative to acknowledge its limitations and adhere to the recommendations provided. By doing so, we can pave the way for a more robust, dependable, and widely applicable understanding of the efficacy of these algorithms in real-world academic assessment scenarios. The potential for further refinement and development in this field is substantial, and continued research will undoubtedly yield even more accurate and insightful results.

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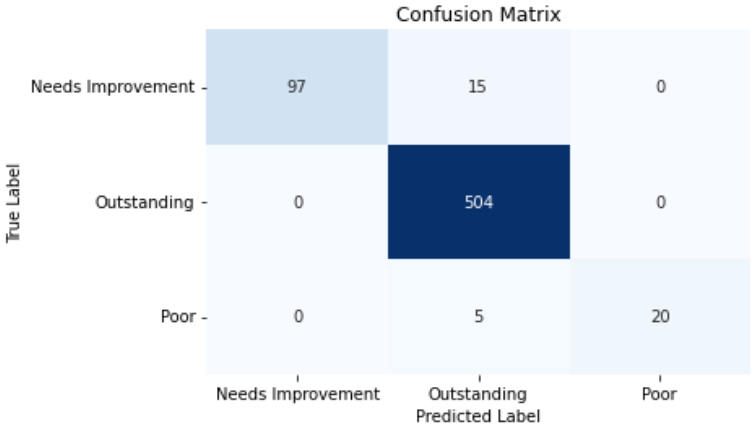
Appendix A

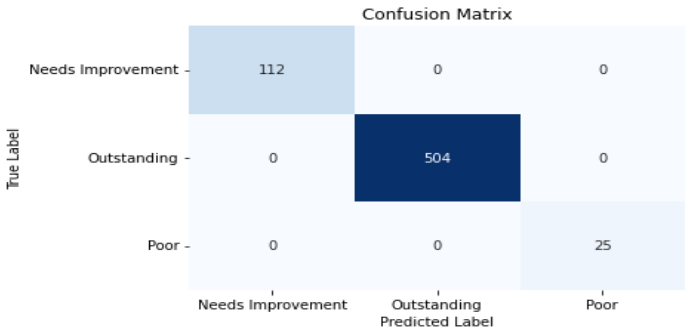
```
# Models with Confusion matrix and metrics
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.preprocessing import LabelEncoder
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score,
confusion_matrix

# Load the dataset
df = pd.read_csv("june1dataset.csv")

# Define the categories or bins for teacher effectiveness
# Define bin boundaries and labels
bins = [-float('inf'), 2.0, 3.0, 3.34, 3.67, float('inf')]
labels = ['Poor', 'Needs Improvement', 'Satisfactory', 'Very Satisfactory',
'Outstanding']

# Categorize 'FEI' column
df['FEI'] = pd.cut(df['FEI'], bins=bins, labels=labels)

# Encode categorical labels to numerical values
label_encoder = LabelEncoder()
df['FEI'] = label_encoder.fit_transform(df['FEI'])

# Split the data into features (X) and target variable (y)
X = df.drop(['FID', 'SchoolYear', 'avgEoT', 'avgOCM', 'avgEoC', 'avgPoO', 'avgPoDL',
'avgAll'], axis=1)
y = df['FEI']  # Faculty Effectiveness Index

# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)

#print the values of the training and testing data
print('Shape of the Training and Test Dataset')
print(' X_train: ', X_train.shape)
print(' X_test: ', X_test.shape)
print('\n')

# Initialize and train different classification models
models = {
    'K-Nearest Neighbors': KNeighborsClassifier(),
    'Naive Bayes': GaussianNB(),
    'Support Vector Machine': SVC(),
    'Random Forest': RandomForestClassifier(),
    'Decision Tree': DecisionTreeClassifier()
}

for name, model in models.items():
    # Train the model
    model.fit(X_train, y_train)
```

```
    # Make predictions on the test set
    y_pred = model.predict(X_test)

    # Evaluate the model
    accuracy = accuracy_score(y_test, y_pred)
    precision = precision_score(y_test, y_pred, average='weighted')
    recall = recall_score(y_test, y_pred, average='weighted')
    f1 = f1_score(y_test, y_pred, average='weighted')
    cm = confusion_matrix(y_test, y_pred)

    # Print the evaluation results
    print(f"{name}:")
    print(f"  Accuracy: {accuracy:.4f}")
    print(f"  Precision: {precision:.4f}")
    print(f"  Recall: {recall:.4f}")
    print(f"  F1 Score: {f1:.4f}")
    print("  Confusion Matrix:")

    # Create a DataFrame for the confusion matrix
    cm_df = pd.DataFrame(cm, index=label_encoder.classes_,
columns=label_encoder.classes_)

    # Create a heatmap for the confusion matrix
    plt.figure(figsize=(6, 4))
    sns.heatmap(cm_df, annot=True, fmt='d', cmap='Blues', cbar=False)
    plt.title('Confusion Matrix')
    plt.xlabel('Predicted Label')
    plt.ylabel('True Label')
    plt.show()

    print("\n")
```

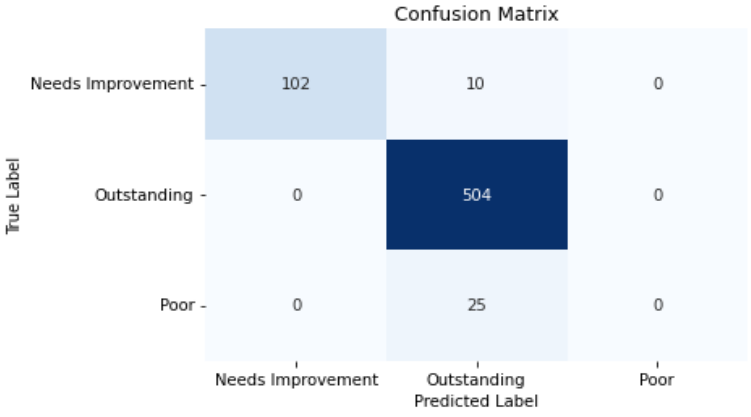
```
Shape of the Training and Test Dataset
 X_train:  (2562, 3)
 X_test:  (641, 3)


K-Nearest Neighbors:
  Accuracy: 0.9688
  Precision: 0.9700
  Recall: 0.9688
  F1 Score: 0.9678
  Confusion Matrix:
```



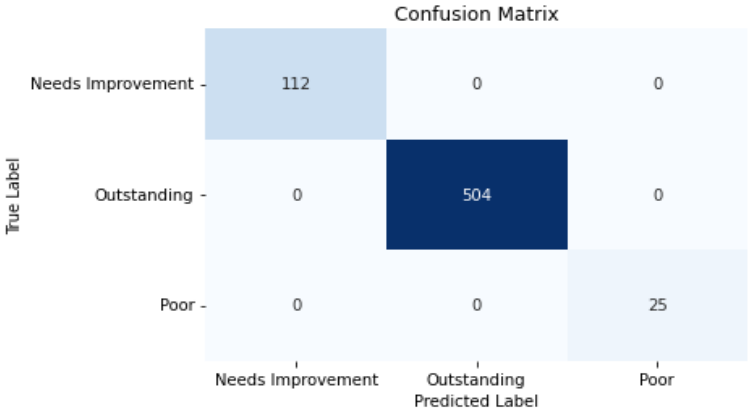
```
Naive Bayes:
  Accuracy: 1.0000
  Precision: 1.0000
  Recall: 1.0000
  F1 Score: 1.0000
  Confusion Matrix:
```




```
Support Vector Machine:
  Accuracy: 0.9454
  Precision: 0.9099
  Recall: 0.9454
  F1 Score: 0.9264
  Confusion Matrix:
```




```
Random Forest:
  Accuracy: 1.0000
  Precision: 1.0000
  Recall: 1.0000
  F1 Score: 1.0000
  Confusion Matrix:
```



```
Decision Tree:
  Accuracy: 1.0000
  Precision: 1.0000
  Recall: 1.0000
  F1 Score: 1.0000
  Confusion Matrix:
```

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Empowering Multi-disciplinary Policymaking with Systems Dynamics: The Return on Investing in Early Childhood Education

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ABSTRACT

The human sciences are maturing rapidly. Education policymaking must also mature. One method of ensuring rigor in policymaking is evaluating the return on investment (ROI). A major discovery in the human sciences is the importance of the first thousand days of life in shaping an individual's life. This period is neglected in educational policymaking and funding. This research aims to build an ROI model to support educational policy in the first thousand days. The research was done in two stages. Firstly, the literature on early childhood was reviewed and integrated to derive equations that describe the life-long impacts of early childhood. Secondly, a systems dynamic (modeling of complex systems) is constructed using Vensim® software. We propose a three-phase model: (1) rigorous adolescent teaching of emotional and social skills; (2) an "it takes a village to raise a child" strategy; and (3)a "parents as first teachers" strategy. We found that (1) Australian government agencies lack a coordinated strategy; (2) Education funding is primarily directed at supporting educational professionals and institutions rather than empowering and skilling families and communities. (3) More research on forgetting and loss of skill post-course completion is needed, and (4) Research into and awareness of complex systems can be fostered with easy-to-use systems dynamics software platforms. This research applies four powerful tactics for empowered educational research: (1) empowering individuals and communities; (2) education as operating in multi-disciplinary complex systems; (3) championing recent transformational discoveries; and (4) exploring the ROI of policies.

Keywords: Early childhood education, Multi-disciplinary research, return on investment, Policy Research, Systems dynamics.

Background

A golden age in the human sciences

Educational science development can be broadly categorized into two streams: (1) those on individual behavior and how learning occurs and (2) those on cultural and institutional behavior.

Thomas Kuhn (1962, 1970), in his influential theory on the history of science, proposed that long periods of slow, incremental development were interspersed with periods of rapid, explosive growth. He coined the term "paradigm shift" to describe the cause of latter periods – when a fundamental scientific conceptual change opens the mind to new viewpoints. One such new perspective was the discovery by Nicolaus Copernicus (1543, 2008) that the earth was not the center of the universe (as was the then-dominant belief in Western civilization), and today, we recognize the earth as merely a speck in a multitude of galaxies. Copernicus's different perspective spurred further discoveries by other scientists. These discoveries were applied to develop inventions and gave us the unprecedented wealth of the Industrial Revolution.

While Copernicus's paradigm shift led to breakthroughs in the physical sciences, Kuhn also identified a later paradigm shift by Charles Darwin (Darwin, 1885): the discovery of evolution. This paradigm shift freed scientists in the human sciences to study humans and their behaviors more objectively and as merely another species in many animals. Disciplines such as neuroscience, biochemistry, and endocrinology provide knowledge of the underlying mechanisms, while evolutionary biology, primatology, cognitive psychology, anthropology, and sociology provide knowledge of observed behavior. Integrating these diverse sources delivers robust and holistic insights. These discoveries are being applied to fuel dramatic change in practical fields such as medicine, economics, and computer science. However, education has been slow to exploit these discoveries. This paper explores the practical implications of one of these discoveries: that human development is not uniform, and it contains *sensitive periods* that can be exploited for rapid development but can also cause damage if poorly managed.

Research Objectives and Contribution

The theme of this conference is "Empowering education through research". We take the position that education is a practical discipline and industry and must thus be guided by its costs and the subsequent benefits it delivers. Unfortunately, education funding is rarely motivated by analyzing costs and benefits but by the desire to continue and expand historical practices and industries. This paper describes the potential for refocusing education based on recent discoveries in sensitive human development periods that promise to deliver substantially superior benefits at significantly lower costs.

As such, this research has two objectives:

(1) Design a set of educational interventions to exploit early childhood's sensitive period better.

(2) Construct a software model of the above design that permits other researchers and policy designers to explore the return from investing in these interventions.

This research contributes to the growing body of research that envisions education as a rigorous science that delivers tangible economic and social benefits to the individual, their immediate community, and the wider society.

Research methods and the structure of this paper

This research explores the future of education and its implications for society in a holistic manner. It is, therefore, appropriate to use the methods from the field of Futures studies - a multi-disciplinary field whose goal is to identify and design preferred futures. Substantial effort has been made to develop a robust toolbox of methods (Bell, 1997, 2003; Inayatullah, 2008; Jerome & Gordon, 2009) for this field. The methods that we use come from this toolbox. In previous work, the authors (Somasundaram, 2017, 2018; Somasundaram et al., 2022) identified sensitive periods as one of several important and underappreciated discoveries in the science of learning that have the potential to transform education. In the next (second) section, we briefly describe the current literature on the most important of the sensitive periods - early childhood. The literature was identified using the future studies method of environmental scanning (Gordon & Glenn, 2009; Voros, 2003). In the third section, we summarise current government education policy and systems. In the fourth section, we use the literature to design a three-stage preferred intervention that builds on existing systems. In the fifth section, we model the interventions using software that supports a method for modeling complex systems known as systems dynamics. Descriptions of systems dynamics and the reasons for selecting the modeling software for this type of work have been described by the authors (Somasundaram et al., 2022) and are not replicated here. The final seventh section discusses our conclusions and the limitations of this work.

Literature on the importance of early childhood

We identified knowledge from three types of sources as providing important knowledge regarding the goals of this research, each applying a defining phrase: (1) the phrase 'sensitive periods' from psychology; (2) the phrase 'the first thousand days of life' from medicine; and (3) the phrase 'it takes a village to raise a child' from culture and sociology. Our delineation of these phrases as arising from distinct fields is arbitrary, as researchers working on these topics realize their work is multi-disciplinary.

Psychology – sensitive periods

The critical impact learning has in later life was scientifically popularised by Conrad Lorenz in another animal species (Lorenz, 1937) - geese. He observed that baby geese established an attachment bond with a nearby object within hours of their birth and would later follow that object around in preference to their mother. Lorenz coined the term *critical period* to describe that window of time in which appropriate attachments needed to be formed with geese.

A half-century later, a similar issue was observed in human infants who were reared in an environment of intense social deprivation and were not removed from it before they were six months old (Rutter, 1998). The research indicated that the damage's intensity was based on the timing and duration of the deprivation. However, this damage is partially reversible with intense therapy, and sensitive periods rather than critical periods more aptly reflect that in humans, the impact of these periods is not absolute.

Further research has linked both adult (1) mental and (2) physical illnesses to both (1) chronic deprivation and (2) acute mental trauma in childhood (Zarse et al., 2019). The National Scientific Council on the Developing Child (2007) compares the occurrence to building a home:

The brain's basic architecture is constructed through an ongoing process that begins before birth and continues into adulthood. Like the construction of a home, the building

process begins with laying the foundation, framing the rooms, and wiring the electrical system in a predictable sequence. It continues by incorporating distinctive features that reflect increasing individuality over time. Brain architecture is built over a succession of "sensitive periods," each associated with forming specific circuits associated with specific abilities. Developing increasingly complex skills and their underlying circuits builds on the circuits and skills that were formed earlier. Through this process, early experiences create a foundation for lifelong learning, behavior, and physical and mental health. A strong foundation in the early years increases the probability of positive outcomes, and a weak foundation increases the odds of later difficulties. (p5)

Better instruments and techniques now allow us to relatively non-invasively monitor changes in brain architecture. Figure 1 shows how synaptic density – the number of connections between brain cells -rapidly increases, peaks, declines, and then flattens out. The density of the visual and auditory cortices (areas involved with vision and hearing) peaks before the prefrontal cortex (associated with complex behavior).

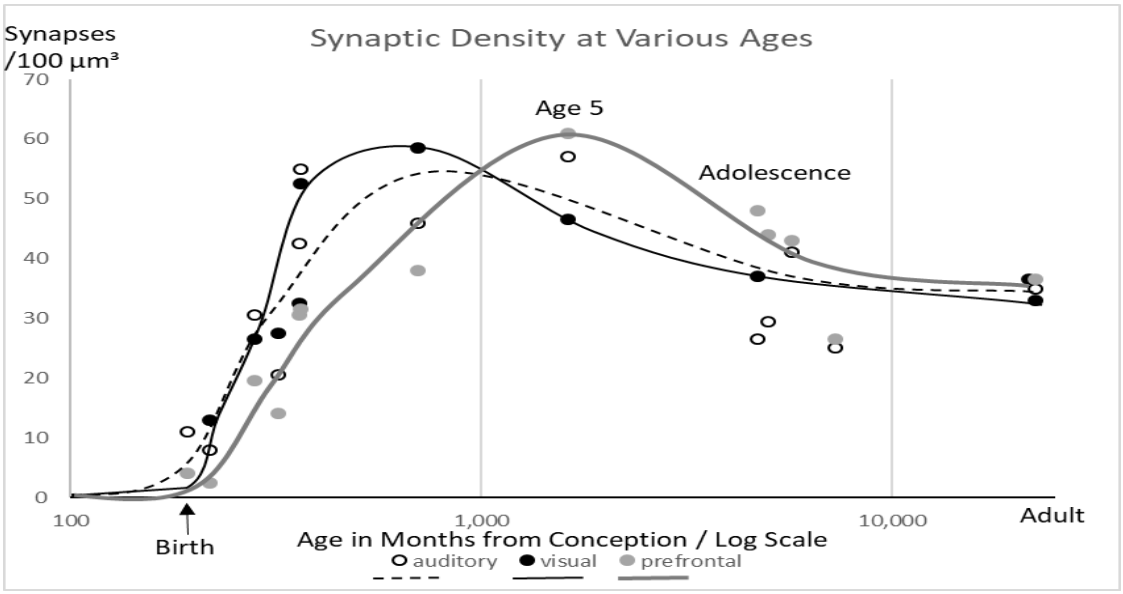

Figure 1. Synaptic density at various parts of the cortex at different ages. From Huttenlocher and Dabholker (1997).

The ability of brain cells to form, strengthen, and weaken connections between each other – called neuroplasticity - is life-long. Neuroplasticity is how we learn. Thinking results from a sequence of nerve cells firing in a meaningful pattern. When a chain of nerve cells fires, they grow stronger (due to neuroplasticity), and a reduced likelihood of firings diverting into less meaningful patterns. Thus, we can define a sensitive period as a biologically driven period of higher neuroplasticity substantially increasing learning impact.

Two issues should be noted. Firstly, a selective reduction in brain cell connections is also a form of learning since it reduces less meaningful patterns. Thus, efficient learning can occur when there is a biologically driven increase in synaptic formation and a biologically driven decrease in synaptic formation. Secondly, learning can also be harmful in the form of "learned helplessness". Where a person learns to avoid seeking solutions to problems they could solve because they have been repeatedly placed in negative situations they have no control over ("a phenomenon in which

repeated exposure to uncontrollable stressors results in individuals failing to use any control options that may later become available" ("Learned helplessness," 2023)). Three characteristics of learned helplessness are (a) a lack of motivation in tackling negative situations, (b) less learning from successful solutions, and (c) higher stress in negative situations. Educational interventions must be careful not to promote learned helplessness during sensitive periods.

The changes discussed so far can be described as nature building the brain for survival. Next to survival, nature's most important goal is reproduction, and two other sensitive periods, both targeting reproduction, are of interest to this paper: one occurs at puberty and the other during pregnancy. These periods are included in the interventions this paper proposes and are targeted in the policy design (section 4).

The First thousand days of life

The term 'the first thousand days of life is thought to originate from a US foreign aid strategy focusing on nutrition during the first thousand days:

Nutrition plays the most critical role in a person's life during a narrow window– the 1,000 days that begin at the start of a pregnancy and continue through the second year of life. The quality of nutrition during those 1,000 days can help determine whether a mother and child survive pregnancy and whether a child will contract a common childhood disease and experience enough brain development to go to school and work as an adult.

The science of nutrition points to a strategy. Suppose we target that brief critical period during which nutrition has the biggest impact and focus on improving nutrition for expectant mothers, new mothers, and young children. In that case, we can accomplish several things at once. We can save lives, help children start on a better path, and bolster economic development and learning.

US Secretary of State. Hillary Clinton (Clinton, 2010)

This insightful phrase caught on quickly in policy and research circles. It also expanded quickly, recognizing that the insight not only promoted adequate nutrition in developing countries but had a global relevance to parental drug use and other physical or mental trauma during maternal pregnancy. A report by the Royal Children's Hospital in Melbourne (Australia) entitled 'The First Thousand Days: An evidence paper' (Moore et al., 2017) and the article 'The First Thousand Days: early, integrated and evidence-based approaches to improving child health: coming to a population near you?' (Darling et al., 2020) in a British Medical Journal publishing group journal, reviews the field thoroughly.

It takes a village to raise a child.

The third insightful phrase is from a widespread African proverb ("It takes a village," February 13, 2023). Raising thriving children is extremely resource-intensive across multiple dimensions, such as nutrition, security, time, and skills. Social forces such as those driving mobility and a nuclear family disrupt traditional social support networks.

The article 'It Takes a Village to Raise a Child: Understanding and Expanding the Concept of the "Village"' (Reupert et al., 2022) in the journal Frontiers in Public Health provides a good review of current research and practice. The authors propose nine principles in a village approach.

Current policy and systems

Australia has two layers of government that deliver services of relevance: federal and state. Within each layer of government are three distinct areas: (1) education, (2) health, and (3) social services operated by distinct departments. Poor coherence and coordination across services often impact educational policy and systems. The descriptions provided below on the state-level systems are based on the Queensland system.

Education

The federal government's education department specifies its purpose as contributing "to Australia's economic prosperity and social wellbeing by creating opportunities and driving better outcomes through access to quality education" (Department of Education, 2023, p4). In contrast, Queensland's education department specifies a common national commitment to "equity and excellence in education – that all children and young people are confident, creative lifelong learners active in their community" (Queensland Government, 2022, p8).

Government funding of early education is primarily directed at supporting institutionalized services (at centers rather than in homes). The federal government calls the funding childcare (implying that a primary purpose of the funding is to provide babysitting services so that parents can work). In contrast, the state government system refers to it as early childhood. Both systems operate by providing funding if the center operates to certain standards. In Queensland, approximately 40% of children attend these centers.

Health

The federal government provides funding for primary care delivered by the private sector in a highly regulated environment. Primary care funding is delivered through a system called Medicare. The states provide hospital services. Health care is focused on the individual as a patient.

Social services

Social services are provided by state governments, with income support provided by the federal government. A principal focus of state social services is to respond to reports of children at high risk of harm.

Proposed design

We propose a three-stage strategy that builds on both current research and current systems: (1) Teach skills for achieving successful parenting delivered during adolescence (puberty); (2) Teach 'village-building' skills and support triggered by pregnancy; and (3) Teach 'parents as first teachers' skills delivered after birth. We base our strategy on the position that the purpose of education is to foster the skills for individual and community thriving (Cantor, 2021; Kristjánsson, 2017).

Adolescence is a sensitive period where the mind and body transform to achieve reproduction. Learning is enhanced due to neuroplasticity, and the relevant skills are immediately relevant and practicable to the adolescent. The specific skills we propose to teach during sensitive periods are summarised in Table 4.1.1 as outcomes: (1) building stable partnerships; (2) building strong social networks (villages); (3) maintaining optimal physical and mental health; (4) life planning and resource management. Adolescence is also a period during which harmful behaviors can be formed

in both the individual and the offspring: (1) dysfunctional pair bonding, (2) substance abuse, (3) early and unwanted pregnancies, and (4) poor financial and resource management skills.

Village-building

Currently, pregnancy triggers only a health response – an assessment of the mother-to-be's physical health and treatment guidance for abnormal markers. We propose a substantive holistic assessment of the strength of the whole village and its capacity to support pregnant women and their children. We also propose a holistic plan integrating health, education, and social services.

Current Medicare strategies for (1) chronic disease management and (2) elder-care assessment and care delivery are examples of multi-disciplinary team-care approaches and are somewhat similar to what we propose. However, these Medicare strategies are (1) weak in applying educational techniques (instructional design and delivery methods) for skills development and (2) lack the authority to appropriate non-health resources.

Parents as first teachers

Childbirth represents a major transition in the skills and environment required for infants to thrive. While the previous period focuses on the mother's physical health and ensuring the village's building, the period after birth focuses on developing parenting skills and maintaining the village. The team-care systems can be continued throughout infancy and childhood as required to support and educate parents in their role as first and most important teachers.

Limitations

As George Box cautioned, "*All models are wrong, but some are useful*" (Box, 1979, p 2). Models are simplifications of a complex reality. It must be simplified to study reality, as there are far too many factors for them to be fully analyzed. The quality of a model is whether it captures and represents the most important elements. The model developed and described here explores the return on investment of different investment tactics for early childhood development. Our goal was to create a simple and easy model for others to understand, but sophisticated enough to represent some underlying principles and attract others to study further and contribute to the presented issues.

This paper draws data from the Australian education system. Other countries have different systems. While other countries have somewhat different systems and educational cultures, we believe that education systems have substantially similar structures, such that our model can be easily adapted for different countries.

Model description

System dynamics (behavior patterns over time) modeling and simulation are powerful tools for policy-making in learning science. It contributes to system thinking (approach) and analysis of a complex social system, its economic problems, and public policies concerning childhood education. Different policymaking approaches can be integrated through system dynamics that influence the development of technology and correct sciences and the application of computer simulation methods to analyze complex social science and systems.

The purpose of the model is to serve as an educational and research tool for developing the novel educational policies for early childhood discussed in section 4. It uses data from the current (2023

forecast) Australian economy. The model is shown in Figure 2. A user can increase the level of funding to each of the three strategies described in section 4 ((1) Adolescent Education (AE); (2) Village Building (VB); and (3) Parents as First Teachers (PAFT)) and observe the quantitative impact on an overall thriving outcome.

In the model, funding for these strategies will be taken from the national education funding and thus cause funding for traditional (existing) educational systems to fall (movement of the slider changes the percentage of educational funding allocated to that particular strategy). This would indirectly lead to a fall in traditional skills, and the lack of traditional skills can potentially reduce national earning capacity (Gross Domestic Product (GDP)). However, investment in the proposed strategies has the potential to improve traditional skills through improved learning skills and classroom behavior (and thus GDP) and improve national thriving.

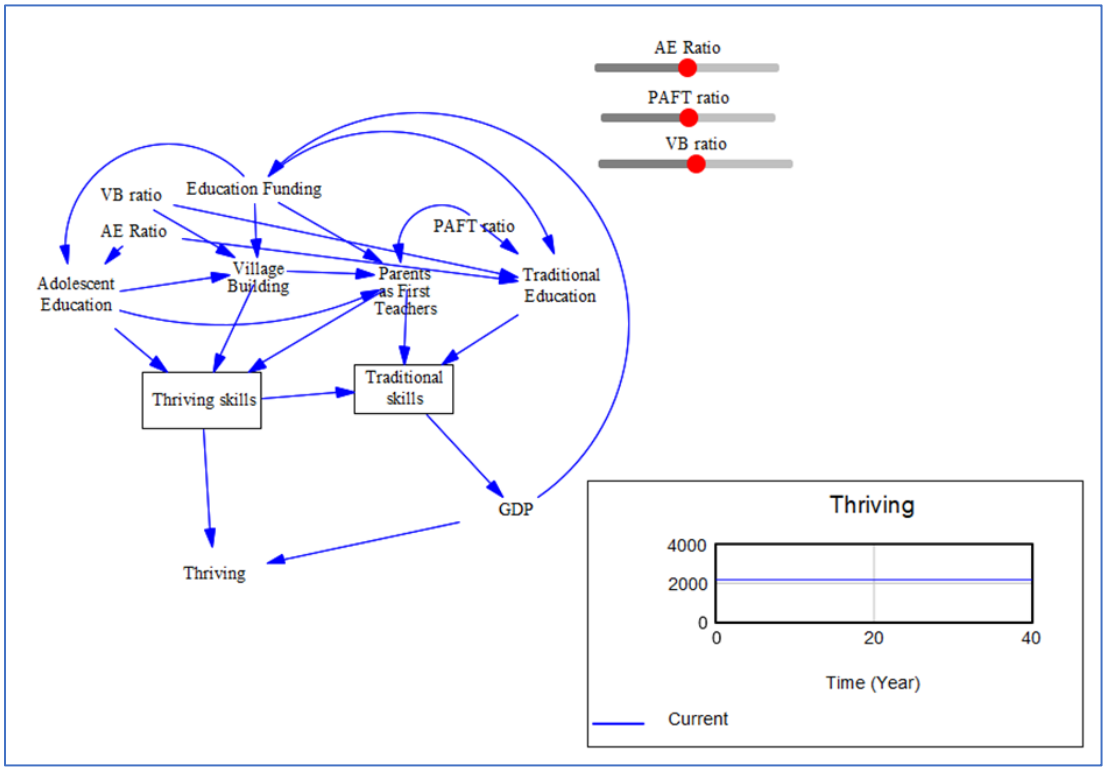

Figure 2. Graphical view of the systems dynamics model used to explore the Return on Investment of the proposed policies.

For those who wish to expand the model further, a copy that can be loaded onto a VENSIM platform is stored here:- https://drive.google.com/file/d/1jbE7sKa9YqcYy3IchDzX-oi1nAR_eF1i/view?usp=sharing and a table with the equations and constants are available here: - https://docs.google.com/spreadsheets/d/1kfOorCzGtVHvzjNm2uorDvCPkFhYitcA/edit?usp=sharing&ouid=104466710374660343241&rtpof=true&sd=true.

Discussion

Findings

From our exploration of the literature, in section 4, we propose a three-stage strategy of educational policy to target the severely under-funded area of sensitive periods in early childhood:

Rigorous adolescent teaching of emotional skills and social skills;

An "it takes a village to raise a child" strategy and

A "parents as first teachers" strategy.

Further, in undertaking this research, we found:

(1) Australian government agencies lack a coordinated strategy, which negatively impacts the education system. Federal and state educational departments have different goals for their educational policies. There is also fragmentation across the key services of education, health, and social services, as described in section 3. These services must be closely coordinated to be effective and economical. Robust public policy decision-making demands a robust return on investment analysis to justify public expenditure. Which strategy provides the better return? How much money should we invest in education? And is the money better spent on education or some other service? The purpose of this model is to explore these questions through quantified analysis.

(2) Education funding is primarily directed at supporting educational professionals and institutions rather than empowering families and communities with skills for autonomous learning (see also (Somasundaram et al., 2006)).

(3) More research on forgetting and loss of skill post-course completion is needed. We found very little educational literature on human forgetting. Understanding the gradual natural losses in skill that occur after course completion is essential if we are to achieve a better understanding of the value of educational programs.

(4) Teaching students easy-to-use tools such as systems dynamics models can enable research into and awareness of complex systems. This research found the software we used reasonably easy to learn and quite powerful. It is free for academic and research use.

Universities have crucial roles to play, influencing the next generation of parents and educators and fostering next-generation research methods for policymaking.

Implications

Scientific discoveries have the potential to revolutionize human thriving. However, we are discovering that our world is complex, and simple solutions based on reductionist methodologies usually have limited success. Policies need to be both multi-pronged and consider life-cycle costs and benefits.

The first thousand days are the most impactful period in a person's life. But educational investment in this period is minimal. Reallocating educational resources to the first thousand days will mean reducing funding from other sources, which will be resisted by stakeholders negatively affected by such reductions. Therefore, significant effort must be invested in building a strong case and engaging stakeholders to embrace educational policies in the first thousand days of life.

Institutions evolve, shaped by the stakeholders with the most influence. Furthermore, as societies advance, their needs and capacities change. There is value in re-examining the purpose of

education and whether existing institutions are meeting this purpose. In particular, if education aims to foster the skills for human thriving (including but not limited to the skills required to get good jobs), emotional and social skills are sorely missing from curricula and examinations.

Historically, research training and most research has been by individuals focusing on a narrowly defined research topic – what Ernst Boyer (1990) called the scholarship of discovery. Furthermore, as there is a global proliferation of universities, research students, researchers, and academic publications, narrowly scoped knowledge has expanded exponentially. This proliferation has caused greater sub-division and splitting of disciplines, often with their specialized technical terms. But complex, real-world problems are best solved by combining expertise from multiple disciplines, which Boyer (ibid) called the scholarship of integration. Modern researchers need the skills to use the methods of the scholarship of integration. Modern scholars also need the skills to work in multi-disciplinary teams. Current research training is not adequately addressing the skills needs of researchers investigating real-world complex problems.

Recommendations

Universities have the intellectual and structural capacity to influence and even lead society strongly, but we too often fail to live up to this capacity. Twenty-first-century leadership requires using twenty-first-century science to learn skills to find solutions to twenty-first-century problems.

This paper is a report on part of a broader research project on recent discoveries in the science of learning. In our previous papers (Somasundaram, 2017, 2018; Somasundaram et al., 2022; Somasundaram et al., 2019), we prioritize three major structural changes to education:

(1) Rigorously teaching the skills of self-regulated learning (which we suggest is more valuable than even learning maths);

(2) For post-secondary educational institutions to substantially reduce their costs by utilizing students' capacity for self-regulated learning and

(3) Designing and delivering educational models to better fit our neurobiological capacities and socio-economic skill needs.

The recommendations in this paper sit under the umbrella of the previous recommendations, and we focus on issues highlighted by the research this paper reports on:

(1) The purpose of education needs to be clarified and widely accepted. In this paper, we argue that the purpose of education is to foster the skills for thriving - that while the skills for economic success are necessary for thriving, our education system neglects other important skills (such as emotional and social) necessary for thriving. But neither we nor the educational industry has a right to decide the purpose of education – that is, the role of society as a whole. However, universities and education professionals can and should lead the discussion on the purpose of education.

The development of (a) emotional skills and (b) social skills are poorly taught by our educational systems even though they are essential, not only for personal thriving, but also success in most work-places, and most importantly, for building the skills and environment to raise our next generation successfully. While our paper argues for best fostering these

skills from early life, higher education institutions should also mandate compulsory formal courses in emotional and social skills for all their students.

The contents of this paper can be used to develop a capstone course (a capstone course is a course near the end of a student's degree that builds on, integrates, and reinforces important earlier courses). Students from multiple disciplines, such as education, health, social work, economics, and information technology, could collaborate to build and extend the systems dynamics model described in this paper. Such a course has several major advantages: (a) it helps build the skill for cross-disciplinary teams; (b) it facilitates students' awareness of the complex, interactive nature of real-world issues; (c) students are the parents and community leaders of tomorrow, and this course will make them better aware of the skills and environment needed for successfully raising the next generation; and (d) students are a substantially underutilized resource and students' work on such a course can be used to extend and expand the contribution this paper makes to early childhood education.

Original contributions

This paper's principal original contribution is the explication of a three-pronged educational strategy that teaches adolescent children the emotional skills and social skills necessary for stable homes and integrates it with the strategies of 'it takes a village to raise a child' and 'parents as first teachers'. The paper also contributes to the literature on the whole-life modeling of the benefits and costs of education.

Conclusion

The theme of the 2023 SEAAIR conference was "Empowering Education Through Research" – a timely recognition of the value of research. This research applies four powerful tactics for empowered educational research: (1) empowering individuals and communities; (2) education as operating in multi-disciplinary complex systems; (3) championing recent transformational discoveries; and (4) exploring the ROI of policies. Both education and research are catalysts for a better society. Catalysts have the valuable property of enhancing activities without being consumed by the process. Once created, catalysts continue to contribute their benefits forever. Investments in both education and research multiply the effects of human efforts to thrive.

We conclude this article with a humorous drawing (Figure 3) of the first element of the proposed three-pronged strategy, one that draws from some of the elements of good teaching: that good teaching engages multiple modalities, engages students' memory and attention, and is immediately applicable to their lived lives. Current research from the human sciences has the potential to empower and revolutionize education. We should not miss that opportunity.

Figure 3: Teaching students emotional skills and social skills. The best education engages students and is immediately relevant to and practicable in their lives. © (Kouwshigan & Somasundaram, 2020).

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Design and Implementation of the E-module in Advanced Swimming

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ABSTRACT

The COVID-19 pandemic disrupted the educational system of the whole world. The institution's approach to the forced implementation of flexible learning is the development of printed and e-modules. This study aimed to develop, design, and evaluate the developed e-module in advanced Swimming as a learning material for Physical Education classes. Design research utilizing the ADDIE model was employed in this study. The e-module was developed based on the course specifications and the acceptability ratings of students and key informants. A purposive sampling method selected 80 students to participate in the examination to determine the least mastered topics. The e-modules were then developed considering these results. E-modules were then conducted for 267 students. These students, with the instructors and academic coordinators, further evaluated the acceptability of the e-modules. Interviews among students on their experiences of using the e-module and key informants from the academe were also conducted. Mean and standard deviation were employed to determine the level of acceptability of the developed e-module, and thematic analysis was utilized for the students' and experts' experiences. Results revealed that the developed e-module has excellently met the standards. The parts were adequate, sufficient, and appropriate as learning material for the intended users and were fitted to help the students learn easily. It also served its purpose of catering to the maritime students' needs during the pandemic. Further research should be conducted on the effectiveness of e-modules on the practical performance of students in advanced Swimming.

Keywords: E-module, Physical Education, Advanced Swimming, ADDIE, Maritime Education

Introduction

The use of technology in education has become imperative and inevitable, not a luxury, because of its positive effects on the teaching and learning process (Ja'ashan, 2015). Since technology has become an integral part of our lives, it has penetrated all areas of teaching and learning at the Higher Education level. Siemens, Gašević, and Dawson (2015) discussed that education technology has undergone three distinct generations of development, and now a fourth is emerging. Video in education is one element of those 'distributed interactions', and the role that video plays within education and how that role develops was explored in this study. Bransford, Brown, & Cocking (2000) discussed the use of video in the classroom and the importance of interactivity in helping students to learn by being able to re-visit and review the material. They emphasized the potential of technology to help in the learning process, but only if it is used properly. Day (2008) found that video usage can be a way to decrease the in-class time spent on information transfer and increase the in-class time available for more engaging learning activities that facilitate learners' active knowledge construction and how physical education can be learned during the pandemic.

Advanced Swimming, as a new general education subject of the Commission on Higher Education (CHED) for maritime based on CMO No. 20. s. 2018 needs learning resources such as books and modules to continue learning even during the pandemic. Although there are some developed modules like that of Navejas (2017) that integrate Pedagogical Content Knowledge (PCK) in her module on the said subject and that of Fernandez (2018) that utilize the module to address the anxiety of students in Physical education, there are few available resources that utilize videos and other audio-visual materials for the subject above because it is a suggested subject of CHED for maritime education. Thus, the researcher pursued the development of e-modules in the form of videos as a tool for the flipped classroom for the learners of the 21st century (CMO 20 s. 2021). Hence, this study aimed to develop e-modules that were compilations of videos for selected topics in *Physical Education 2 (Advanced Swimming)* in response to the demand of 21st-century students for technology-enabled learning material in a flipped classroom model. E-module can be defined as a digitalized module created interactively. It can also be regarded as a medium for independent learning because it has self-study guides. Unlike the usual modules, e-modules present videos and animations to enable users to learn actively. Using an e-module is one way of integrating ICT into the learning process. By developing the e-module, students are expected to learn the material easily, effectively, and efficiently (Fajaryati et al., 2017). Thus, an e-learning module could be a solution for young learners to study at home, for it provides digital teaching and learning materials through interactive videos to improve the students' interest (Trilestari, K. & Almunawaroh, N.F., 2020).

In a flipped classroom, students are introduced to the content at home and practice working through it at school. In this blended learning approach, face-to-face interaction is mixed with an independent study via technology. Students watch pre-recorded videos at home, then come to school to do the homework armed with questions and at least some background knowledge and perform the required activity. In the flipped classroom model, students practice under the teacher's guidance while accessing content independently (Teach Thought Staff, 2016). Proponents of flipped classrooms assert that increased student-teacher interactions give

teachers more opportunities to provide student feedback. Moreover, Karabulut-Ilgu et al. (2017) cited some benefits of flipped learning: Flexibility – students could re-watch the lecture videos. They could pause and rewind the videos, take notes, and perform activities while watching the lecture videos.

This study is anchored on the e-learning theory of Mayer & Moreno (2007) and Sweller (2005), as cited by David (2015), which consists of cognitive science principles that describe how electronic educational technology can be used and designed to promote effective learning. Another foundation of this study is based on Anchored Instruction (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990), which involves the use of an "anchor" material or media, often a video, to create a shared experience among learners and a beginning point for further learning on a topic.

Furthermore, constructivism is also evident in this study. This learning theory asserts that individuals form or construct much of what they learn and understand (Schunk, 2012). In constructive learning theory, learners do not transfer knowledge from the outside world into their memories but build personal meanings and interpretations based on experiences and interactions (Ertmer & Newby, 1993). The process involved and variables are presented in the following paradigm.

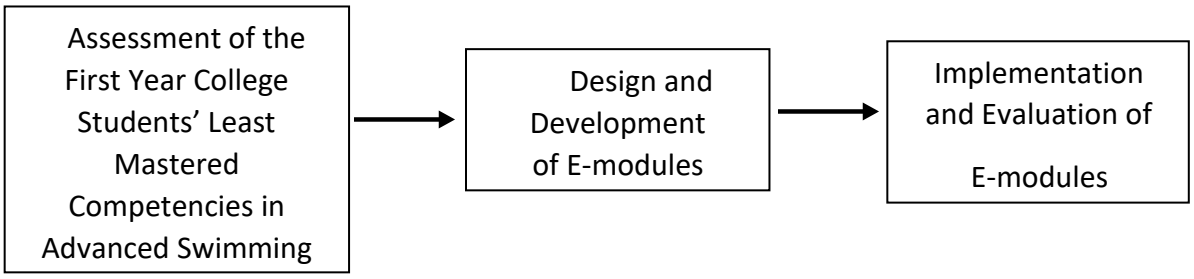

Figure 1. Paradigm of the study on the development and evaluation of the e-modules.

Statement of the Problem

Specifically, this study aimed to answer the following questions: (1) What are the least mastered competencies of first-year college students in Physical Education 2 (Advanced Swimming)? (2) What instructional materials can be developed to cater to the least mastered topics of first-year college students in Physical Education 2 (Advanced Swimming)? (3) What is the level of acceptability of the developed e-module as a tool for the flipped classroom in terms of (a) Learning Objectives, (b) Content, (c) Organization and Presentation, (d) Format and Design, (e) Learning Activities; and (f) Assessment as evaluated by the experts and students?; and (4) What are the experiences of the students in using the e-module?

Methodology

This study utilized design research using the Analysis-Design-Development-

Implementation-Evaluation (ADDIE) Model of McGriff (2000) as its research design because it aimed to develop and evaluate an e-module as a tool for the flipped classroom. Of the two purposes of design research, this study utilized developmental studies that purport to develop research-based solutions for complex problems in educational practice. This type of research design is defined as the systematic analysis, design, and evaluation of educational interventions with the dual aim of generating research-based solutions for complex problems in educational practice and advancing our knowledge about the characteristics of these interventions and the processes of designing and developing them (Plomp, 2013).

Development, implementation, and evaluation of e-modules and study participants

Initially, the principal investigator designed a questionnaire as an assessment tool to evaluate the student's learning using the hard copy modules. Such an assessment tool was administered to 80 first-year maritime students taking the Physical Education 2 (Advanced Swimming) course in the second semester of AY 2020-2021. From this assessment, the least mastered topics were then identified. With the identified least mastered topics, e-modules were then developed. A tryout of the e-modules was then conducted for 267 Bachelor of Science in Marine Transportation (BSMT) and Bachelor of Science in Marine Engineering (BSMarE) students taking Physical Education 2 during the study. These students further evaluated the e-modules for their acceptability.

Four maritime students were selected using a purposive sampling method to serve as key informants about their experiences using the e-module. Each specialization has two representatives to ensure the heterogeneity and adequacy of experience information. Moreover, six key informants who have been teaching for decades in the field of educational technology and information technology, physical education instructors handling the Advanced Swimming course, curriculum development and instructional materials development, and teacher implementers of the e-module were likewise interviewed for the acceptability of the e-module.

Table 1. The Participants and the Research Tasks

Participants	Tasks
Research principal investigator	**Initial designing of the e-module in the Advanced Swimming course based on the result of the assessment given to First-year maritime students where the least mastered topics were identified**
Respondents: **First-year maritime students (n = 80)**	**Assessment of the least mastered topics using the examination made by the principal investigator**
	Tryout out the e-module
BS Marine Transportation and BS Marine Engineering students (n = 267)	**Interview on their experiences during the implementation of the e-module**

	Evaluation of the acceptability of the revised e-module **Submitted video on their practical performance**
Key informants: **Physical Education instructor implementers (n = 2)** **Course chair and academic committee members (n = 4)**	**Implement the designed e-module** **Interview for experiences during the implementation** **Observation and evaluation during the tryout of the e-module** **Evaluation of the acceptability of the revised e-module**
Maritime students (n = 4)	**Interview for experiences on using the e-module**

Research Instruments

The questionnaire developed by the principal investigator, which was used as an assessment tool for Physical Education 2 (Advanced Swimming), was the initial research instrument of this study. This researcher-made assessment tool was an 80-item multiple-choice test administered to first-year college students. The main goal of this assessment was to determine the least mastered topics, which were the basis for developing acceptable e-modules to improve students' performance.

The principal investigator developed another questionnaire in a 5-point Likert scale to assess the acceptability of the e-modules. Key informants from the academe validated these instruments, and a reliability test was conducted where Cronbach's alpha equals 0.89. Kuder-Richardson 20 or KR 20 was used to analyze the internal consistency of the assessment tool, while Cronbach's alpha was used for the students' and experts' evaluation questionnaires. The interview schedule guided the researcher to solicit the students' experiences utilizing the e-modules after the tryout.

Data Gathering Procedure

The process of gathering pertinent data in this study was based on the ADDIE model. Figure 2 below shows each phase in the procedure.

The data-gathering procedure is shown in the Tabulation below.

Analysis	● Administered the researcher-made test to assess the least mastered topics of first-year college students in Physical Education 2 (Advanced Swimming).
Design	● Designed an outline of the e-module based on the least mastered topics and the course syllabus. The format of the e-module was also determined in this stage.
Development	● Developed the e-module for the least mastered topics based on the format and outline in the designing stage using Camtasia 2018. Initial validation of the e-module by the experts, like content checking, was done in this stage.
Implementation	● Tried out the e-module to first-year maritime students in a flipped classroom model.
Evaluation	● Students and experts evaluated the acceptability of the developed e-module. ● Interviewed with randomly selected students about their experiences in using the e-module.

Figure 2. The research procedure on the conduct of the study.

Data Analysis

Moreover, descriptive statistics were employed to analyze and interpret quantitative data: frequency count, percentage, mean, and standard deviation. Practical analysis was used to analyze qualitative data.

Results and Discussion

The study revealed first-year college students' eight least mastered competencies in *Physical Education 2 (Advanced Swimming),* as shown in Table 1. The least mastered topics of first-year college students for the first four chapters of Advanced Swimming were the following: In lesson 1, the two least mastered topics were "The Breathing Techniques in Freestyle Stroke," showing only 44 or 57.14% of the students answered the items in this topic correctly and "The Shoulder Roll in Backstroke" where 56 or 72.73% of the students answered the items correctly. For the second chapter, the number one least learned lesson is "The Body Positioning in Breastroke," showing 29 or 37.66% of the respondents answered the items correctly. In contrast, this chapter's second least learned topic is "Different Kinds of Diving," where 36 or 46.75% of the respondents answered the items correctly. For chapter 3, "Timing and Coordination in Butterfly Stroke" and "Phases of Arm Pull and Leg Kick" were the two least mastered topics in this chapter, where 24 or 31.17% for the former and 43 or 55.84% for the latter, of the students, answered the questions in these topics accurately. Lastly, in chapter 4, the bottom two least mastered topics were "Officials for Swimming" and "FINA Rules," showing 10 or 12.99%, and 16 or 20.78% of the students correctly answered the items in these two topics. The ones with ranks 1 and 2 were considered the least mastered topics per chapter.

Due to the low performance of the students in the least mastered topics, as disclosed in Table 1, the researcher developed an e-module in the form of a video with corresponding activity

sheets per module as a tool for the flipped classroom model. This supports the findings in the study of Fajaryati et al. (2017) that by developing the e-module, students are expected to learn the material easily, effectively, and efficiently. In addition, Day (2008) found that video usage can be a way to decrease the in-class time spent on information transfer and increase the in-class time available for more engaging learning activities that facilitate learners' active knowledge construction.

Furthermore, the developed e-module in Physical Education 2 (Advanced Swimming) has the following parts: title, learning objectives, overview, discussion, references, activity sheet, and answer key, as shown in Figure 3. Moreover, it has two distinct features in the e-modules, namely the checkpoint and key to correction, that help students reflect on their progress.

The e-modules were in video format that could be played by the students using their smartphones, laptops, or tablets. These range from 30 – 40 minutes, depending on the lesson tackled. Students could listen, watch the videos, and then answer the questions after discussing a subtopic to check their understanding. They could pause and play the video whenever they wanted, making it flexible.

Table 2. Least mastered topics in Physical Education 2 – Advanced Swimming (n=80)

Topic	*f* (correct responses)	% (correct responses)	Rank
Lesson 1			
The Breathing Techniques in Freestyle Stroke	44	57.14%	1
The Shoulder Roll in Backstroke	56	72.73%	2
The Phases of Arm Pull in Backstroke	58	75.32%	3
Lesson 2			
Different Kinds of Diving	36	46.75%	2
The Phases of Arm Pull in Breaststroke	38	49.35%	3
The Body Positioning in Breaststroke	29	37.66%	1
Lesson 3			
Timing and Coordination in Butterfly Stroke	24	31.17%	1
Phases of Arm Pull and Leg Kick	43	55.84%	2
The Body Positioning	45	58.44%	3
Breathing Techniques	55	71.43%	5
Water Entry	46	59.74%	4
Lesson 4			
Entry and Turns	69	89.61%	6
Individual Medley	40	51.95%	4
Officials for Swimming	10	12.99%	1
Medley Relays	50	64.94%	5
FINA Rules	16	20.78%	2
Commencement of the Event	18	23.38%	3

This format is per the statement of Acuram (2015) that the format and style of a module may differ depending on its purpose and the institution where it is developed. The components of each module should be title, overview, objectives, discussion of content, self-check test,

evaluation activities, and references. It also follows the list of components of a typical module enumerated by Aguirre & de Cadiz (2013), which includes the title, overview, objectives, learning activities, and post-test.

Different e-modules were tried out in different sections to maximize the validity of the student's evaluation of the acceptability of the e-module. For the BSMT, e-module 1.1 or "The Breathing Techniques in Freestyle Stroke" and e-module 1.2 or "Shoulder Roll in Breastroke" were utilized, e-module 2.2 or "Different Kinds of Diving" and e-module 3.1 or "Timing and Coordination in Butterfly Stroke" was utilized for BSMarE.

These e-modules were given to the students a day during the flexible learning modalities during the pandemic for them to watch the videos at home. During the actual class, they were encouraged to ask questions to clarify their understanding of the videos, and the teacher acted as a facilitator. After an online short discussion, worksheets were forwarded to assess whether they learned the concepts from the watched e-modules.

It was also found that the acceptability of the eight developed e-modules as evaluated by the experts and the students in general and in terms of learning objectives, content, organization, presentation, format, design, learning activities, and assessment was rated "Highly Acceptable". Table 3 shows the overall acceptability of the eight developed e-modules.

As to the overall acceptability of the e-module, it has an overall rating of "highly acceptable" (M = 4.75, SD = 0.06). This shows that the e-module has excellently met the standards, and no revision is needed. In particular, the students rated the assessment part the highest, with a mean of 4.87 and an SD of 0.27. Also, for the experts, the learning objectives obtained the highest rating (M = 4.80, SD = 0.45). Regarding the average mean, the highest rating was attributed to the learning objectives (M = 4.83, SD = 0.04). Still, the lowest rating was accounted for from format and design (M = 4.66, SD = 0.15), yet both were highly acceptable. In general, the overall rating of the students in terms of overall acceptability was "highly acceptable" (M = 4.83, SD = 0.03), and a similar overall rating of "highly acceptable" was found by the experts (M = 4.68, SD = 0.09).

Based on the result, the respondents agreed that the e-module is highly acceptable in learning objectives, content, organization and presentation, format and design, learning activities, assessment, and overall rating. This implies that the developed e-module is worthy and can serve as instructional material in a flipped classroom model to help students learn independently.

This result is under the study of Robles (2009), who cited that the development of the learning package was reliable, as revealed by the high percentage obtained in the strongly agreed category of the instrument. The developed Computer Assisted Learning Package (CALP) was valid as to its objective, contents, manner of presentation, and usefulness and, therefore, could be used as instructional material for enrichment and remediation.

Table 3. Overall Acceptability of the Eight Developed E-modules

	Students		Experts				
	M	*SD*	*M*	*SD*	*SD*	*Mean*	*Description*
Learning Objectives	4.85	0.23	4.80	0.45	0.04	4.83	Highly Acceptable
Content	4.83	0.23	4.72	0.52	0.08	4.77	Highly Acceptable
Organization and Presentation	4.83	0.23	4.60	0.79	0.16	4.71	Highly Acceptable
Format and Design	4.77	0.30	4.56	0.77	0.15	4.66	Highly Acceptable
Learning Activities	4.82	0.24	4.72	0.63	0.07	4.77	Highly Acceptable
Assessment	4.87	0.27	4.68	0.72	0.13	4.78	Highly Acceptable
Overall Rating	4.83	0.03	4.68	0.09	0.06	4.75	Highly Acceptable

Note: Description is based on the following scale. 4.51-5.0 (Highly Acceptable), 3.51-4.50 (Acceptable), 2.51-3.50 (Moderately Acceptable), 1.51-2.50 (Fairly Acceptable), 1.0-1.50 (Not Acceptable).

In addition, the student's experiences in using the e-module were the following: the e-module was unique, innovative, and easy to understand, making it interesting and exciting; it had immediate feedback because of the presence of practice exercises to check their progress; and it is an effective and flexible instructional material that helps students learned the lessons seamlessly.

The presence of the checkpoint section and an explanation after that part made the e-module student-friendly, as the key informant told the researcher. The conversational tone of the e-module conveyed the social presence of the teacher, which guided the students well in learning the lesson.

In addition, the researcher conducted triangulation in support of the study findings on whether students can apply the knowledge learned. Students were required to execute the activities on the video submitted before receiving the final credit of their grades.

These results conform to the quantitative analysis because the students have rated the learning activities and assessment part of the e-module as highly acceptable and suited to the level of the students. Moreover, these statements support the findings of Cox (2017) that students prefer technology because they believe it makes learning more interesting and fun. Subjects that students deem challenging or boring can become more interesting with virtual lessons, through a video, or when using a tablet.

Furthermore, these findings agree with the study by Nardo & Hufana (2014) that the students' exposure to appropriate activities heightened their understanding. It also substantiates the recommendation of Woolfitt (2015) that videos should incorporate active elements (such as

quizzes) or be combined with other learning activities. Like any medium, a video's content and message must be constructed well to support learning.

Conclusions

Some students still struggle in the subject Physical Education 2 (Advanced Swimming) during the pandemic, as evidenced by their least mastered topics since it's a practical performance course. The e-module, which not only consists of the basic parts such as learning objectives and discussion but also contains distinct features, namely, checkpoint and key to correction, helped students reflect on their learning progress through self-assessment.

The e-module has excellently met the standards, and no major revision is needed, as reflected in the evaluation by the experts and the students. The learning objectives, content, organization and presentation, format and design, learning activities, and assessment were acceptable to the intended users.

Thus, the developed e-module is fitted to help the students easily learn the concepts of Physical Education and Advanced Swimming. The e-module served its purpose to cater to the needs of the 21st-century learners of a technology-enhanced instructional material that is flexible, innovative, interesting, and acceptable, which would facilitate their construction of knowledge through videos and coming to class prepared in a flipped classroom model.

Implications

The findings of this study have led to certain implications for both theory and practice. For theory, the results of this study affirmed that by developing the e-module, students are expected to learn the material easily, effectively, and efficiently (Fajaryati et al., 2017). Furthermore, the findings also attested what Day (2008) found out that: video usage can be a way to decrease the in-class time spent on information transfer and increase the in-class time available for more engaging learning activities that facilitate learners' active knowledge construction. It also affirms the findings of Cox (2017) that students prefer technology because they believe it makes learning more interesting and fun.

For practice, the results of this study revealed that the developed e-module composed of videos and activity sheets was highly acceptable for the students and the experts, as indicated by the quantitative analysis. The students also validated their experiences using the e-module as they agreed that the instructional material is interesting, exciting, easy to understand, flexible, innovative, and consequently an effective aid in learning. This result was aligned with the stand of Bishop & Verleger (2013) that the flipped classroom approach allows students to learn at their own pace, as they can stop, backtrack, and review while watching videos. Motivation increases when students know they must apply or discuss the out-of-class content during face-to-face class.

Since we are now in the digital age, teachers and other educators must consider this idea regarding instructional material development. This is supported by Day (2008), who states

that in "light of contemporary learning theory, the traditional one-to-many lecture still prevalent in most classrooms is arguably not the most educationally effective" (p. 19). This statement is largely attributed to the lack of learner engagement in often passive lecture settings. Hence, technology-enhanced instructional materials like the e-module in videos paired with an innovative flipped classroom strategy are one of the new trends today.

When deploying video and considering its educational effect, it can be helpful to keep the constructivist perspective in focus to ensure that the student is assisted in actively constructing the relevant knowledge.

Recommendations

Hence, it is recommended that teachers are encouraged to create, develop, and utilize technology-based instructional tools and strategies to provide interesting and meaningful experiences to the learners.

Students, being the main beneficiaries of the study, may not confine their learnings within the four walls of the classroom; instead, they may explore other means of learning the subject, like in the flipped classroom model where lectures can be done at home in the form of videos.

School administrators may develop projects, such as instructional materials development. They can tap the institution's curriculum planners and designers to plan training and seminars, especially in integrating technology into teaching through innovative instructional materials to cater to the needs of 21st-century learners.

Textbook writers may consider using e-modules in the form of videos as supplementary materials aside from the textbooks they publish to better facilitate learning in this technology-suffused education system.

More in-depth research on the e-module developed in this study to ascertain the effectiveness of this instructional material composed of videos is encouraged.

Furthermore, a blended learning modality is encouraged for courses with required laboratory and performance so students can apply the theories learned in online/modular instruction.

Further research should be conducted on the effectiveness of e-modules on the practical performance of students in Advanced swimming.

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