International Journal of Evaluation and Research in Education (IJERE)
Vol. 14, No. 5, October 2025, pp. 3882~3890
ISSN: 2252-8822, DOI: 10.11591/ijere.v14i5.34224

The educational accomplishments scale: development and validation in the context of education institutions

Anil DCosta[1], Joseph Chacko Chennattuserry[1], Kennedy Andrew Thomas[2]
[1]Department of International Studies, Political Science and History, Christ University, Bangalore, India
[2]School of Education, Christ University, Bangalore, India

Article Info

Article history:

Received Dec 21, 2024
Revised May 9, 2025
Accepted Jun 18, 2025

Keywords:

Accomplishments
Congregation
Integrated education
Quality education
Scale development
Value-based education

ABSTRACT

Educational institutions play a significant role in fostering academic growth and personal development. However, there is a lack of standardized tools to assess the impact of educational accomplishments (EA), particularly integrating dimensions such as quality, value-based, integrated, and culture-enhanced education. This paper aims to create and validate a measurement tool that assesses how EA impacts students and institutions to foster academic growth, personal development, and institutional effectiveness, contributing to the overall quality of education. The data was collected from 120 participants, including religious heads, directors, principals, and coordinators of ten schools run by a specific religious congregation. The study implemented a three-stage systematic procedure in the development of the scale. Stage one consisted of item generation, literature review, and expert judgment. The second stage validated the scale and was followed by an item analysis, principal component with varimax rotation (exploratory factor analysis) using Kaiser normalization on IBM SPSS 26. The third step resulted in the final reliability and validity of the scale. A final 19-item educational accomplishments scale (EAS) is psychometrically reliable and of potential use to policymakers globally, comparing student and teacher perceptions, especially with religious congregational affiliations. This scale can particularly be used by each institution to evaluate the EA and can also be used by other researchers for further research.

Corresponding Author:

Anil DCosta
Department of International Studies, Political Science and History, Christ University
560029 Bangalore, India
Email: anil.costa@res.christuniversity.in

1. INTRODUCTION

Educational accomplishments (EA) are the results of an individual's learning journey, which includes both academic and skillset development, personal growth, milestones individuals attain, and contributions to society [1]. These accomplishments contribute to our identity, the opportunities, and the overall impact on society. A person's EA are determined by both their formal academic achievements and the development of skills, knowledge, and personal growth [2], [3]. These successes can be found at every level of our educational system, from early childhood education to higher education and beyond.

To achieve educational success, it is often necessary to implement and develop unique approaches, methods, and strategies to enhance student engagement, critical thinking, and learning outcomes. Innovations in pedagogy may include inquiry-based learning, project-based learning, experiential learning, flipped classrooms, and collaborative learning [4]. It also includes integrating interdisciplinary content, incorporating real-world applications, promoting cultural diversity and inclusivity, and cultivating 21st-century skills such as creativity, communication, and problem-solving [5], [6].

Achieving educational success also encompasses contributions to research and scholarship that advance our understanding of the teaching and learning process [7], [8]. In addition to formal educational achievements, it includes skill development, personal growth, and the potential positive impact on the people and community as a whole. A well-rounded education empowers individuals to contribute meaningfully to a wide range of areas in society. Thus, to meet the learners' changing needs and challenges in diverse contexts, educators, researchers, policymakers, administrators, students, and stakeholders collaborate to innovate, improve, and transform educational systems and practices [9], [10].

Several studies have been carried out and published in reputed Scopus journals to identify the factors, barriers, or determinants of educational patterning, namely student engagement [11], intellectual property creation capability [12], work behavior in higher education [13], learning outcome of open education [14], space and scale in higher education [15]. Several different scales are available to measure perceived service quality [16], thinking mindset [17], and service quality [18]. However, research on EA in the Indian context and the framework of religious congregations remains relatively scarce. This study is the first to evaluate the different dimensions of EA in institutions by taking into account the quality, values, and cultural aspects of higher education in India.

While various scales exist for measuring service quality and student perceptions, the EA measurement tool specifically assesses both student and institutional development, particularly those affiliated with religious congregations. Unlike previous studies that assess either student performance or institutional effectiveness in isolation, this research establishes a connection between EA and the overall performance of schools and colleges. The study is novel because it covers specific data from Catholic-run institutions of religious congregation and how Christian-based education pairs value and culture with academic growth, an area that has remained largely unexplored in previous research. However, the scale's application also extends beyond religious congregations, making it a globally relevant tool that can be refined and expanded to suit various educational frameworks, thereby helping elevate education quality and management strategies worldwide.

The educational accomplishments scale (EAS) offers several key contributions. First, it follows the best practices for developing assessment tools while contributing to research on understanding educational achievements. Second, it addresses a gap that was identified regarding the lack of emphasis that EA has placed on valid measures. Finally, this paper serves as an initial step that paves the way for future research to further refine a tool for measuring educational competencies, with potential applications in both educational and research settings.

2. METHOD

The first step in scale development was building a comprehensive item pool that consistently measures the construct. For the preliminary assessment, 42 items related to EA were formed following a systematic review of the relevant literature. The Likert scale, structured in a Likert-type format, required participants to rate each statement on a five-point scale, with 5 indicating "strongly agree" and 1 indicating "strongly disagree." The items encompassed relevant literature review on historical aspects, current practices, preferred leadership, and future perspectives on educational achievements and objectives.

2.1. Validation methods

The strength and reliability of any research study are based on the validity and reliability aspect of instruments or measurement methods used to collect the data. Validity indicates whether these tools are suitable, precise, and accurate in measuring what they are designed to assess [19]. The items in the current tool were adapted from existing sources and developed by the investigator to ensure alignment with the research objectives. Steps followed for the construction of the scale:

2.1.1. Expert validation

The expert judgment was employed to assess the EAS. The items were developed based on insights gained from an extensive review of relevant literature and feedback from subject matter experts in the fields of history, psychology, and management from external universities. Additionally, a few Ph.D. scholars from a specific religious congregation contributed their perspectives. This approach ensured that the scale's items were both comprehensive and grounded in a range of academic and practical expertise, thereby enhancing the scale's content validity.

Initially, the study comprised 42 items focused on EA, especially aligned with pedagogy and educational institutions in India. To ensure content validity, the scale underwent a rigorous review by a panel of six experts, including professionals from diverse academic fields. Their review played a pivotal role in refining and shaping the items, ensuring the scale's alignment with the study's objectives in the Indian context.

Further, the remaining items were pre-tested by two senior supervisors, each with over 25 years of experience publishing in reputed journals and holding key administrative positions such as vice chancellor or director in their respective universities. After careful evaluation, 39 out of the original 42 items were considered valid and significant for inclusion. By retaining 39 items that met the criteria established by the expert panel, the researchers followed a systematic and validated approach to scale development, ensuring that the final version of the EAS is both reliable and valid for measuring EA in the context of education institutions and pedagogy.

2.1.2. Pilot study

The researchers conducted a pilot study with a sample of 120 participants, including religious heads, directors, principals, and coordinators of ten schools run by a specific religious congregation. For pilot testing, a 39-item questionnaire was developed and assessed using a five-point Likert scale (ranging from 5– "strongly agree," 4– "agree," 3– "undecided," 2– "disagree," and 1– "strongly disagree"). This Likert-type format is commonly employed in scale development to capture participant responses on a continuum, facilitating nuanced data collection.

Following the administration of the 39 items, item analysis was conducted to assess the quality of each item. The item-to-total correlation was used as the primary criterion, where items that correlate with the total score indicate that they contribute to the overall construct being measured. Based on Kherif and Latypova [20] recommendation, an item-to-total correlation threshold of 0.5 was used to determine acceptable items. As a result, seven items with item-to-total correlations below 0.5 were eliminated. The deletion of seven items subsequently increased the scale's reliability, as indicated by a Cronbach's alpha of 0.951, reflecting excellent internal consistency [21].

The principal component analysis (PCA) was carried out on the 32 items of the EAS to assess the effectiveness of the questionnaire. The Kaiser–Meyer–Olkin (KMO) index obtained was 0.893, which is close to the meritorious range; however, it is well above the minimum criteria of .6 [22]. From this value, the sample size is adequate to be subjected to the estimates of correlation among the variables. Further, Bartlett's test of sphericity revealed a statistical significance of 0.000 (i.e., $p<0.005$) [23]. Hence, the data was suitable for factor analysis.

3. RESULTS

3.1. Factor analysis

The exploratory factor analysis (EFA) was conducted on the 32 items retained after the scale purification and reliability assessment. Factor analysis was performed on a sample of 120 participants using IBM SPSS version 26, aiming to identify and eliminate items that did not accurately measure the intended components or did not align with specific factors within the research instrument. PCA with varimax rotation was utilized to facilitate the factor analysis. Items with factor loadings less than 0.5 were removed, leading to a final set of 19 items organized into four factors. Any coefficients under 0.5 were not displayed in the analysis in order to improve clarity and focus. The commonalities of all retained measures were relatively large, exceeding 0.5, indicating that the items had a significant portion of their variance explained by the factors. A total of 19 items for all four factors shown in Table 1 were retained.

3.2. Factor loadings

The factor loadings are presented in Table 1. After performing a rotated principal component matrix on the initial 32 items, 13 items were identified as unsuitable for inclusion and were subsequently excluded. This process resulted in the selection of 19 items that yielded four distinct factors. A factor loading of 0.50 or greater is considered acceptable for sample sizes up to 120 in EFA [24]. Table 2 lists the distributions of items determined by the factor analysis, providing a complete summary of these factors.

3.3. Factors and their distribution

The factors and their distributions are presented in Table 2. Malkewitz *et al.* [21] emphasized that when multiple factors are present, reliability should be calculated separately for the items corresponding to each factor. Consequently, Cronbach's alpha was computed for each of the four subscales identified through EFA, as detailed in Table 2. Kherif and Latypova [20] indicated that Cronbach's alpha threshold of at least 0.60 is acceptable, with a value above 0.70 considered highly reliable. In this study, the reliability for the first three subscales was found to be above 0.80, indicating excellent internal consistency. These findings provide strong evidence of the reliability of the developed scale. The present study employed IBM SPSS version 26 to determine the reliability of each factor related to EA separately.

Table 1. Factor loadings EAS

Item no.	Item	Components corresponding with factor loadings			
		1	2	3	4
EA 1	The congregation has a vision for educational empowerment.	0.700			
EA 2	The educational institutions of the congregation have implemented the charism of the congregation.	0.577			
EA 3	The educational institutions of the congregation have an excellent administrative body to achieve the desired goals.	0.574			
EA 4	The educational institutions of the congregation promote quality-based teaching and learning.	0.553			
EA 5	The educational institutions of the congregation strive toward service-oriented education.	0.686			
EA 6	The educational institutions of the congregation work according to its motto.	0.677			
EA 7	The educational institutions of the congregation concentrate on differences in every child.	0.658			
EA 8	The education institutions of the congregation have strived to re-live the values of the founder of the congregation.		0.727		
EA 9	The educational institutions of the congregation focus on the servant leadership model.		0.744		
EA 10	The educational institutions of the congregation reach out to the poor children in the vicinity.		0.745		
EA 11	The leaders of the educational institutions of the congregation will strive to walk in the footprints of their founder saint.		0.661		
EA 12	In the future, the educational institutions of the congregation will continue to impart moral and spiritual accompaniment to the students.			0.698	
EA 13	The educational institutions of the congregation will strive for the holistic development of the students.			0.784	
EA 14	The educational institutions of the congregation will strive for the all-round development the children.			0.725	
EA 15	The congregation will foster school leaders by forming an environment for free communication, where everybody shares his/her opinion.			0.587	
EA 16	The educational institutions of the congregation have given importance to respect the culture of the society.				0.640
EA 17	The educational institutions of the congregation has conducted various activities to promote cultural enrichment among the students.				0.785
EA 18	The educational institutions of the congregation provide effective leadership in every concerning matter of the curriculum.				0.613
EA 19	The educational institutions of the congregation are concerned about capacity building of the staff.				0.625

Table 2. Table of factors and distributions

Sl. No	Factor	Subscales	n of items	Reliability (Cronbach's alpha)
1.	Factor 1	Quality education	1-7	0.860
2.	Factor 2	Value-based education	8-11	0.802
3.	Factor 3	Integrated education	12-15	0.810
4.	Factor 4	Culture-enhanced education	16-19	0.795

3.4. Scoring methodology for educational accomplishments scale

The items were scored using a Likert scale. The scale was prepared in the Likert scale model with five alternatives to answer, i.e., strongly agree, agree, undecided, disagree, and strongly disagree, with scores of 5, 4, 3, 2, and 1, respectively. Cumulative scoring was done by giving 5 points to the most favorable response and 1 point to the most negative response.

3.5. Reliability analysis

3.5.1. Cronbach's alpha

Cronbach alpha is a measure of the internal consistency of a tool, reflecting how closely related the items are to each other [21]. The obtained value of Cronbach's alpha can be interpreted in various ways. Kline [25] suggests an alpha of 0.7 to 0.8 is acceptable for cognitive and ability tests. They recognize that when studying psychological constructs, reliability values lower than 0.7 can be acceptable because of the inherent variability in what is being measured. Additionally, it is important to note that the number of items on the scale can affect the Cronbach alpha value. DeVellis and Thorpe [26] provide specific ranges for interpreting Cronbach's alpha for research scales: below 0.6 (unacceptable); 0.6 to 0.65 (undesirable); 0.65 to 0.7 (minimally acceptable); between 0.7 to 0.8 (respectable); and from 0.8 to 0.9 classified as very good. In this study, the Cronbach's alpha for the 19 items of the EAS was found to be 0.921, indicating a very good measure of internal consistency, consistent with the standards set by DeVellis and Thorpe [26]. This strong reliability provides confidence in the scale's effectiveness as a valid instrument for measuring EA, as summarized in Table 3.

Table 3. Cronbach's alpha reliability coefficients for the EAS

Reliability statistics number of items	Cronbach's alpha
19	0.921

3.5.2. Split-half coefficient

The split-half reliability measure evaluates the consistency of a tool by correlating results from half one and half two. Table 4 presents statistics for the split-half reliability of the EAS. Internal consistency (Gutmann split-half coefficient) for the 19 items of the scale was found to be 0.865, with the test items divided into two, first half and second half. Reliability for these two groups of items was quantified using Cronbach's alpha 0.862 (n=10) and 0.872 (n=09), respectively. The researchers calculated the correlation in this same manner but now applied it to how closely aligned (related) each of these two forms was, with a total score for that group of test items of 0.762.

Table 4. Split-half reliability statistics of the EAS

Reliability statistics			
Cronbach's alpha	Part 1	Value	0.862
		No of items	10[a]
	Part 2	Value	0.872
		N of items	9[b]
	Total N of Items		19
Correlation between forms			0.762
Spearman-brown coefficient	Equal length		0.865
	Unequal length		0.865
Guttman split-half coefficient			0.865

[a]The items are: Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10.
[b]The items are: Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19.

3.5.3. Guttman's Lambda

The Lambda indices described by Guttman were calculated by splitting the items on a test into two halves in a way that maximized the covariance of scores between these two halves. Table 5 presents the results of Guttman's reliability statistics of the EAS. Table 5 shows six Guttman Lambda indices numbered in order, e.g., Lambda 1, 2, ... 5, and Lambda 6. The Lambda 2 calculated inter-form reliabilities of parallel forms, which provides an estimate of the correlation between parallel forms 0.923, or 92.3% of the variance, is a true score and only 7.7% due to measurement error. Each of the six Lambda measures are over 0.8, which signified a sufficient reliability of the test.

Table 5. Guttman's reliability analysis for the EAS

Particulars	Lambda indices	Correlation
Lambda	1	0.873
	2	0.923
	3	0.921
	4	0.865
	5	0.902
	6	0.941
n of items		19

3.6. Descriptive statistics of educational accomplishments scale

Table 6 gives the descriptive of the 19 items of the EAS, with respect to their mean and standard deviation. The mean and standard deviation were calculated to be 78.57 and 9.896, respectively. The norms of the scale were calculated using the mean and standard deviations.

3.7. Norms of educational accomplishments scale

Norms for the 19 items of the EA were established based on the mean and standard deviation (M+/-SD) as given in Table 7. Scores of the respondents obtained below 67 were ranked as 'low; those in the range of 67-88 were categorized as being 'moderate' scores, and those 89 and above were ranked as being 'high.' Thus, the reliability (alpha) established for the 19 items of EAS was calculated to be 0.921. This scale is valuable for educational assessment and decision-making for different institutions.

Table 6. Results of descriptive statistics of EAS

n of items	Minimum	Maximum	M	SD
19	47	98	78.57	9.896

Table 7. Norms of EAS

Low	Moderate	High
Below 68	68-88	Above 89

4. DISCUSSION

Although India has broadened the provision of education with notable achievements by having institutes like Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), there are still policy voids that need attention in the context of EA. Despite the enactment of policies like the Right to Education Act and the National Early Childhood Care and Education (ECCE) Policy, which ensure education for children and early childhood care, challenges persist in terms of quality, equity, and outcomes across various educational levels. On the one hand, India has a large number of universities, but the state of affairs related to quality in education is deplorable, and yet skill development and employability sit as major challenges [27], [28]. Filling these policy gaps is essential to the continued strengthening of EA in the country.

The literacy rate has shown significant improvement, especially in rural areas, and there has been a notable increase in education expenditure–from 0.64% of GDP in 1952 to 4.13% in 2014, but challenges persist (Ministry of Statistics and Programme Implementation). These include disparities in educational quality between urban and rural areas, insufficient infrastructure, and a need for better-trained teachers. Although the rise in literacy rates reflects progress in reaching marginalized communities, there is still much work to be done to ensure equitable access to quality education and to address the gaps in educational outcomes across different regions and socioeconomic groups.

India has made significant progress in reducing the number of out-of-school children from 13.46 million in 2006 to 6.1 million in 2014, but major challenges remain, particularly in retaining students throughout the education cycle. Nearly 29% of students drop out before completing elementary education, disproportionately affecting marginalized groups. Additionally, around half of adolescents do not finish secondary education, and 20 million children are not attending preschool (SRI-IMRB Surveys, 2009 and 2014). The fact that nearly 500 million primary school children are not achieving grade-appropriate learning levels underscores the difficulty of meeting sustainable development goal 4 (SDG 4), which aims for inclusive and equitable quality education for all in India (Rapid Survey of Children 2013 to 2014, Ministry of Women and Child Development (MWCD) and National Achievement Survey, National Council of Educational Research and Training (NCERT), 2017). These gaps highlight the need for intensified efforts to address disparities and improve education quality at all levels.

India's education system presents significant barriers for students trying to progress to higher levels, with stark issues such as high unemployment rates among youth with secondary education (18.10%) compared to those with primary education (11.60%). According to the report by the National Sample Survey Organization (NSSO), the quality of education is compromised, as nearly one-third of teachers are not adequately qualified, and the reliance on rote learning stifles critical thinking and practical application of knowledge. Additionally, the curriculum is often outdated, and schools, especially in rural areas, suffer from inadequate infrastructure, lacking essentials like electricity, clean water, and sanitation [29], [30].

Secondly, regarding value-based education, the National Study on Ten Year School Curriculum Implementation by NCERT recommended that moral education be included in the school curriculum, and encouragement of character building, programs for social service, physical education, and cultural programs should be promoted. The National Curriculum Frameworks of 2000 and 2005 advocated for the inclusion of value education and peace education to address both national and global concerns. The national education policy (NEP) 2020 further emphasizes the need to incorporate ethical reasoning, traditional Indian values, such as *seva* (service), *ahimsa* (non-violence), *swachchata* (cleanliness), *satya* (truthfulness), *nishkamakarma* (selfless or desireless action), *shanthi* (peace), sacrifice, tolerance, diversity, pluralism, righteous conduct, gender sensitivity, respect for elders and all people [31]. These initiatives aim to nurture not only academic development but also the moral and ethical growth of students, preparing them to be responsible citizens.

The study also underlines the importance of culture-embedded education in India's multi-culturally diverse socio-cultural landscape. The NEP 1986 recognized the importance of making education culture-based to reflect the country's multi-ethnic and multi-religious contexts. The Centre for Cultural Resources and Training, Delhi (CCRT) emphasized that effective education must address students' cognitive, emotional, and spiritual needs by integrating cultural elements. The NEP 2020 has reiterated this aim of ensuring that there is no negation of diversity and local realities in curriculum, pedagogy, and policies while advocating for Indian languages, arts, and culture [32]. This is followed by an approach that assures an education that aligns with the cultural heritage and identity of learners, thereby making it more relevant and wholesome.

In the end, the EA tool not only enhances the EA of institutions but also helps develop a quality, integrated, value-based, and culture-enhanced education. It lays emphasis on teacher training, curriculum modernization, and infrastructural development, especially in rural areas. It also focuses on the governmental function of providing education to all, regardless of social class. Furthermore, policies like the NEP 2020 and schemes such as the *Samgra Shiksha Abhiyan* (the national education mission) and *Rashtriya Madhyamik Shiksha Abhiyan* (national mission for secondary education) are crucial for enhancing the quality of education across all levels. However, to implement these effectively, strong governance and monitoring mechanisms are necessary. Ultimately, the paper serves as a resource for researchers, policymakers, and educators committed to fostering a holistic, quality system of education that modernizes with time and integrates inclusivity on a global scale.

5. CONCLUSION

The study developed and validated the EAS, a 5-point Likert-type scale designed to assess the accomplishments of educational institutions. The process followed distinct phases, including item generation, content validation, scale construction, and evaluation of the scale's dimensions, reliability, and validity. During the development, the scale underwent scrutiny for face validity and content validity. Reliability measures for the overall scale and its four subscales were established. This proposed study provides valuable contributions to the educational scenario. First, it enhances the existing literature by creating and validating a tool to measure EA in academic settings. Second, it provides a scale that can gather essential insights into institutions' needs and goals related to EA, as well as guide educational management efforts. Third, the study deepens the understanding of EA within the Indian educational context. Finally, it expands the current body of research by exploring the relationship between EA and the performance of schools or colleges. This scale can help policymakers understand the performance achieved by various institutions, especially religious congregations, making it a valuable tool for educational evaluation and decision value.

FUNDING INFORMATION

Authors state no funding involved.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Anil DCosta	✓		✓	✓			✓	✓	✓	✓				
Joseph Chacko Chennattuserry	✓				✓	✓			✓	✓	✓	✓		
Kennedy Andrew Thomas	✓	✓		✓	✓	✓	✓		✓	✓				

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

Derived data supporting the findings of this study are available from the corresponding author [AD], on request.

REFERENCES

[1] S. Djambazova-Popordanoska, "Implications of emotion regulation on young children's emotional wellbeing and educational achievement," *Educational Review*, vol. 68, no. 4, pp. 497–515, Oct. 2016, doi: 10.1080/00131911.2016.1144559.

[2] B. Vadivel, S. Alam, I. Nikpoo, and B. Ajanil, "The Impact of Low Socioeconomic Background on a Child's Educational Achievements," *Education Research International*, vol. 2023, no. 1, p. 6565088, Jan. 2023, doi: 10.1155/2023/6565088.

[3] M. J. Hawthorne, A. Cooper, K. Chavis, T. Burrell, and C. Evans, "Ability and responsibility: Need for Cognition and study habits in academic achievement," *Research in Higher Education Journal*, vol. 39, pp. 1–13, 2021.

[4] T. Konst (e. Penttilä) and L. Kairisto-Mertanen, "Developing innovation pedagogy approach," *On the Horizon*, vol. 28, no. 1, pp. 45–54, Jan. 2020, doi: 10.1108/OTH-08-2019-0060.

[5] A. E. Gottfried, K. S. J. Preston, A. W. Gottfried, P. H. Oliver, D. E. Delany, and S. M. Ibrahim, "Pathways from parental stimulation of children's curiosity to high school science course accomplishments and science career interest and skill," *International Journal of Science Education*, vol. 38, no. 12, pp. 1972–1995, Aug. 2016, doi: 10.1080/09500693.2016.1220690.

[6] M. W. Meyer and D. Norman, "Changing Design Education for the 21st Century," *She Ji: The Journal of Design, Economics, and Innovation*, vol. 6, no. 1, pp. 13–49, 2020, doi: 10.1016/j.sheji.2019.12.002.

[7] M. Cachia, S. Lynam, and R. Stock, "Academic success: Is it just about the grades?" *Higher Education Pedagogies*, vol. 3, no. 1, pp. 434–439, Jan. 2018, doi: 10.1080/23752696.2018.1462096.

[8] A. Alam and A. Mohanty, "Predicting Students' Performance Employing Educational Data Mining Techniques, Machine Learning, and Learning Analytics," in *International Conference on Communication, Networks and Computing (CNC 2022)*, 2023, pp. 166–177, doi: 10.1007/978-3-031-43140-1_15.

[9] O. Erstad, R. Miño, and P. Rivera-Vargas, "Educational practices to transform and connect schools and communities," *Comunicar*, vol. 29, no. 66, pp. 9–20, Jan. 2021, doi: 10.3916/C66-2021-01.

[10] L. Jimenez and S. Sargrad, "A Well-Rounded Education: Rethinking What is Expected of High School," 2018. [Online]. Available: https://eric.ed.gov/?id=ED592798

[11] A. F. Siddiqi, M. S. Shabbir, M. Abbas, A. Mahmood, and R. Salman, "Developing and testing student engagement scale for higher educational students," *Journal of Applied Research in Higher Education*, vol. 14, no. 1, pp. 424–439, Jan. 2022, doi: 10.1108/JARHE-11-2020-0388.

[12] A. Kashyap and R. Agrawal, "Scale development and modeling of intellectual property creation capability in higher education," *Journal of Intellectual Capital*, vol. 21, no. 1, pp. 115–138, Dec. 2019, doi: 10.1108/JIC-09-2018-0168.

[13] A. E. A. H. Ayoub, S. M. Almahamid, and L. F. Al Salah, "Innovative work behavior scale: development and validation of psychometric properties in higher education in the GCC countries," *European Journal of Innovation Management*, vol. 26, no. 1, pp. 119–133, Jan. 2023, doi: 10.1108/EJIM-04-2021-0176.

[14] I. Jung and J. Lee, "Open thinking as a learning outcome of open education: scale development and validation," *Distance Education*, vol. 43, no. 1, pp. 119–138, Jan. 2022, doi: 10.1080/01587919.2021.2020620.

[15] S. Marginson, "Space and scale in higher education: the glonacal agency heuristic revisited," *Higher Education*, vol. 84, no. 6, pp. 1365–1395, Dec. 2022, doi: 10.1007/s10734-022-00955-0.

[16] D. S. Silva, G. H. S. M. de Moraes, I. K. Makiya, and F. I. G. Cesar, "Measurement of perceived service quality in higher education institutions," *Quality Assurance in Education*, vol. 25, no. 4, pp. 415–439, Sep. 2017, doi: 10.1108/QAE-10-2016-0058.

[17] M. Vignoli, C. Dosi, and B. Balboni, "Design thinking mindset: scale development and validation," *Studies in Higher Education*, vol. 48, no. 6, pp. 926–940, Jun. 2023, doi: 10.1080/03075079.2023.2172566.

[18] V. Teeroovengadum, T. J. Kamalanabhan, and A. K. Seebaluck, "Measuring service quality in higher education," *Quality Assurance in Education*, vol. 24, no. 2, pp. 244–258, Apr. 2016, doi: 10.1108/QAE-06-2014-0028.

[19] Y. Zhou, "A Mixed Methods Model of Scale Development and Validation Analysis," *Measurement: Interdisciplinary Research and Perspectives*, vol. 17, no. 1, pp. 38–47, Jan. 2019, doi: 10.1080/15366367.2018.1479088.

[20] F. Kherif and A. Latypova, "Principal component analysis," in *Machine Learning: Methods and Applications to Brain Disorders*, A. Mechelli and S. Vieira, Eds. London: Academic Press, 2020, pp. 209–225, doi: 10.1016/B978-0-12-815739-8.00012-2.

[21] C. P. Malkewitz, P. Schwall, C. Meesters, and J. Hardt, "Estimating reliability: A comparison of Cronbach's α, McDonald's ωt and the greatest lower bound," *Social Sciences & Humanities Open*, vol. 7, no. 1, p. 100368, 2023, doi: 10.1016/j.ssaho.2022.100368.

[22] M. P. G. Broen *et al.*, "Factor analysis of the Hamilton Depression Rating Scale in Parkinson's disease," *Parkinsonism & Related Disorders*, vol. 21, no. 2, pp. 142–146, Feb. 2015, doi: 10.1016/j.parkreldis.2014.11.016.

[23] P. Šprajc, M. Bjegović, and B. Vasić, "Energy security in decision making and governance - Methodological analysis of energy trilemma index," *Renewable and Sustainable Energy Reviews*, vol. 114, p. 109341, Oct. 2019, doi: 10.1016/j.rser.2019.109341.

[24] J. B. Schreiber, "Issues and recommendations for exploratory factor analysis and principal component analysis," *Research in Social and Administrative Pharmacy*, vol. 17, no. 5, pp. 1004–1011, May 2021, doi: 10.1016/j.sapharm.2020.07.027.

[25] P. Kline, *Handbook of Psychological Testing*, 2nd ed. London: Routledge, 2013, doi: 10.4324/9781315812274.

[26] R. F. DeVellis and C. T. Thorpe, *Scale development: Theory and applications*, 5th ed. Thousand Oaks, CA: SAGE Publications, Inc., 2021.

[27] N. Singal, "Challenges and opportunities in efforts towards inclusive education: reflections from India," *International Journal of Inclusive Education*, vol. 23, no. 7–8, pp. 827–840, Aug. 2019, doi: 10.1080/13603116.2019.1624845.

[28] P. G. Altbach, "India's higher education challenges," *Asia Pacific Education Review*, vol. 15, no. 4, pp. 503–510, Dec. 2014, doi: 10.1007/s12564-014-9335-8.

[29] R. Mahajan, R. Agrawal, V. Sharma, and V. Nangia, "Analysis of challenges for management education in India using total interpretive structural modelling," *Quality Assurance in Education*, vol. 24, no. 1, pp. 95–122, Feb. 2016, doi: 10.1108/QAE-07-2013-0030.

[30] A. Alam, "Challenges and Possibilities in Teaching and Learning of Calculus: A Case Study of India," *Journal for the Education of Gifted Young Scientists*, vol. 8, no. 1, pp. 407–433, Mar. 2020, doi: 10.17478/jegys.660201.

[31] V. K. Patil and K. D. Patil, "Traditional Indian Education Values and New National Education Policy Adopted by India," *Journal of Education*, vol. 203, no. 1, pp. 242–245, Jan. 2023, doi: 10.1177/00220574211016404.

[32] D. N. Kumari and D. Yetcherla, "National Education Policy-2020: Language, Literature and Culture," *Journal of Positive School Psychology*, vol. 6, no. 10, pp. 3974–3977, 2022.

BIOGRAPHIES OF AUTHORS

Anil DCosta is a doctoral scholar at the Department of International Studies, Political Science and History at Christ University, Bengaluru, India. He has completed a bachelor of education and a masters in history as well as counselling and psychotherapy. His research focuses on educational, socio-cultural accomplishments, leader motives, and congregation's culture of Franciscan capuchins from a historical perspective. He can be contacted at email: anilcapuchin@gmail.com; anil.costa@res.christuniversity.in.

Joseph Chacko Chennattuserry is the vice chancellor of Christ University, Hosur Road, Bengaluru, Karnataka, India. He is also an associate professor at the Department of International Studies, Political Science and History. He has published many research articles and a few books in Scopus journals. He has guided many research scholars in the Department of History. He can be contacted at email: josecc@christuniversity.in.

Kennedy Andrew Thomas is an associate professor at the School of Education, Christ University Central Campus, Bangalore, India. He is the Director of the Centre for Education Beyond Curriculum (CEDBEC) at Christ University. He has authored a number of articles and book chapters in the Scopus journals. He has been invited to many institutions as a resource person. He has been assisting Ph.D. candidates in their effort to earn a doctorate. He can be contacted at email: kennedy.andrew@christuniversity.in.