

Graduate Attributes: Modelling the Roles of Teaching, Learning, and Communicative Factors

Kwai Ming Chan*, See Ki Tse

Educational Development Centre, The Hong Kong Polytechnic University, Hong Kong SAR, China
Email: *ak.chan@polyu.edu.hk

How to cite this paper: Chan, K. M., & Tse, S. K. (2025). Graduate Attributes: Modelling the Roles of Teaching, Learning, and Communicative Factors. *Creative Education*, 16, 1017-1039.

<https://doi.org/10.4236/ce.2025.167064>

Received: June 2, 2025

Accepted: July 28, 2025

Published: July 31, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Graduate attributes are essential skills, knowledge and values that prepare university students for professional success and responsible citizenship in a globalised world. This study uses structural equation modelling to examine how teaching quality, online learning, academic support, English proficiency, and intercultural contact collectively influence graduate attributes. Data were collected from two cohorts of final-year bachelor students at a major university: the first cohort consisted of 685 students surveyed during the 2022/23 academic year, and the second cohort included 1317 students surveyed in the 2023/24 academic year, for a total sample of $N = 2002$. Results indicate that English proficiency is the strongest direct predictor of a unified measure of graduate attributes. The findings also identified teaching quality, academic support and intercultural contact as significant direct and mediating pathways in the model which could provide guidance for evidence-based strategies for fostering holistic graduate outcomes. Limitations include the study's cross-sectional, single-institution design; future research should therefore employ longitudinal methods and investigate the emerging role of Generative AI in moderating the relationship between language proficiency and student development or consider its inclusion as a graduate attribute.

Keywords

Graduate Attributes, English Proficiency, Teaching Quality, Structural Equation Modelling, Parcelling

1. Introduction

In contemporary higher education, institutions face critical challenges in preparing graduating students to possess not only disciplinary knowledge but also a

broad set of transferable attributes. These graduate attributes can enable students to navigate complex professional environments, adapt to changing societal needs, and contribute meaningfully to communities (Bath et al., 2004; Knight & Yorke, 2003). Various educational frameworks highlight essential graduate attributes, including critical thinking, effective communication, ethical behaviour, teamwork, intercultural awareness, and lifelong learning (Barrie, 2006; Harvey, 2001). Furthermore, research indicates that the development of these attributes is influenced by a variety of factors such as teaching methods, intercultural experiences, and language skills (Bosanquet et al., 2012; Tang et al., 2025), which this study will explore in depth.

Among the diverse range of graduate attributes, the domains of cognitive competence, communication skills, and ethical leadership are widely recognised as foundational pillars that underpin graduate success across disciplines of study. Cognitive competence, including competence in critical thinking and problem-solving, is essential for analysing complex issues and making “effective” decisions (Funke et al., 2018). Effective communication skills, in turn, enable graduates to articulate ideas, collaborate, and navigate multicultural environments (Elsayed & Hartley, 2005). In addition to these, ethical leadership, which reflects the capacity to make responsible decisions and act with integrity, is increasingly viewed as a critical component of graduate attributes for fostering students’ social and professional responsibility (Brown & Treviño, 2006). According to Bandura and Walters’ social learning theory (Bandura & Walters, 1977), ethical leaders can induce direct influence on their followers’ attitudes and subsequent behaviours through modelling exemplary behaviours.

This study models the relationships among students’ perceived teaching and learning (T&L) factors (teaching quality, online learning, and academic support) and communicative factors (English proficiency and intercultural contact) in shaping graduate attributes. Structural equation modelling is used to explore and clarify the direct and mediated paths among these factors affecting graduate attribute development. The findings contribute to theoretical understanding and practical strategies for enhancing graduate readiness in higher education.

2. Literature Review

2.1. The Landscape and Composition of Graduate Attributes

Graduate attributes (GAs) have become a cornerstone of higher education policy worldwide, reflecting a shift from primarily focusing on disciplinary knowledge to a more holistic understanding of graduate readiness (Barrie, 2004; Singh & Morkel, 2024). Bath et al. (2004) suggested that GAs are broadly defined as the skills, knowledge, attitudes, and values that graduates should possess to succeed professionally and contribute to the society. Importantly, GAs are not fixed traits but develop progressively through academic learning, co-curricular activities, and reflective practices (Chanock, 2013; Khanna & Bigham, 2022; Singh & Morkel,

2024). Institutions should embed these attributes into learning outcomes, teaching strategies, assessment practices, and other aspects of the learning experience to ensure continuous development.

While the specific composition of graduate attributes varies across institutional and cultural contexts, a common core of competencies underpins graduate readiness (De la Harpe & David, 2012; Kember & Leung, 2005; Lam, 2024). These typically include cognitive skills (e.g., critical thinking), interpersonal abilities (e.g., communication and teamwork), and personal qualities (e.g., ethical awareness and lifelong learning). Universities however, will tailor their frameworks to reflect unique priorities. For instance, institutional frameworks from Hong Kong SAR to Australia and the United Kingdom consistently emphasise attributes related to intellectual rigour, professional competence, and global citizenship, though the specific terminology may differ (The Hong Kong Polytechnic University, 2024; Southern Cross University, 2024; University of Glasgow, n.d.). These variations illustrate how attribute frameworks are strategically designed to prepare students for diverse professional and societal challenges.

To synthesise these variations, researchers tried to identify core graduate attributes in the literature. Osmani et al. (2015), after consolidating overlapping terms from their review of 39 studies, identified key graduate attributes such as communication and interpersonal skills, teamwork, motivation and leadership, and critical and creative thinking. Similarly, Oliver and Jorre de St Jorre (2018) examined the graduate attributes emphasised by Australian universities and discovered that, in addition to discipline knowledge, the most common attributes include strong written and oral communication as well as critical, analytical, creative, and reflective thinking. They also identified information literacy, collaborative learning, ethical and inclusive engagement (e.g., intercultural interactions), as popular graduate attributes. Despite the clear importance of these lists, challenges persist in achieving a consistent understanding and assessment of GAs across disciplines interdisciplinarily and transdisciplinarily, with some critics arguing that attributes risk becoming rhetorical rather than actionable goals (Bath et al., 2004; Green et al., 2009).

2.2. Factors Influencing Graduate Attribute Development

The development of these diverse attributes is influenced by a range of teaching and learning factors. Pedagogy in particular plays a pivotal role in this development. Research indicates that active learning, problem-based learning, and reflective practices can significantly enhance students' critical thinking and problem-solving abilities (Bath et al., 2004; Singh & Morkel, 2024). The quality of teaching, together with clarity of instruction, feedback, and academic support, further influences how effectively students apply graduate attributes (Green et al., 2009). High-quality teaching practices that encourage critical thinking, collaborative learning, and ethical reflection are expected to enhance graduate attributes altogether.

The rise of online learning and educational technologies introduces both opportunities and challenges for pedagogy. Digital platforms (e.g., learning management system) can support personalised learning, collaboration, and access to diverse resources, potentially enriching the development of graduate attributes (Chan et al., 2019; Dhananjaya et al., 2024; Leshchenko et al., 2021; Redecker, 2017). Online learning has increasingly been well integrated with face-to-face instruction, creating a blended learning environment that enhances flexibility and accessibility for students. Technologies are effectively used to support teaching and learning, with up-to-date online materials and videos that contribute to a comprehensive learning experience. However, minimising the digital divide, maintaining engagement, and adapting teaching methods to virtual formats require careful planning and faculty training (Chan et al., 2024; Koehler & Mishra, 2009; Lawless & Pellegrino, 2007). Addressing these challenges is essential to maximise the benefits from educational technologies usage and to foster the development of key graduate attributes.

Language proficiency and intercultural contact are increasingly recognised as essential graduate attributes in a globalised educational and professional landscape. English, as the dominant language of international academia and business, is particularly important for enabling graduates to participate in global networks and access knowledge resources (Zainuddin et al., 2019). Proficiency in it can enable effective communication, collaboration, and performance in diverse contexts (Budiman et al., 2023; Triwibowo, 2023). The interplay between language proficiency and intercultural contact is complex. Language skills facilitate intercultural communication, while intercultural experiences motivate language learning and deepen cultural understanding (Chen & Yang, 2016; Tsang, 2022). Institutions that integrate language support with intercultural learning opportunities better prepare graduates for ethical leadership and global engagement (Deardorff, 2006). In this context, “intercultural competence” involves the ability to understand, respect, and navigate cultural differences, fostering ethical awareness and social responsibility (Leung et al., 2014; Lyu, 2024). Intercultural contact as a key graduate attribute, encompasses language skills and cultural understanding and prepares students for ethical leadership and global citizenship. Exposure to diverse cultural perspectives, such as studying abroad, living on multicultural campuses, or engaging with internationalised curricula, can enrich students’ worldviews and prepare them for global citizenship (Campbell, 2012). Research emphasises that peer interactions across cultural and ethnic groups play a crucial role in fostering inclusivity and valuing diversity, aspects that are increasingly recognised as distinct graduate attributes connected to social cohesion and broader graduate outcomes (Bosanquet et al., 2012).

Academic support also plays a vital role in enhancing students’ intercultural contact as well as the development of graduate attributes according to literature studies. By providing targeted assistance such as language support, mentoring,

and intercultural learning opportunities, institutions can help students build critical skills like communication, cultural awareness, and ethical responsibility. This can help nurture a holistic educational experience that not only improves academic success but also prepares students to navigate diverse social and professional environments effectively. Consequently, academic support contributes significantly to shaping graduates who are adaptable, socially responsible, and equipped for global citizenship (Mahon, 2022; Singh & Morkel, 2024).

2.3. The Interconnected Nature of Graduate Attributes

Graduate attributes exhibit bidirectional interdependencies that should not be spilt into isolated competencies. For instance, communication skills both support and are supported by ethical awareness (Brown & Treviño, 2006), cognitive competence both enables and is enhanced by communication abilities (Duran & Spitzberg, 1995), and attributes function as synergistic constellations rather than isolated skills (Barrie, 2006). These reciprocal relationships form a causal web suggesting that graduate attributes grow together and build on each other. Traditional approaches modelling attributes as separate dependent variables fail to capture bidirectional influences and may hide the extra benefits that come from their interaction (Treleaven & Voola, 2008). This complexity necessitates the unified construct approach guiding our conceptual framework. By conceptualising attributes as a single latent variable through item parcelling, this approach aims to address the limitations of fragmented modelling and better capture the systemic nature of these attributes.

2.4. Conceptual Framework

While graduate attributes broadly encompass diverse competencies, this study examines how the holistic development of graduate attributes (as a unified construct) is influenced by two groups of factors: teaching and learning factors (teaching quality, online learning, and academic support) and communicative factors (English proficiency and intercultural contact). These two groups were selected based on the preceding literature review to primarily represent key institutional and important individual student factors that are critically essential in influencing student development. The unified GA construct is conceptualised as a single, integrated outcome variable, measured using 18 items parcelled from seven distinct attributes developed at a major university: professional competence, critical thinking, innovative problem-solving, effective communication, lifelong learning, ethical leadership, and socially responsible global citizenship. This holistic approach is critical, as it moves beyond analysing attributes in isolation to provide a more integrated understanding of student development.

The proposed framework, as illustrated in **Figure 1**, posits that the five factors exert both direct and indirect influences on the unified outcome. Furthermore, it acknowledges the potential interrelationships among the factors.

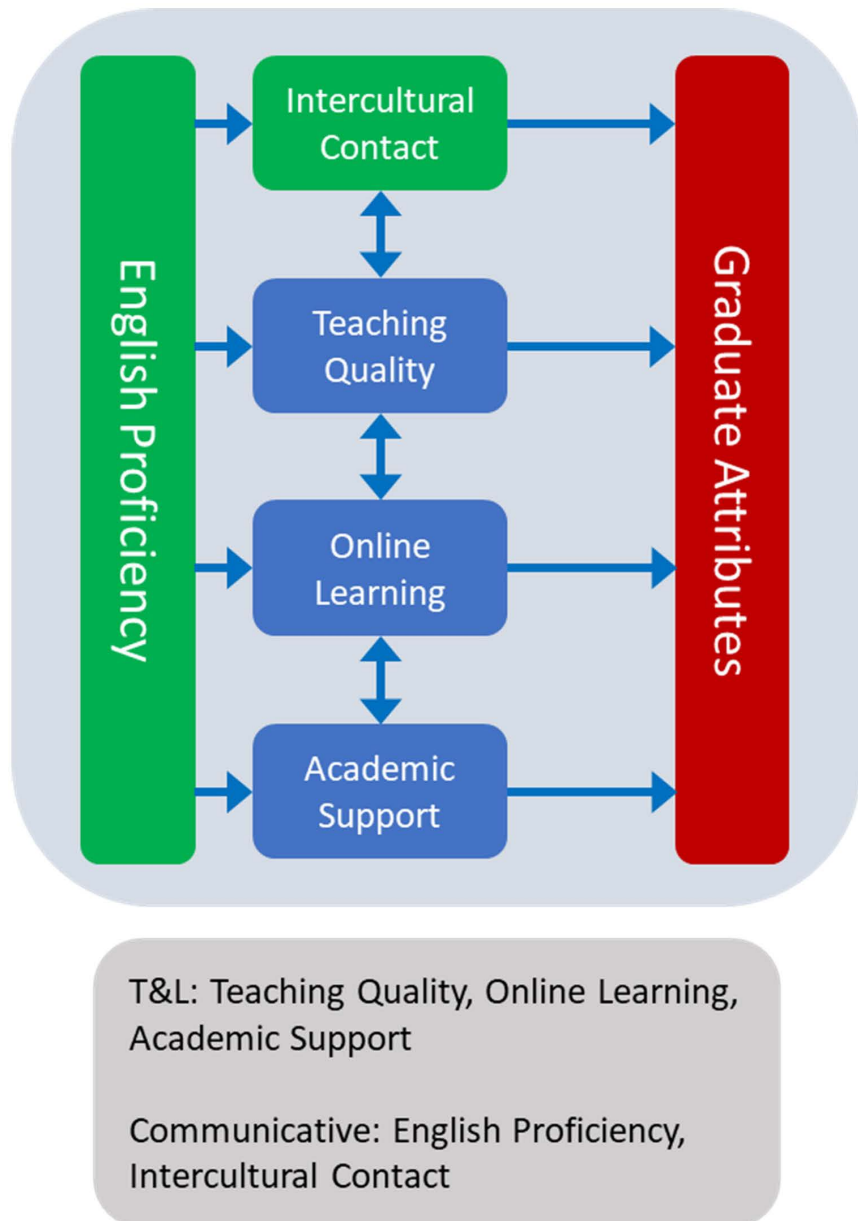


Figure 1. Conceptual framework of graduate attribute development.

3. Methodology

3.1. Data Collection

Ethical approval for the study was granted by the Institutional Review Board of the university. Data were subsequently collected from two cohorts of final-year bachelor students at the same institution, yielding a total sample of $N = 2002$. The first cohort ($n = 685$) was surveyed during the 2022/23 academic year and the second ($n = 1317$) during the 2023/24 academic year. Both cohorts completed the same set of questions, which was designed to assess their perceptions of graduate attributes and the key teaching and learning and communicative factors investigated in this study.

All constructs in this study were measured using self-report items on three different types of 5-point Likert scales (1 = very little to 5 = very much; 1 = very dissatisfied to 5 = very satisfied; 1 = strongly disagree to 5 = strongly agree). Items for these constructs were adapted from established institutional instruments used over multiple years to assess students' perceptions. In addition, prior to the main study, the instruments underwent a review process to establish face and content validity. A panel of four professionals reviewed all items for clarity, comprehensibility, and relevance to the constructs being measured. Minor revisions to the wording were made based on their feedback to enhance clarity. The complete list of all survey items can be found in [Appendix B](#) and [Appendix C](#).

The graduate attributes were measured using 18 self-assessment items, which originally resulted in seven distinct attributes. To manage the large number of indicators and enhance model parsimony, a parcelling technique was employed ([Bandalos, 2002](#); [Little et al., 2002](#)). These items were randomly grouped to create six parcels, with each parcel consisting of three items. The six parcels then served as the observed indicators for the single unified graduate attributes (UGA) latent factor in the structural equation model. Descriptive results for the seven graduate attributes are in [Appendix A](#), while [Table 1](#) presents the descriptives for the UGA parcels.

The questionnaire also measured five predictor variables. For the T&L factors, perceptions of teaching quality (TEACH) were assessed through items covering instructor attitude and expertise, the design of learning materials, clarity of delivery, and the quality of feedback on assessments. Online learning (OL) perceptions were measured by items related to the integration of online and face-to-face formats, the effectiveness of the university's learning platform, and the helpfulness of digital materials. Academic support (SUP) was measured by students' sense of being adequately supported in their studies and their awareness of available services. On the other hand, for the communicative factors, English proficiency (ENG) was measured using a series of self-assessment items where students rated the English language abilities they developed through their overall university education. Intercultural contact (INCTL) was assessed based on students' experience in forming friendships with peers from different cultural backgrounds and their perception of being encouraged to do so.

The collected data were first screened for missing values, resulting in a final sample of $N = 2002$, with no cases excluded. Following this, descriptive statistics and reliability analyses were conducted for all scales (see [Table 1](#)). To test the hypothesised model, analysis was performed using structural equation modelling (SEM) in AMOS. This multivariate technique was chosen as it is particularly suited for validating complex theoretical models, allowing for the simultaneous analysis of direct and indirect effects while accounting for measurement error ([Byrne, 2013](#)).

3.2. Measurement Model Validation

Prior to testing the structural model, the measurement model was validated to

ensure the constructs met the required thresholds (Anderson & Gerbing, 1988; Hair et al., 2006). Normality checks were conducted, including skewness and kurtosis. Specifically, all absolute skewness values were below the threshold of 3, and all absolute kurtosis values were below the threshold of 10, consistent with the guidelines proposed by Kline (2005).

Construct reliability was established, with both Cronbach's alpha and Composite Reliability (CR) values for all constructs exceeding the recommended .70 threshold, indicating strong internal consistency (Nunnally & Bernstein, 1994; Hair et al., 2006).

Convergent validity was demonstrated through two criteria. First, all individual items loaded significantly on their respective latent factors, with all standardised loadings exceeding the recommended threshold of 0.60. Furthermore, all six parcels for the UGA construct loaded very strongly on their latent factor, with loadings between 0.894 and 0.912. Second, the Average Variance Extracted (AVE) for all constructs surpassed the 0.50 threshold, indicating that each latent construct explains more than half of the variance in its corresponding items (Fornell & Larcker, 1981). A comprehensive summary of the normality, reliability, and convergent validity results for all constructs is presented in Table 1.

Finally, discriminant validity was confirmed using the Fornell-Larcker criterion. As detailed in Table 2, the square root of the AVE for each construct, presented on the diagonal, was greater than the inter-construct correlations shown in the off-diagonal positions, confirming that each construct is empirically distinct (Fornell & Larcker, 1981).

Table 1. Descriptive statistics, reliability and convergent validity.

Latent Construct	Item	Mean	SD	Skewness	Kurtosis	Cronbach's α	Factor Loading	CR	AVE	$\sqrt{\text{AVE}}$
UGA	UGA1	3.535	0.749	-0.242	0.250	0.962	0.912	0.962	0.808	0.899
	UGA2	3.500	0.748	-0.180	0.283		0.920			
	UGA3	3.575	0.730	-0.182	0.151		0.892			
	UGA4	3.417	0.751	-0.117	0.182		0.858			
	UGA5	3.553	0.766	-0.273	0.296		0.917			
	UGA6	3.555	0.771	-0.280	0.459		0.894			
TEACH	TEACH1	3.763	0.762	-0.502	0.654	0.927	0.812	0.925	0.674	0.821
	TEACH2	3.830	0.739	-0.612	1.073		0.785			
	TEACH3	3.646	0.792	-0.507	0.473		0.853			
	TEACH4	3.633	0.809	-0.539	0.419		0.858			
	TEACH5	3.669	0.786	-0.523	0.626		0.806			
	TEACH6	3.643	0.823	-0.561	0.548		0.810			
OL	OL1	3.861	0.884	-0.632	0.330	0.903	0.811	0.905	0.656	0.810
	OL2	3.949	0.820	-0.667	0.639		0.867			

Continued

	OL3	3.941	0.866	-0.741	0.685		0.814			
	OL4	3.971	0.822	-0.782	1.030		0.714			
	OL5	3.911	0.838	-0.638	0.544		0.836			
SUP	SUP1	3.609	0.721	-0.645	1.121	0.797	0.846	0.800	0.668	0.817
	SUP2	3.546	0.784	-0.596	0.699		0.787			
ENG	ENG1	3.761	0.849	-0.314	-0.080		0.845			
	ENG2	3.792	0.858	-0.331	-0.125		0.849			
	ENG3	3.714	0.886	-0.286	-0.168		0.838			
	ENG4	3.532	0.940	-0.250	-0.213	0.934	0.787	0.932	0.661	0.813
	ENG5	3.760	0.844	-0.316	-0.144		0.825			
	ENG6	3.715	0.876	-0.292	-0.170		0.771			
	ENG7	3.509	0.909	-0.235	-0.152		0.770			
INCTL	INCTL1	3.456	0.924	-0.603	0.310	0.867	0.836	0.869	0.768	0.876
	INCTL2	3.476	0.912	-0.630	0.432		0.915			

Table 2. Discriminant validity (correlation matrix with square root of AVE on diagonal).

Latent Construct	UGA	TEACH	OL	SUP	ENG	INCTL
UGA	0.899					
TEACH	0.739	0.821				
OL	0.598	0.644	0.810			
SUP	0.724	0.764	0.693	0.817		
ENG	0.729	0.607	0.510	0.530	0.813	
INCTL	0.590	0.567	0.498	0.636	0.509	0.876

Note: Values in bold are the square root of AVE.

4. Results

4.1. Model Fit

The structural model demonstrated a strong fit to the data. The chi-square to degrees of freedom ratio (χ^2/df) was 4.884, which is below the recommended maximum of 5.00. The incremental fit indices were excellent, with a Comparative Fit Index (CFI) of 0.975 and a Tucker-Lewis Index (TLI) of 0.971, both exceeding the 0.90 threshold for good fit. Finally, the absolute error indices were also strong, with a Root Mean Square Error of Approximation (RMSEA) of 0.044 and a Standardized Root Mean Square Residual (SRMR) of 0.029, both well within the acceptable limit of 0.08 (Byrne, 2013; Hair et al., 2006; Hu & Bentler, 1999; O'Rourke & Hatcher, 2013). Taken together, these results confirm that our final model is statistically sound, with reliable, valid, and distinct constructs, and fits the observed data well.

4.2. Structural Path Coefficients

Structural equation modelling was conducted to examine the relationships among teaching quality (TEACH), online learning (OL), academic support (SUP), English proficiency (ENG), intercultural contact (INCTL), and unified graduate attributes (UGA). **Figure 2** illustrates the paths and constructs of the final model.

ENG demonstrated significant direct effects on UGA ($\beta = 0.402, p < 0.001$), TEACH ($\beta = 0.609, p < 0.001$), OL ($\beta = 0.189, p < 0.001$), and INCTL ($\beta = 0.238, p < 0.001$). TEACH significantly predicted UGA ($\beta = 0.228, p < 0.001$), OL ($\beta = 0.529, p < 0.001$), and SUP ($\beta = 0.549, p < 0.001$). OL significantly influenced SUP ($\beta = 0.346, p < 0.01$) but not UGA ($\beta = 0.014, p = 0.528$). SUP showed significant effects on UGA ($\beta = 0.300, p < 0.001$) and INCTL ($\beta = 0.523, p < 0.001$). INCTL had a small but significant effect on UGA ($\beta = 0.063, p = 0.003$). **Table 3** summarises the standardised path coefficients and significance levels for all hypothesised paths in the model.

The model's explanatory power for the endogenous constructs was strong overall. The model accounted for a substantial 71.5% of the variance in unified graduate attributes (UGA; $R^2 = 0.715$) and 66.6% of the variance in academic support (SUP; $R^2 = 0.666$). The explanatory power for the remaining endogenous constructs was moderate, including intercultural contact ($R^2 = 0.458$), online learning ($R^2 = 0.438$), and teaching quality (TEACH; $R^2 = 0.371$). **Table 4** lists the R^2 values for all constructs.

Table 3. Standardised effects from the structural model.

Path	Standardized Beta (β)	<i>p</i> -value
TEACH \rightarrow UGA	0.228	<0.001
TEACH \rightarrow OL	0.529	<0.001
TEACH \rightarrow SUP	0.549	<0.001
OL \rightarrow UGA	0.014	0.528
OL \rightarrow SUP	0.346	<0.001
SUP \rightarrow UGA	0.300	<0.001
SUP \rightarrow INCTL	0.523	<0.001
ENG \rightarrow UGA	0.402	<0.001
ENG \rightarrow TEACH	0.609	<0.001
ENG \rightarrow OL	0.189	<0.001
ENG \rightarrow INCTL	0.238	<0.001
INCTL \rightarrow UGA	0.063	0.003

Table 4. List of R^2 for all constructs.

Construct	R^2
UGA	0.715
TEACH	0.371

Continued

OL	0.438
SUP	0.666
INCTL	0.458

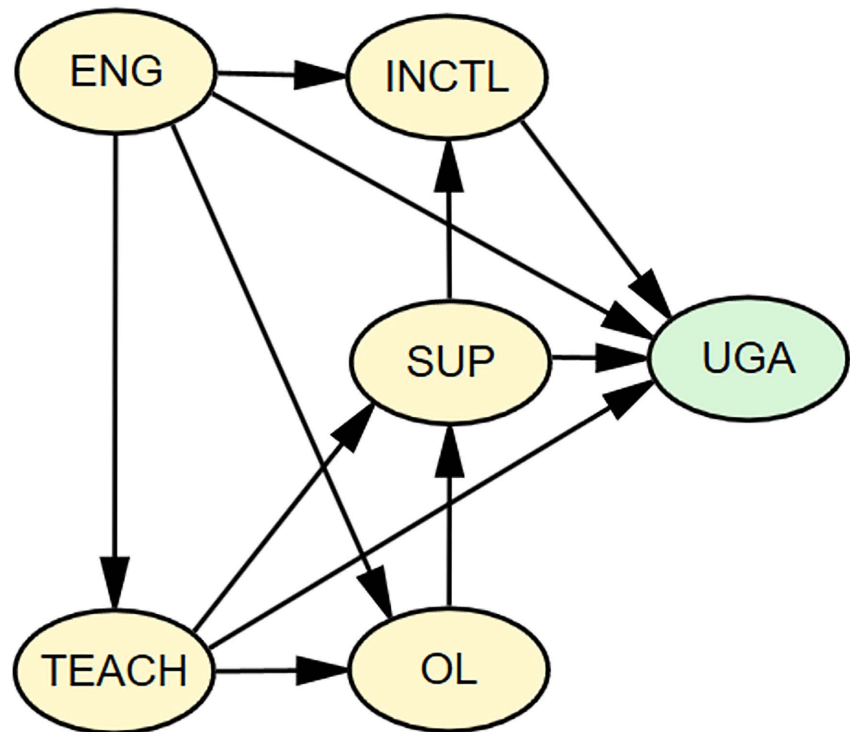


Figure 2. SEM of final model.

5. Discussion

This study examined both the structural relationships among the T&L and communicative factors and their collective influence on the UGA construct. The results reveal several key patterns that advance our understanding of graduate attribute development in higher education.

Interpretation of Key Findings

The results confirm that teaching quality, academic support, English proficiency, and intercultural contact are important for graduate attribute development, with online learning being the sole construct that has no significant direct influence on UGA.

Overall, these findings offer several key implications for pedagogical practice and institutional strategy. First, the results reinforce the foundational role of high-quality teaching and supportive learning environments in graduate attributes development. Consistent with prior research, perceptions of high teaching quality and strong academic support were positively associated with students' development of UGA, encompassing key areas such as cognitive competence and com-

munication skills. This finding is significant because high teaching quality, through practices like active learning (Freeman et al., 2014), and robust academic support (Prananto et al., 2025) are both widely understood to promote not only disciplinary knowledge but also the more holistic skills needed for life beyond the university.

Teaching quality (TEACH) functioned as a critical mediator by channelling the effects of English proficiency (ENG) onto online learning (OL), academic support (SUP), and unified graduate attributes (UGA). This supports Shulman's (1987) pedagogical content knowledge model, where teaching quality bridges content expertise and student support systems. Furthermore, the strong effect of teaching quality on academic support (TEACH \rightarrow SUP, $\beta = 0.549$) is worth examining more closely, as it may be explained by the halo effect. First suggested by psychologist Edward Thorndike (1920), the halo effect is a cognitive bias where a positive impression in one prominent area influences perceptions of other related areas. This bias is well-documented in educational research. For instance, in student evaluations of teaching, a general positive feeling about an instructor often creates a halo that inflates ratings on all specific teaching attributes (Michela, 2023). This halo effect is not limited to perceptions of instructors; it also extends to how students assess their own learning. Pike (1998), for example, identified this same bias when students were asked to rate their perceived improvement over time, finding that a general sense of success often leads to higher ratings across all specific skill areas. In the context of our model, this suggests that the high-quality teaching experience, arguably a student's most direct and frequent positive interaction with the institution (Chickering & Gamson, 1987; Kuh, 2009), may create a halo that raises student perceptions of academic support. For example, students who rate "quality of teacher feedback" (TEACH6) highly may also report higher perceptions of broader support items such as "I am adequately supported to complete my academic studies" (SUP1), reflecting this halo effect. This helps explain the strong effect of teaching quality on academic support in our model.

The results for academic support provide important insights into how students develop and succeed, both confirming and expanding on Tinto's (2012) views on student integration. Tinto explains that students are more likely to succeed and stay in school when they feel connected to both the academic and social parts of the university. The direct effect of academic support on UGA (SUP \rightarrow UGA, $\beta = 0.300$) in this study supports this idea. It shows that academic support is more than just resources; it plays a key role in helping students become fully involved in their education, which leads to better overall outcomes.

In addition, academic support was the strongest predictor of intercultural contact (SUP \rightarrow INCTL, $\beta = 0.523$), which extends Tinto's original focus on retention. While Tinto emphasised support as a way to cultivate a sense of belonging and stay enrolled, the findings from this study suggest its role is more than just helping students stay enrolled. To understand this relationship, it is important to first clarify the nature of the INCTL construct. In this study, it was measured by two items:

the first (INCTL1) reflects informal, social contact (i.e., making friends), while the second (INCTL2) captures a broader encouragement to interact that could occur in both social and academic contexts. With this broad view of intercultural contact in mind, the strong link between academic support and the INCTL construct can be explained by the function of support services (e.g., tutoring centres, workshops). These services create structured environments where diverse students can come together, facilitating not only the informal social interactions captured by our measure but also encouraging the academically integrated contact that is essential for developing holistic graduate attributes. Academic support, therefore, appears to be a key mechanism for creating the varied social and academic intercultural experiences that contribute to overall student development.

One of the most notable findings is the non-significant direct effect of online learning (OL) on UGA ($\beta = 0.014, p = 0.528$). A likely explanation is that students perceive digital platforms primarily as digital delivery systems for course content. This perception may hold true even when platforms are designed with sophisticated interactive features. If students view the platform as a passive repository, its potential to directly drive skill development will be wasted.

The platform's significant effect on academic support (OL \rightarrow SUP, $\beta = 0.346$), however, suggests a different, more perceptual role. A possible explanation is that a high-quality online learning experience creates a strong perception of support. For instance, when a well-designed and feature-rich learning management system (LMS) allows students to manage their learning with ease, this practical success contributes directly to their feeling that the support provided is adequate.

This suggests a clear path forward for making online platforms more effective. To forge a direct link from online learning to student development (UGA), the focus must shift from passive content delivery to creating a more customised-learning experience. Learning analytics dashboards (LADs), for example, are a key tool in this approach. By providing students with real-time feedback on their progress, a LAD can give them more control over their learning and a clearer understanding of their own academic status (Chan et al., 2019; Chan et al., 2021). This enhanced control and self-awareness could increase the perceived value of online learning, which in turn may positively influence students' satisfaction with the graduate attributes they have developed.

However, the effectiveness of any online learning tools, including learning analytics dashboards, is not guaranteed by its mere existence. Rather, its effectiveness also depends on the instructor. This aligns with a recent finding that an instructor's competence in instructional design influences their willingness to use learning analytics tools in their teaching practice (Chan et al., 2024). This suggests that while an instructor's confidence with a specific technology is important, their broader pedagogical competence also shapes how they apply edtech. This provides a compelling explanation for the non-significant OL \rightarrow UGA path in our model, suggesting it is not a failure of the technology per se, but a reason to reconsider institutional priorities. Thus, professional development for teaching staff and the

university's investment in technological tools are equally important factors in the development of graduate attributes.

While the previous section focused on the learning environment, the model also provides critical insights into individual student factors driving GAs success. English proficiency and intercultural experiences were both identified as significant predictors of graduate attributes. This finding aligns with the view that to succeed in a multicultural workforce, graduates require not just technical skills but also effective communication abilities and global awareness (Bosanquet et al., 2010). The findings therefore suggest that universities should prioritise creating opportunities for meaningful intercultural engagement, such as through internationalised curricula and diverse campus communities.

The model reveals English proficiency as a foundational skill with significant influence across nearly all factor constructs, serving as the strongest direct predictor of UGA ($\beta = 0.402$). While this aligns with existing literature, the magnitude of this effect is best understood in the specific context of the student population. For L2 English learners, who form the majority of the sample, English is not their native language but is the primary medium for academic and professional advancement. In contrast, native English speakers (L1) may not perceive English proficiency with the same level of importance, as it is a natural part of their daily lives. This phenomenon, where the value of a native language is less consciously recognised because it is always present, represents a privilege often overlooked. This suggests that the substantial ENG \rightarrow UGA path, along with its significant connections to other constructs, reflects not only linguistic ability but also L2 students' perception of their English proficiency, which is linked to their self-reported development of graduate attributes and other academic factors. This context-specific, motivational factor provides a plausible explanation for why English proficiency emerged as such a powerful and pervasive predictor in this study.

Beyond the interpretation of these individual pathways, an assessment of the model's overall explanatory power offers further insights. The model is highly effective in explaining the final outcome, accounting for a substantial 71.5% of the variance in unified graduate attributes. This indicates a robust and comprehensive specification of the key determinants influencing graduate outcomes.

The R^2 values for the mediating variables are notable. The model is particularly successful at explaining academic support, with 66.6% of its variance accounted for, highlighting its role as a key mediating construct in student experience. The variances explained for intercultural contact ($R^2 = 0.458$) and online learning ($R^2 = 0.438$) are also considerable, indicating that while these factors are significantly shaped by the model's predictors, a notable portion of their variance remains unexplained. In contrast, the lower explained variance for teaching quality ($R^2 = 0.371$) suggests that although English proficiency is a significant predictor in the model, a substantial portion of the variance is likely attributable to other unmeasured factors. These could include institutional policies, departmental culture, and

specific instructional design choices not captured within the present model. This particular finding presents a direction for future research investigating the complex nature of perceived teaching quality.

6. Limitations and Future Research Directions

Despite its contributions, this study has several limitations. Future longitudinal studies, which track these variables over time, would provide stronger evidence for establishing the direction of causality more definitively. Additionally, the study was conducted at a single institution, which may limit generalisability to other contexts. Future research should therefore employ longitudinal and multi-institutional designs to track developmental trajectories and ensure the findings are applicable across diverse contexts.

Second, the reliance on self-report may introduce bias such as recall bias (Chan et al., 2019) or limited self-awareness. To build on these findings, subsequent studies could incorporate objective or performance-based assessments of graduate attributes. For example, learning analytics can provide data on what students actually do, which would supplement the self-reported information in this study. Employing mixed-methods approaches could also provide richer, more triangulated insights into how students perceive their development.

Third, parcelling was employed in this study to manage the large number of items used to define a single latent variable. Using an extensive number of indicators for one construct can create an overly complex model and increase the risk of poor fit due to minor, item-specific issues. While parcelling is a common strategy to address this, it presents a methodological trade-off. This approach prevents a detailed examination of how an individual survey item performs within a latent construct, making it impossible to diagnose potential issues with specific items once they are grouped into a parcel.

Finally, beyond addressing methodological limitations, future research should consider the growing role of Generative AI in higher education. Studies could explore how GenAI use influences the relationship between English proficiency and graduate attributes, including investigating the emerging role of Generative AI in moderating this relationship or considering its inclusion as a graduate attribute itself. Additionally, research could examine the effects of pedagogical interventions involving GenAI, such as AI-powered tutoring and feedback systems, on key constructs like perceived teaching quality and academic support.

7. Conclusion

This study provides an integrated model showing how teaching quality, academic support, online learning, English proficiency, and intercultural contact collectively influence the development of interconnected graduate attributes. The findings highlight that factors like teaching quality and English proficiency act as key drivers, while online learning and academic support function as crucial mediating pathways. Ultimately, these insights guide universities on how to foster holistic

student development by integrating high-quality pedagogy, robust academic and language support, and meaningful intercultural and online learning opportunities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Anderson, J. C., & Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, *103*, 411-423. <https://doi.org/10.1037/0033-2909.103.3.411>
- Bandalos, D. L. (2002). The Effects of Item Parceling on Goodness-of-Fit and Parameter Estimate Bias in Structural Equation Modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*, 78-102. https://doi.org/10.1207/s15328007sem0901_5
- Bandura, A., & Walters, R. H. (1977). *Social Learning Theory* (Vol. 1, pp. 141-154). Prentice Hall.
- Barrie, S. C. (2004). A Research-Based Approach to Generic Graduate Attributes Policy. *Higher Education Research & Development*, *23*, 261-275. <https://doi.org/10.1080/0729436042000235391>
- Barrie, S. C. (2006). Understanding What We Mean by the Generic Attributes of Graduates. *Higher Education*, *51*, 215-241. <https://doi.org/10.1007/s10734-004-6384-7>
- Bath, D., Smith, C., Stein, S., & Swann, R. (2004). Beyond Mapping and Embedding Graduate Attributes: Bringing Together Quality Assurance and Action Learning to Create a Validated and Living Curriculum. *Higher Education Research & Development*, *23*, 313-328. <https://doi.org/10.1080/0729436042000235427>
- Bosanquet, A., Winchester-Seeto, T., & Rowe, A. (2012). Social Inclusion, Graduate Attributes and Higher Education Curriculum. *Journal of Academic Language and Learning*, *6*, A73-A87. <https://journal.aall.org.au/index.php/jall/article/view/210>
- Brown, M. E., & Treviño, L. K. (2006). Ethical Leadership: A Review and Future Directions. *The Leadership Quarterly*, *17*, 595-616. <https://doi.org/10.1016/j.leaqua.2006.10.004>
- Budiman, B., Ishak, J. I. P., Rohani, R., Lalu, L. M. H., Jaelani, S. R., & Jaelani, M. P. (2023). Enhancing English Language Proficiency: Strategies for Improving Student Skills. *Journal of Scientific Research, Education, and Technology (JSRET)*, *2*, 1118-1123. <https://doi.org/10.58526/jsret.v2i3.205>
- Byrne, B. M. (2013). *Structural Equation Modeling with MPLUS: Basic Concepts, Applications, and Programming*. Routledge. <https://doi.org/10.4324/9780203807644>
- Campbell, N. (2012). Promoting Intercultural Contact on Campus: A Project to Connect and Engage International and Host Students. *Journal of Studies in International Education*, *16*, 205-227. <https://doi.org/10.1177/1028315311403936>
- Chan, A. K. M., Botelho, M. G., & Lam, O. L. T. (2021). An Exploration of Student Access to a Learning Management System—Challenges and Recommendations for Educators and Researchers. *European Journal of Dental Education*, *25*, 846-855. <https://doi.org/10.1111/eje.12664>
- Chan, A. K. M., Tse, A. S. K., Lam, O. L. T., & Chan, C. S. (2024). Examining Teacher Acceptance of Learning Analytics in a Higher Educational Institute: A Structural Equation Modelling Exploration. *Asian Journal of Educational Research*, *12*, 125-146.

<https://multidisciplinaryjournals.com/wp-content/uploads/2024/07/Full-Paper-EXAMINING-TEACHER-ACCEPTANCE-OF-LEARNING-ANALYTICS-IN-A-HIGHER-EDUCATIONAL-INSTITUTE-A-STRUCTURAL-EQUATION-MODELLING-EXPLORATION.pdf>

- Chan, A. K., Botelho, M. G., & Lam, O. L. (2019). Use of Learning Analytics Data in Health Care-related Educational Disciplines: Systematic Review. *Journal of Medical Internet Research, 21*, e11241. <https://doi.org/10.2196/11241>
- Chanock, K. (2013). Developing Criteria to Assess Graduate Attributes in Students' Work for Their Disciplines. *Journal of Learning Development in Higher Education, No. 6*.
- Chen, J. J., & Yang, S. C. (2016). Promoting Cross-Cultural Understanding and Language Use in Research-Oriented Internet-Mediated Intercultural Exchange. *Computer Assisted Language Learning, 29*, 262-288. <https://doi.org/10.1080/09588221.2014.937441>
- Chickering, A. W., & Gamson, Z. F. (1987). Seven Principles for Good Practice in Undergraduate Education. *AAHE Bulletin, 3*, 7.
- de la Harpe, B., & David, C. (2012). Major Influences on the Teaching and Assessment of Graduate Attributes. *Higher Education Research & Development, 31*, 493-510. <https://doi.org/10.1080/07294360.2011.629361>
- Deardorff, D. K. (2006). Identification and Assessment of Intercultural Competence as a Student Outcome of Internationalization. *Journal of Studies in International Education, 10*, 241-266. <https://doi.org/10.1177/1028315306287002>
- Dhananjaya, G. M., Goudar, R. H., Kulkarni, A. A., Rathod, V. N., & Hukkeri, G. S. (2024). A Digital Recommendation System for Personalized Learning to Enhance Online Education: A Review. *IEEE Access, 12*, 34019-34041. <https://doi.org/10.1109/access.2024.3369901>
- Duran, R. L., & Spitzberg, B. H. (1995). Toward the Development and Validation of a Measure of Cognitive Communication Competence. *Communication Quarterly, 43*, 259-275. <https://doi.org/10.1080/01463379509369976>
- Elsayed, A., & Hartley, R. (2005). Communication, Conceptualization and Articulation. *Interactive Technology and Smart Education, 2*, 195-206. <https://doi.org/10.1108/17415650580000044>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*, 39-50. <https://doi.org/10.1177/002224378101800104>
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H. et al. (2014). Active Learning Increases Student Performance in Science, Engineering, and Mathematics. *Proceedings of the National Academy of Sciences, 111*, 8410-8415. <https://doi.org/10.1073/pnas.1319030111>
- Funke, J., Fischer, A., & Holt, D. V. (2018). Competencies for Complexity: Problem Solving in the Twenty-First Century. In E. Care, P. Griffin, M. Wilson, (eds.), *Assessment and Teaching of 21st Century Skills: Research and Applications* (pp. 41-53). Springer International Publishing. https://doi.org/10.1007/978-3-319-65368-6_3
- Green, W., Hammer, S., & Star, C. (2009). Facing up to the Challenge: Why Is It So Hard to Develop Graduate Attributes? *Higher Education Research & Development, 28*, 17-29. <https://doi.org/10.1080/07294360802444339>
- Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate Data Analysis* (6th ed.). Pearson Prentice Hall.
- Harvey, L. (2001). Defining and Measuring Employability. *Quality in Higher Education, 7*, 97-109. <https://doi.org/10.1080/13538320120059990>

- Hu, L., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55. <https://doi.org/10.1080/10705519909540118>
- Kember, D., & Leung, D. Y. P. (2005). The Influence of the Teaching and Learning Environment on the Development of Generic Capabilities Needed for a Knowledge-Based Society. *Learning Environments Research*, 8, 245-266. <https://doi.org/10.1007/s10984-005-1566-5>
- Khanna, J., & Bigham, A. (2022, January). The Progression and Development of Graduate Attributes in Undergraduate Students and Graduate Engineers. In *Proceedings of the 33rd Australasian Association for Engineering Education Conference (AAEE 2022): Future of Engineering Education* (pp. 767-774). Australasian Association for Engineering Education (AAEE).
- Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling* (2nd ed.). Guilford Press.
- Knight, P., & Yorke, M. (2003). *Assessment, Learning and Employability*. McGraw-Hill Education (UK). <https://core.ac.uk/download/pdf/51145815.pdf>
- Koehler, M., & Mishra, P. (2009). What Is Technological Pedagogical Content Knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9, 60-70. <https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogical-content-knowledge/>
- Kuh, G. D. (2009). What Student Affairs Professionals Need to Know about Student Engagement. *Journal of College Student Development*, 50, 683-706. <https://doi.org/10.1353/csd.0.0099>
- Lam, M. H. A. (2024). Exploring the Future-Ready Graduate Attributes across the Undergraduate Curricula from the Eight Publicly Funded Universities in Hong Kong SAR in the Era of Academic Entrepreneurism. *International Journal of Chinese Education*, 13, 1-28. <https://doi.org/10.1177/2212585x241234338>
- Lawless, K. A., & Pellegrino, J. W. (2007). Professional Development in Integrating Technology into Teaching and Learning: Knowns, Unknowns, and Ways to Pursue Better Questions and Answers. *Review of Educational Research*, 77, 575-614. <https://doi.org/10.3102/0034654307309921>
- Leshchenko, M., Lavrysh, Y., & Kononets, N. (2021). Framework for Assessment the Quality of Digital Learning Resources for Personalized Learning Intensification. *The New Educational Review*, 64, 148-159. <https://czasopisma.marszalek.com.pl/images/pliki/tner/202102/tner6412.pdf>
- Leung, K., Ang, S., & Tan, M. L. (2014). Intercultural Competence. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 489-519. <https://doi.org/10.1146/annurev-orgpsych-031413-091229>
- Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To Parcel or Not to Parcel: Exploring the Question, Weighing the Merits. *Structural Equation Modeling: A Multidisciplinary Journal*, 9, 151-173. https://doi.org/10.1207/s15328007sem0902_1
- Lyu, J. (2024). Cultivating Cross-Cultural Competence in Students. *SHS Web of Conferences*, 187, Article No. 04006. <https://doi.org/10.1051/shsconf/202418704006>
- Mahon, D. (2022). The Role of Graduate Attributes in Higher Education. A Review of the Issues Associated with Graduate Attributes and the Case for Their Measurement. *Interchange*, 53, 353-369. <https://doi.org/10.1007/s10780-022-09457-5>
- Michela, J. L. (2023). Toward Understanding and Quantifying Halo in Students' Evaluation of Teaching. *Assessment & Evaluation in Higher Education*, 48, 438-450.

- <https://doi.org/10.1080/02602938.2022.2086965>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. McGraw-Hill.
- O'Rourke, N., & Hatcher, L. (2013). *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling*. SAS Institute.
- Oliver, B., & Jorre de St Jorre, T. (2018). Graduate Attributes for 2020 and beyond: Recommendations for Australian Higher Education Providers. *Higher Education Research & Development*, 37, 821-836. <https://doi.org/10.1080/07294360.2018.1446415>
- Osmani, M., Weerakkody, V., Hindi, N. M., Al-Esmail, R., Eldabi, T., Kapoor, K. et al. (2015). Identifying the Trends and Impact of Graduate Attributes on Employability: A Literature Review. *Tertiary Education and Management*, 21, 367-379. <https://doi.org/10.1080/13583883.2015.1114139>
- Pike, G. R. (1998). *The Constant Error of the Halo in Educational Outcomes Research*. ERIC Clearinghouse on Higher Education. <https://files.eric.ed.gov/fulltext/ED424802.pdf>
- Prananto, K., Cahyadi, S., Lubis, F. Y., & Hinduan, Z. R. (2025). Perceived Teacher Support and Student Engagement among Higher Education Students—A Systematic Literature Review. *BMC Psychology*, 13, Article No. 112. <https://doi.org/10.1186/s40359-025-02412-w>
- Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/bitstream/JRC107466/pdf_digco-medu_a4_final.pdf
- Shulman, L. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review*, 57, 1-23. <https://doi.org/10.17763/haer.57.1.j463w79r56455411>
- Singh, D., & Morkel, J. D. (2024). Holistic Student Development Powering the Student Journey: A Model for Graduate Attributes, Curriculum, and the Second Transcript. *Creative Education*, 15, 1784-1795. <https://doi.org/10.4236/ce.2024.159109>
- Southern Cross University (2024). *Graduate Attributes*. <https://www.scu.edu.au/staff/teaching-and-learning/curriculum-development/design/graduate-attributes/>
- Tang, M., Maat, S. M., & Azman, N. (2025). Graduate Attributes and Influential Factors in Higher Education: Perceptions of International Undergraduates in China. *International Journal of Learning, Teaching and Educational Research*, 24, 87-108. <https://doi.org/10.26803/ijlter.24.2.5>
- The Hong Kong Polytechnic University (2024). *Graduate Attributes*. <https://www.polyu.edu.hk/teachingandlearning/graduate-attributes/>
- Thorndike, E. L. (1920). A Constant Error in Psychological Ratings. *Journal of Applied Psychology*, 4, 25-29. <https://doi.org/10.1037/h0071663>
- Tinto, V. (2012). *Completing College: Rethinking Institutional Action*. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226804545.001.0001>
- Treleaven, L., & Voola, R. (2008). Integrating the Development of Graduate Attributes through Constructive Alignment. *Journal of Marketing Education*, 30, 160-173. <https://doi.org/10.1177/0273475308319352>
- Triwibowo, F. D. (2023). Enhancing English Proficiency: The Impact of Communicative Language Teaching on Second Language Learners. *Tomorrow's Education Journal*, 1, 1-10. <https://doi.org/10.58660/tej.v1i2.40>
- Tsang, A. (2022). Examining the Relationship between Language and Cross-Cultural En-

counters: Avenues for Promoting Intercultural Interaction. *Journal of Multilingual and Multicultural Development*, 43, 98-110. <https://doi.org/10.1080/01434632.2020.1725526>

University of Glasgow (n.d.). *Graduate Attributes*.

https://www.gla.ac.uk/media/Media_183776_smxx.pdf

Zainuddin, S. Z. B., Pillai, S., Dumanig, F. P., & Phillip, A. (2019). English Language and Graduate Employability. *Education + Training*, 61, 79-93.

<https://doi.org/10.1108/et-06-2017-0089>

Appendix A

Descriptive Results for the Original Seven Graduate Attributes.

GA Item	Mean	Std. Deviation
Professional Competence 1	3.500	0.856
Professional Competence 2	3.442	0.874
Professional Competence 3	3.310	0.955
Professional Competence 4	3.168	1.017
Critical Thinker 1	3.537	0.856
Critical Thinker 2	3.584	0.816
Innovative Problem-solver 1	3.568	0.848
Innovative Problem-solver 2	3.475	0.872
Effective Communicator 1	3.696	0.855
Effective Communicator 2	3.547	0.947
Lifelong Learner 1	3.719	0.840
Lifelong Learner 2	3.586	0.889
Ethical Leader 1	3.535	0.889
Ethical Leader 2	3.610	0.834
Ethical Leader 3	3.560	0.843
Ethical Leader 4	3.602	0.837
Socially responsible global citizen 1	3.472	0.905
Socially responsible global citizen 2	3.496	0.887

Appendix B

Item Descriptions for the Five Factors (T&L and Communicative Factors).

T&L factor	Item
TEACH1	The attitude of teaching staff
TEACH2	The expertise of teaching staff
TEACH3	Design of learning materials and activities
TEACH4	Effectiveness of delivery (e.g., lecturers' presentations are clear, precise and well organised)
TEACH5	Appropriateness of assessment
TEACH6	Quality of teacher feedback
OL1	Online learning has been well integrated with face-to-face learning
OL2	Technologies are effectively used to support teaching and learning
OL3	The online experiences have been helpful to my learning
OL4	I am satisfied with the use of Learn@PolyU (Blackboard)
OL5	The online learning materials and videos are up-to-date and sufficient

Continued

SUP1	I am adequately supported to complete my academic studies
SUP2	I am aware of the student support services available to me
ENG1	Listening in English
ENG2	Reading in English
ENG3	Writing in English
ENG4	Speaking in English
ENG5	Academic English (e.g., academic style and referencing)
ENG6	Discipline-related English (e.g., professional vocabulary)
ENG7	Workplace English (e.g., job applications, workplace speaking and writing)
INCTL1	I have made friends with students from different cultural backgrounds
INCTL2	I am encouraged to interact with students from different cultural backgrounds

Note: 5-point Likert: 1 = very dissatisfied to 5 = very satisfied (for TEACH); 5-point Likert: 1 = strongly disagree to 5 = strongly agree (for OL, SUP, INCTL); 5-point Likert: 1 = very little to 5 = very much (for ENG).

Appendix C

Item Descriptions for the Original Seven Graduate Attributes.

GA	Item
Professional Competence 1	Acquiring knowledge and skills useful for your profession
Professional Competence 2	Applying what you learned in the academic, professional and daily context
Professional Competence 3	Understanding global trends in your discipline
Professional Competence 4	Understanding the concept and importance of entrepreneurship
Critical Thinker 1	Examining the validity of information, arguments, and different viewpoints
Critical Thinker 2	Making rational judgements based on evidence and logical reasoning
Innovative Problem-solver 1	Identifying problems and their causes
Innovative Problem-solver 2	Generating innovative solutions to deal with problems
Effective Communicator 1	Communicating effectively in English in the academic, professional and daily context
Effective Communicator 2	Communicating effectively in Chinese in the academic, professional and daily context
Lifelong Learner 1	Recognising the need to continually upgrade your skills and knowledge

Continued

Lifelong Learner 2	Planning and managing continual development (both self and professional)
Ethical Leader 1	Being prepared to serve as a leader and a team player
Ethical Leader 2	Demonstrating ethical reasoning in the academic, professional and daily contexts
Ethical Leader 3	Developing self-leadership and psychosocial competence to pursue personal and professional development
Ethical Leader 4	Building and maintaining (team) relationships and being able to resolve conflicts in group work situations
Socially responsible global citizen 1	Understanding different cultures and social development needs in the local, national and global contexts
Socially responsible global citizen 2	Accepting your responsibilities as a citizen to society, own nation and the world

Note: 5-point Likert: 1 = very little to 5 = very much.