

The 21st Century Assessment: Measuring 21st Century Skills among Middle School Students

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INTRODUCTION

Twenty-first century skills (e.g., teamwork, leadership) represent the knowledge and skills that one must possess to live in the emerging global marketplace (Silva, 2009). As globalization becomes a reality, the need for youth to develop such skills has become a pressing priority. Schools and other youth development settings have an opportunity to foster such skills. Unfortunately, few instruments specifically assess 21st Century skills (Silva, 2009). A demonstrable need exists for psychometrically sound instruments to evaluate youth on critical 21st Century skills such as leadership and time management.

Several organizations offer frameworks of 21st Century skill development (e.g., Partnership for 21st Century Skills, American Association of School Librarians). Three key domains of skill are typically included: Learning and Innovation; Information, Media, and Technology; and Life and Career (Partnership for 21st Century Skills, 2009). Learning and innovation skills include creativity, critical thinking, problem solving, and collaboration. Information, Media, and Technology encompasses several types of literacy related to the growing prominence of technology in learning (e.g., information literacy, media literacy, etc.). Life and career skills include key skills necessary for youth to work in complex environments, such as time management, initiative, and self-directed learning.

In addition, recent research (Christen, 2009; Pappas, 2009) emphasizes the importance of 21st Century learning environments that provide opportunities to apply 21st Century skills across content areas. These settings enable innovative learning methods that integrate the use of technology, inquiry- and problem-based approaches, and higher-order thinking skills. Research highlights the importance of these settings and notes that an emphasis on 21st Century skills in learning environments can influence both *how* and *what* youth learn (Roschelle et al., 2000).

Few measures exist to assess these skills among youth. As such, this study aimed to develop a psychometrically sound measure of several core 21st Century skills, titled the 21st Century Assessment. Several concepts were considered in the construction of this measure, including those within the three domains of 21st Century skills. This study also aimed to develop a measure of learning environment in relation to these skills.

METHOD

Instrument Development

The 21st Century Assessment was developed using steps of scale development outlined by DeVellis (2003). Following a thorough review of literature, the researchers initially developed 29 items to measure 21st Century skills in the three domain areas identified in the literature. These items also included measures of 21st Century learning environments. All items utilized a 5-point Likert-type response scale (1=Not at all true; 5=Really true).

Participants and Data Collection

The 21st Century Assessment was administered to middle school students ($N = 267$) in grades 6 (34.9%), 7 (34.9%), and 8 (27.8%). Nearly half (47.9%) of respondents reported as male and 46.1% reported as female. Half of the students reported their race/ethnicity as African American (50.8%), 25.2% reported as White, and 21.1% reported as Multi-Racial.

Data Analysis

This study utilized an exploratory factor analysis (EFA) to examine the psychometric properties of the 21st Skills Assessment, comprised of items measuring both 21st Century skills and 21st Century learning environments. Principal axis factoring with varimax rotation allowed an examination of the underlying factor structure of each component of the *21st Skills Assessment*. In addition, estimates of internal consistency and intercorrelations were calculated among the resulting factors.

Table 1: 21st Century Skills Items and Factor Loadings

Item	Factor 1	Factor 2	Factor 3	Factor 4
1. I set goals for myself in school.	.696	.261	.144	.182
2. I find ways to achieve my goals.	.745	.176	.164	.264
3. I put all my energy into accomplishing my goals.	.550	.210	.224	.322
4. I push myself.	.539	.229	.253	.082
5. I stand up for what I believe in.	.507	.258	.246	.169
6. I respect others when working on a project.	.363	.572	.088	.221
7. I control my temper when working with others on a project.	.298	.527	.030	.203
8. I listen to what others say.	.161	.743	.037	.099
9. I think about how others see things.	.163	.732	.154	.152
10. I motivate others.	.175	.073	.615	.079
11. I assign tasks to others.	.069	.003	.575	.060
12. I resolve conflicts.	.182	.137	.657	.164
13. I lead others to accomplish a goal.	.205	.079	.693	.242
14. I organize my time.	.199	.210	.130	.577
15. I set priorities.	.362	.163	.169	.570
16. When I have multiple tasks, I plan ahead of time how to accomplish the tasks.	.152	.166	.221	.699

Table 2: 21st Century Learning Environment Items, Factor Loadings, and Descriptive Statistics

Item	Factor 1	M	SD
1. My teachers give me the opportunity to lead groups.	.681	3.27	1.35
2. I learn about other cultures in my classes.	.624	3.76	1.27
3. My teachers help me organize my time.	.639	3.11	1.42
4. My teachers give me time to work with other students.	.720	3.67	1.26
5. My teachers encourage me to ask questions.	.738	3.74	1.29
6. My teachers use technology in our classrooms.	.555	3.83	1.27
7. My teachers encourage me to consider the opinions of others.	.764	3.42	1.29
8. My teachers help me set goals for myself.	.750	3.71	1.33

RESULTS

Two separate EFAs were used to determine the factor structures of the two scales comprising the 21st Century Assessment. One EFA was used for the analysis of the 21st Century Skills scale and another for the analysis of the 21st Century Learning Environment scale. Factor analysis was deemed appropriate given significant ($p < 0.01$) Bartlett's (1954) Tests of Sphericity and Kaiser-Meyer-Olkin Measure (KMO; Kaiser, 1974) values of 0.92 and 0.90.

Items were eliminated if they did not load greater than .50 (Tabachnik & Fidell, 2007). Results of the EFA indicated that the 21st Century Skills scale resulted in a four-factor solution accounting for 62.75% of the total variance. The 21st Century Learning Environment scale resulted in a one-factor solution accounting for 49.97% of the total variance. The factor loadings are presented in Tables 1 and 2 and discussed further below.

21st Century Skills

The resulting four factors were positively related to each other and demonstrated strong internal consistency. Descriptive Statistics and Correlations for the 21st Century Skills scale are presented in Table 3. The factors are as follows:

- *Factor 1*: Accounted for 37.16% of the variance and comprised five items, labeled *Self-Directed Learning*.
- *Factor 2*: Accounted for 11.38% of the variance and comprised four items, labeled *Working Responsibly with Others*.
- *Factor 3*: Accounted for 7.34% of the variance and comprised four items, labeled *Leadership*.
- *Factor 4*: Accounted for 6.88% of the variance and comprised four items, labeled *Time Management*.

21st Century Learning Environment

The one-factor solution was comprised of eight items accounting for 49.97% of the total variance. This solution demonstrated strong internal consistency as well ($\alpha = .88$). The factor loadings are presented in Table 2.

Table 3: Descriptive Statistics and Correlations

Factor	1.	2.	3.	4.
1. Self-Directed Learning ($\alpha = .83$)	--	.584**	.464**	.518**
2. Working Responsibly with Others ($\alpha = .78$)		--	.333**	.493**
3. Leadership ($\alpha = .76$)			--	.412**
4. Time Management ($\alpha = .74$)				--
M	3.85	3.53	2.97	3.22
SD	0.91	1.00	0.95	1.07
Possible Range	1-5	1-5	1-5	1-5

Note. ** $p < .01$

SUMMARY

The scale construction results of this study indicate that the *21st Century Assessment* offers a brief, psychometrically sound measure of the following critical skill areas: (1) Self-Directed Learning; (2) Working Responsibly with Others; (3) Leadership; and (4) Time Management. Additionally, this tool offers a valid and reliable measure of 21st Century Learning Environments.

These findings should be interpreted with caution given the exploratory nature of this study. While statistical analyses indicated that an EFA was an appropriate technique for this study, additional scale development procedures are necessary to further validate this measurement tool.

Implications for Social Work Practice

Nevertheless, this instrument has relevance and importance to social work practice. Social workers can perform interventions at the micro, mezzo, and macro levels to foster and advocate for 21st Century skill development among youth. For instance, social workers can lead efforts to utilize such tools in school and community programming (i.e., afterschool programs) to facilitate continuous improvement processes geared toward developing these skills in today's youth.

Additionally, social workers can play a key role by collaborating with teachers and other youth leaders to cultivate learning opportunities that enhance 21st Century skill development. Finally, social workers can serve as advocates for policies that ensure equality in technology access across communities and school districts. This access is essential in the development of these critical skills. Ultimately, enhancing 21st Century skills better prepares youth for the current workforce; thus, these skills may prove vital for future efforts to ameliorate poverty.



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