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Construct Validation - Community College Instructional Development Inventory

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Community College Instructional Development Inventory (CC-IDI)

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This white paper describes the construct validation of the Community College Instructional Development Inventory (CC-IDI). The CC-IDI is an institutional assessment tool designed to inform professional development programming for instructional faculty. The instrument was developed to serve as a standardized assessment tool to determine the efficacy of community college faculty instruction and encourage institutional professional development.

Assessing Faculty Professional Development Needs

The CC-IDI features items and scales that have been indicated to promote successful teaching practices for underserved students in the community college (Wood, 2011; Wood, Hilton & Lewis, 2011). A construct validation of the instrument was conducted to examine the psychometric properties of the instrument.

Data for the current study were derived from the Community College Instructional Development Inventory (CC-IDI). The CC-IDI was distributed online using Qualtrics to instructional faculty from randomly selected community colleges across the United States. The final sample included 1,775 instructional faculty across 125 community colleges.

Additionally, the sample included a diverse group of full-time and part-time instructional faculty with a range of experience, in years, teaching at their current institution. This sample consisted of full-time faculty (tenured) (35%), full-time faculty (tenure track) (10%), full-time faculty (non-tenure track) (21%), part-time faculty (teaching here only) (20%), and part-time faculty (teaching here and at one or more institutions) (14%). The number of years the faculty member has taught at their current institution ranged from one to 31 or more years, with the breakdown as follow: 1-9 year (51%), 10-19 year (33%), 20-29 years (12%), 30 or more years (4%).

A total of 65 items from the CC-IDI were employed for this analysis. These items were intended to measure Collaborative Learning, Culturally Relevant Teaching (CRT), Culturally Relevant Materials (CRM), Performance Monitoring, Personal Relationships, Institutional Responsibility, High Expectations,

Validation, Faculty-Student Engagement, Disclosing, Welcoming Engagement (Inside the Classroom), Welcoming Engagement (Outside the Classroom), Intrusiveness, and Racial Microaggressions.

Through exploratory factor analysis (EFA), the current study sought to identify constructs within the CC-IDI. In particular, EFA using principal axis factoring with Promax rotation was employed to examine items associated with each factor. Promax rotation was used due to the perceived interrelationship among study variables. Cronbach's alpha coefficients were used to examine the internal consistency of the items within each construct.

Initially, the CC-IDI consisted of 84 items intended to measure 14 instructional practices. After the content validation, 65 items remained. The 65 items in the CC-IDI were examined to investigate uni-dimensionality in the data. This enabled the researchers to understand the total number of factors that should be subjected to rotation. A two-stage analytic process was employed to identify factors, this included an examination of factors with eigenvalues about 1 (the one-criterion) and the sharp line of descent in the scree plot.

Scree plots are a graphical depiction of the magnitude of each eigenvalue, the analysis indicated that there were fifteen groupings in the sharp line of descent that also had associated eigenvalues of 1.00 or greater (the lowest being 1.14). The analysis employed Principal Axis Factoring to examine items associated with each factor. Promax rotation was used due to the perceived interrelationship among study variables.

Assessing Faculty Professional Development Needs

The Kaiser-Meyer-Olkin measure of sampling adequacy demonstrated that there was a sufficient sample size per factor ratio (.90). Moreover, the Barlett's test of Sphericity was significant ($x^2 =$ 59,709.05 (2080), p < .001), indicating that the items were correlated enough to support a factor analysis. Table 1 presents the total variance explained for the extraction sums of squared loadings. After rotation, the cumulative item variance for the 15 factors was 62.8%. The first factor accounted for 21% of the variance in the outcome. The remaining variance was as follows: Factor 2, 8.1%, Factor 3, 5.7%, Factor 4, 4.7%, Factors 5 and 6, from 3.3 to 3.7%, Factors 7-10, from 2.1 to 2.8%, and Factors 11-15, from, 1.0 to 1.7%.

Of the 15 factors subjected to rotation, 14 were retained based on factor loadings. The results from the Promax rotated pattern matrix using Kaiser normalization are presented in Table 2. The structure matrix loadings are presented in parentheses. The researchers examined loadings of .400 or above, though most items were higher than this threshold.

The range of pattern loadings for each factor, as well as the concepts they sought to measure are as follows: Factor 1 – Collaborative Learning, items 1-4 (.49 to .66), Factor 2 – Culturally Relevant Teaching (CRT), items 5, 6, 9 and 10 (.95 to .99); Factor 3 – Culturally Relevant Materials (CRM), items 7, 8, 11, and 12 (.42 to .93), Factor 4 – Performance Monitoring, items 14, 15, 16, and 17 (.41 to .91); Factor 5 – Personal Relationships, items 18, 19, 20, 21, and 22 (.53 to .89); Institutional Responsibility, items 23, 24, 25, and 26 (.55 to .78); High Expectations, items 27, 28, 29, 30, and 31 (.79 to .92); Validation, items 32, 33, 34, 35, and 36 (.77 to .94); Faculty-Student Engagement, items 37, 38, 39, and 40 (.66 to .78);

Disclosing, items 41, 42, and 43 (.83 to .92); Welcoming Engagement (Inside the Classroom), items 44, 45, and 46 (.65 to .73); Welcoming Engagement (Outside the Classroom), items 48, 49, 50, 51, and 52 (.45 to .81); Intrusiveness, items 57, 58, 59, 60, and 61 (.51 to .84); and Racial Microaggressions, items 62, 63, 64, and 65 (.96 to .98).

The initial items for Empowerment were 53 through 56, however only two of the items (54 and 55) remained in the factor, thus the full factor was removed for further analysis. Beyond these items, the following items did not load on any factors, items 13 (from Performance Monitoring), 47 (from Welcoming Engagement – Inside), 49 (from Welcoming Engagement – Outside). It should be noted that items 8 and 12, rotated on factors for CRT and CRM. Factor loadings for items 8 and 12 were .44 and .46 (CRT) and .42 and .45 (CRM), respectively. Thus, loadings were slightly higher for CRT, however, from a heuristic perspective, these items had a more logical alignment with the factor for CRM and were retained on that factor.

To determine the reliability of each identified factor, the items within each factor were examined using Cronbach's alpha. Given that the instrument is used to make comparison across faculty status (e.g., full-time, part-time), reliability analyses are reported for the overall, and the following groups: full-time (tenure), full-time (tenure track), full-time (non-tenure track), part-time (teaching here only), and part-time (teaching at multiple colleges). Table 3 depicts the coefficient alphas for each group. Based on overall scores, six of the 14 items demonstrated very strong reliability, they include: CRT (.96), CRM (.90), High Expectations (.93), Validation (.95), Disclosing (.90), and Racial Microaggressions (.98).

Table 1

Total variance explained for the extraction sums of squared loadings

	All	Full-Time (tenured)	Full-Time (tenure track)	Full-Time (non-tenure track)	Part-Time (teaching here only)	Part-Time (teaching at multiple colleges)
Collaborative Learning	.66	.63	.67	.70	.66	.68
Culturally Relevant Teaching	.96	.96	.96	.95	.96	.98
Culturally Relevant Materials	.90	.91	.89	.89	.90	.90
Performance Monitoring	.80	.81	.82	.82	.79	.76
Personal Relationships	.88	.87	.85	.89	.88	.89
Institutional Responsibility	.78	.81	.79	.75	.79	.71
High Expectations	.93	.93	.94	.94	.93	.94
Validation	.95	.95	.94	.96	.96	.96
Faculty-Student Engagement	.83	.86	.82	.84	.82	.79
Disclosing	.90	.90	.87	.91	.89	.91
Welcoming Engagement (I)	.80	.79	.87	.84	.80	.72
Welcoming Engagement (O)	.78	.77	.72	.78	.79	.77
Intrusiveness	.85	.86	.85	.86	.81	.85
Racial Microaggressions	.98	.98	.97	.98	.98	.99

Table 2

Extraction Sums of Squared Loadings

Factor	Total	% of Variance	Cumulative %
1	13.66	21.01	21.01
2	5.26	8.10	29.11
3	3.67	5.65	34.76
4	3.07	4.72	39.48
5	2.38	3.67	43.15
6	2.15	3.31	46.45
7	1.84	2.84	49.29
8	1.56	2.40	51.69
9	1.40	2.16	53.84
10	1.35	2.07	55.91
11	1.14	1.75	57.66
12	0.97	1.50	59.15
13	0.90	1.38	60.53
14	0.81	1.24	61.77
15	0.68	1.04	62.81

In addition, five items were classified as having strong reliability, such as: Performance Monitoring (.80), Personal Relationships (.88), Faculty-Student Engagement (.83), Welcoming Engagement (Inside the Classroom) (.80), and Intrusiveness (.85). Two scales had reliability scores that were on the high end of the satisfactory scale, including: Institutional Responsibility (.78) and Welcoming Engagement (Outside the Classroom) (.78). One scale, Collaborative Learning, had reliability scores that were below the satisfactory range (at .66). Though some scholars have suggested that a reliability score above .60 is acceptable for social science research (see Flowers, 2006), this analysis suggests that additional modifications to the instrument are needed to improve the utility of this scale.

Factor analysis was employed to identify 15 constructs within the CC-IDI. They included Collaborative Learning, Culturally Relevant Teaching (CRT), Culturally Relevant Materials (CRM), Performance Monitoring, Personal Relationships, Institutional Responsibility, High Expectations, Validation, Faculty-Student Engagement, Disclosing, Welcoming Engagement (Inside the Classroom), Welcoming Engagement (Outside the Classroom), Intrusiveness, and Racial Microaggressions.

While reliability analysis indicated that each construct has satisfactory reliability > .60, the researchers of this study suggest that a score of .70 and above are more reliable, thus indicating there are thirteen constructs in the measure with high reliability. Further modifications to Collaborative Learning are needed to improve the reliability score.

Nonetheless, the CC-IDI has utility as an assessment tool for faculty serving college students of color. Community colleges can use the instrument to inform training and professional development programs to advance success outcomes for students of color in the community college. The CC-IDI should be used to assess community college faculty teaching practices.

Community colleges could then utilize the CC-IDI to create a baseline and proceed with multiple assessments over time. In addition to using the CC-IDI to assess the effectiveness of current teaching practices, community colleges could also use the survey instrument to help guide the development of future classroom structures as well. With the development of the CC-IDI, it is hoped that community colleges will now have a valid and reliable tool to assess the efficacy of faculty teaching practices serving college men of color.

References

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