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## **Editor's Note**

**Steven R. Aragon**

*University of Illinois at Urbana-Champaign*

I am pleased to welcome you to Volume 31 of *Career and Technical Education Research (CTER)*. We had a bit of a rough first year with the name changes taking place of both the journal and the research organization. If you had an opportunity to read my editor's note included in 30(3), I discussed some of the challenges I faced during my first year as editor in terms of the quality of the submitted manuscripts. I won't say that we are completely over that hump but I can say we are moving forward very well at this point.

Over the past few months, my staff, the reviewers, and I have seen a vast improvement in the manuscripts received. In fact, enough quality manuscripts were submitted within the same window of time that issues 1, 2, and 3 will be coming out back-to-back. I have been very pleased with the scope of these papers. The recent manuscripts examine career and technical education in different international settings, use a variety of methodological perspectives, and help expand the definition of the field. The manuscripts have strong theoretical frameworks, methods, conclusions, and discussions. I want to thank the reviewers for their informative and timely feedback that have allowed us to publish a great first issue for 2006. I would like to highlight the articles that appear in this issue.

In the first manuscript, Sang Hoon Bae and Ji Hoon Song examine youth unemployment in the Korean labor market and the role that CTE can play in reducing this gap. Using national jobless data and educational statistics, Bae and Song found that CTE graduates perform better than non-CTE graduates and that high school graduates without occupational skills are the highest at-risk group for unemployment. The authors conclude that labor market advantage comes not from the length of schooling but from the occupational skills that youth possess upon entering the job market. Bae and Song propose that CTE can be effective in preventing joblessness among youth.

Joo Ho Park and Jay Rojewski examine the applicability of the learning organization concept for vocational and academic teachers in Korean high schools. While their results provide strong evidence that the learning organization model can be applied to different teacher groups, in my opinion, a second contribution of the article lies in the method. The study utilized a large sample of teachers that was randomly selected thus, increasing the generalizability of the study. The instrument used had reliability coefficients ranging from .86 to .90 for each of the subscales. Finally, the data were analyzed using advanced statistical analyses. While all of the manuscripts published in *CTER* are of high quality, I do feel it brings a new level of

credibility to the field to have research that uses more advanced methods. I believe at a time when CTE often gets criticized for lack of rigor, studies like Park and Rojewski's help to dispute that argument.

In the final article of this issue, Amy Ryken examines the ways in which CTE programs support and constrain urban youths' career decision-making. Using a case study method, Ryken tells the story of three African American female students who entered biotechnology programs at the community college and how each reached different career and educational destinations. A major implication of the study suggests that while programs that link school and work settings can provide resources for students within the context of long-term planning, it is important that program designers help students see multiple options for their futures. In addition to the findings related to the career pathways, this article represents a well-designed and executed case study. It provides the detail, description, and format to serve as an excellent model for others interested in developing qualitative manuscripts.

I think you will enjoy reading all three articles included in this issue. I encourage you to submit manuscripts for publication consideration in *CTER*.

## **Youth Unemployment and the Role of Career and Technical Education: A Study of the Korean Labor Market**

**Sang Hoon Bae**

**Ji Hoon Song**

*The Pennsylvania State University*

### **Abstract**

*Using national jobless data and education statistics, this study examines the systemic association between Korea's youth unemployment trend and the workforce supply structure in which the youths' educational attainment patterns plays a key role. Focus is given to how type and length of education are correlated with employability. The findings of this study include the following: (a) Youth joblessness is becoming chronic and structural -- Despite the economic fluctuation, youth jobless rates have remained around 7% over the past five years; (b) With the college enrollment expansion, not only is the number of jobless college graduates increasing, but the percentage of unemployed college graduates among all jobless youth groups has continued to rise during the past decade; (c) Contrary to the increased female working population, employment of female university graduates has declined; (d) In terms of job placement, two-year college graduates continued to perform better than those with a four-year degree; similarly, CTE graduates performed better than non-CTE graduates; and (e) High school graduates without occupational skills are the highest at-risk youth group. The findings suggest that some degree of youth joblessness is generated by supply dynamics such as the tendency toward a four-year degree rather than a two-year CTE program and ongoing disdain for CTE. Consistent with previous findings, this study found that labor market advantage comes from occupational skills, not length of schooling. Thus, it can be concluded that encouraging students to go to college without a specific career plan may entail an unintended consequence, chronic youth unemployment; furthermore, given the labor market shortage of technicians, CTE would be effective in preventing youth joblessness.*

### **Introduction**

Youth unemployment is becoming an increasingly troublesome issue in many parts of the world. A good example is Korea, which has experienced high rates of unemployment among young people over the past decades. The costs of high and prevailing youth unemployment vary and are reported to be harmful, or even devastating, to both the individual and the society as a whole, both psychologically and economically (Jeon, 2002a, 2002b; Kim & Yang, 2004; Lee & Chung, 2003;

O'Higgins, 1997; Passmore, 1983; Wilson, 1996). Presently, the increasing lack of job security for college-educated people has sparked heated policy debates in Korea on the value of a college degree, imposing a serious political burden on the government, a supporter of the "going-to-college" (Gray, 2000) movement under the banner of "Education for All."

Due to its political and economic significance, considerable research has been conducted to find the causes of and the remedies for persistent youth joblessness (e.g., Chae, 2001; Chung & Kim, 2005; Jeon, 2002a, Korean Prime Minister's Office [PMO], 2004; Lee, 2004, Lee & Chung, 2003; Passmore, 1982; US Vice President's Task Force on Youth Employment, 1980). The focus, however, is mainly on the demand issues of the labor market that are generally associated with economic conditions, while the supply issues have often been overlooked as major factors. Because of this tendency, the majority of policy actions have been geared to solving the problems related to demand, including job shortage. The best example may be the globally popular "active labor market policies (ALMP)" to generate more job opportunities through such programs as those that create public service jobs or subsidize private-sector employment (Auer, Efendioğlu, & Leschke, 2005; Wilensky, 1990). From the policy standpoint, however, those demand-related policies may be successful in reducing the number of the already unemployed youth, but would not be effective in preventing youth joblessness. Given that the key to the prevention of joblessness is improving employability of the individual, which greatly relies on one's education and training (Jeon, 2002a; Gray & Herr, 1998, Lee, 2004), a different approach focusing more on the workforce supply-related issues may be needed for youth unemployment problems (Lee, Ahn, & Jeon, 2001; Park, 2005).

## **Review of the Related Literature**

### **Youth Unemployment**

The term "youth unemployment" in this paper represents the number of unemployed young people aged 15 to 29 as a percentage of the total labor force, where the total labor force comprises the unemployed and the employed. Although the internationally used definition of *youth* is all persons aged between 15 and 24 – e.g., OECD (Organization for Economic Co-operation and Development) labor force statistics and the UN (United Nations) studies – most statistical reports in Korea, including the government data, use the 15- to 29-age range, taking into account the compulsory military service for men that generally takes three years or so (Lee & Chung, 2003). In accordance with the definition of Korean National Statistical Office (NSO), *unemployed young people* comprises all those who are not currently working but who made specific efforts to find employment within the four-week period. Although two options – either the one-week or four-week period – for a time period for seeking jobs are widely used in defining *unemployed person*, NSO has produced

jobless data based on four-week period criteria. The economically inactive population such as those who are preparing for work and not actively looking for jobs are not included.

## **Causes of Youth Unemployment**

**Labor Market Issues – Demand Problems.** The demand problems are generally related to the labor market situation that is tightly connected to the nation's economic conditions. Among the significant issues pertaining to the causes of high youth unemployment are the following: (a) the prolonged economic downturn that continuously weakens the fundamental employment base (Chae, 2001; Jeon, 2002a; Lee & Chung, 2003; PMO, 2004), (b) the industrial restructuring toward the knowledge-based, technology-intensive economy that enables corporations to do business with fewer workers (Kim & Yang, 2004), and (c) the recent workforce recruitment practices that prefer experienced workers to new labor market entrants in order to immediately place workers at workplaces (Jeon, 2002a; Kim & Yang, 2004). Particularly, with regard to Korean firms' employment practices, Lee and Chung (2003) note that since the 1997 national economic crisis, there has been a growing tendency for Korean firms not to view training new employees as a worthwhile investment; instead, they prefer recruiting experienced workers or outsourcing to a qualified workforce. Indeed, employment of experienced workers by the major companies has dramatically increased from 39.3% in 1997 to 81.8% in 2002, in comparison with the decreasing employment of new entrants (see Table 1). All the factors above emphasize "job shortage" as a major problem contributing to the high rate of youth joblessness.

Table 1  
*The Percentage of Employment by the Top 30 Companies by the Experience Level (%)*

	1997	1998	1999	2000	2001	2002
New entrants	60.7	45.3	27.1	21.7	21.3	18.2
Experienced workers	39.3	54.7	72.9	78.3	78.7	81.8

*Note.* The surveyed companies include the top 30 private companies, public corporate, and financial businesses in Korea. From "Employment Insurance Database," by Korean Ministry of Labor (MOL), 2004.

Little relevant research was available as to what segment of the labor force in Korea has been more negatively affected by all those job market related factors above. Nonetheless, of note, the special report of the Korean Prime Minister's Task Force on youth unemployment problems highlights the decreasing aspect of labor demands for college-educated workers, pointing out that during the past five years,

0.3 million of the so-called “decent” jobs which tend to be filled with college-educated workers have disappeared and this labor market situation is expected to continue (Kim & Yang, 2004; PMO, 2004). Taking into account the current Korean labor market situation and job prospect described above and later, one may speculate that white-collar workers without specific occupational skills are one of the most vulnerable groups in terms of job placement.

**Labor Supply Issues – Supply Problems.** Researchers and the government reports (Jeon, 2002a, 2002b; Kim & Yang, 2004; Lee, Ahn, Jeon, 2001; Lee & Chung, 2003; PMO, 2004), in general, explain two categories of workforce supply related problems: the individual and the structural problems. In regard to individual-level problems, the most frequently addressed factor is the youth labor market behavior that includes (a) reluctance of working at the small- and medium-sized businesses (SMBs), and (b) higher turnover rate due partly to a weaker sense of duty to support a family as compared with that of other age groups. Supporting this, the survey conducted by the Korea Small and Medium Business Administration points out that despite the 0.14 million job openings by SMBs in 2003, young workers, especially college-educated workers, rarely applied for jobs in SMBs. According to the report, many SMBs are suffering from severe workforce shortages and thus are forced to hire foreign-born workers or move their operations to other countries to use the cheap skilled labor available there (PMO, 2004). Another factor reported by researchers is the lack of occupational skills. Researchers (Chun & Lee, 2002) hold that this is particularly the case with general high school graduates without occupational training. On the other hand, the dramatically increasing number of college graduates appears to be the most frequently raised issue related to the structural problems (Chung & Kim, 2005; Jeon, 2002a; Kim & Yang, 2004; Lee & Chung, 2003; PMO, 2004). Emphasis, however, is placed on the quality of college graduates in terms of occupational skills, but not on the quantity, namely numbers.

The changes in the total and youth population are reported as another determinant of youth unemployment rates (Chae, 2001; Kim, 2004; Ministry of Finance and Economy [MOFE], 2005). While Kim (2004) and MOFE (2005) report that the decreasing youth population among the total population since the 1980s, coupled with the aging of the population, contributes to reducing youth unemployment rates, Chae (2001) points out that the effect of undersupply of young people on youth unemployment rates would be minimal.

### **Suggested Policy Actions and Problems**

Vast scholarly and policy attention tends to be given to the labor market problems rather than the workforce supply issues (Kim & Yang, 2004; Korean Ministry of Education [MOE], 2004; PMO, 2004). Accordingly, creation of jobs for the youth has been considered a top priority. Regarding the workforce supply issues, efforts have been made to provide training and education for the unemployed with



emphasis on the individual problems overshadowing the structural issues. The ever-growing number of college graduates appears to be taken for granted as a broader societal issue for which little can be done by policies.

From the policy point of view, however, those job market-related policies emphasizing job creation are inevitably dependent on, and thus may be vulnerable to, the economic conditions and private corporations' investments. The public sector employment is also problematic, when taking into account increased financial burden on taxpayers and the efficiency of public businesses. The policy measures to support job search and training for the unemployed would benefit those who are currently unemployed and take part in the programs. Most importantly, as will be shown later, all those policies discussed above may be effective in reducing the current unemployment rate, but may not be sufficient to prevent the chronic and structuralized youth joblessness problems. Within this context, this study addressed the workforce supply structure characterized by the massive influx of workforce with college degree and the lack of workforce with occupational skills as a major cause of chronic youth unemployment and sought to find a solution from career and technical education (CTE) as a way to enhance employability of youth and thus prevent youth unemployment.

### **Research Objectives**

The purpose of this study was to examine whether there is a systemic association between youth unemployment and the workforce supply structure. Specifically, the study investigated the following: (a) trends in the workforce supply structure and youth unemployment in Korea; (b) whether and how the workforce supply structure is related to youth unemployment in the Korean labor market; and (c) future job opportunities for CTE completers both in high school and college levels. To understand the workforce supply structure, or dynamics, and the influence of the workforce supply structure on the youth labor market, the study focus was given to educational attainment patterns of Korean youth and the relationship between type and length of education and employability in the Korean labor market.

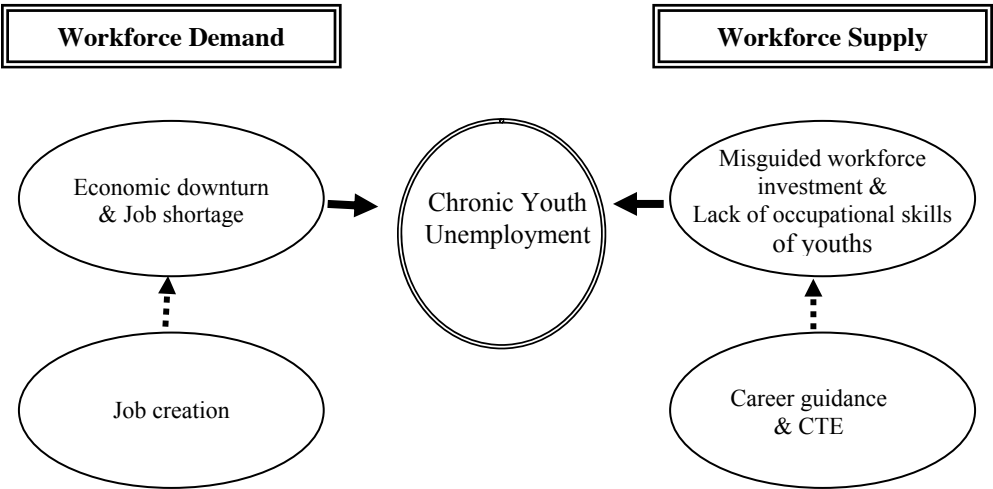
### **Conceptual Framework**

The main concept of this study was guided by the "skills-employability paradigm" (Gray & Herr, 1998, p. 9), of which the theoretical foundation can be found from the well-known "human capital development theory" (Becker, 1993). In their book *Workforce Education: The Basics*, Gray and Herr state that, historically, this worldwide conventional wisdom that job skills enhance an individual's job security has proven to be true.

With regard to the youth unemployment issue, the skills-employability paradigm suggests that solutions could be found from the workforce supply problems,

more specifically the lack of occupational skills. Figure 1 below summarizes the conceptual framework this study.

Figure 1. The causes of and the remedies for youth unemployment



Method

Data

This research involved secondary data analysis. Most data for this study were collected from various sources including official Korean Ministry of Education and Human Resources Development (MOE), Ministry of Labor (MOL), National Statistical Office (NSO) and industry sources. Specifically, the Annual Economically Active Population Survey by NSO was used to obtain national unemployment data. The workforce supply structure was analyzed by examining the Statistical Year Book on Education in Korea published yearly by Korean Education Development Institute (KEDI) and MOE. To obtain the current labor market dynamics information, the researchers employed various labor market surveys, database, official government reports and papers from research conference presentations – e.g., Yearly Labor Demand Survey by MOL, Job Shortage Survey by the Small and Medium Business Administration (SMBA), Employment Insurance Database by MOL, and Special Report on Youth Unemployment by PMO.

## **Data Analysis**

Given that the purpose of this paper is to trace trends in the workforce supply structure and explore its influence on youth unemployment, the study employed longitudinal data analysis, rather than inferential statistical testing for a given time. Specifically, comparative and descriptive data analysis was done on nationally aggregated education and jobless statistics, in addition to the current job market information.

First, national jobless data were examined to look at trends in youth unemployment in Korea. Second, longitudinal education statistics were analyzed to find educational attainment/transition patterns of Korean youth, which is used to capture the workforce supply structure. Third, to explore how educational transition patterns are related to youth unemployment, comparison was made on employment rates among four groups – general high school, CTE high school, two-year college, and four-year college graduates. Finally, to prospect future job opportunities for CTE graduates, job shortage data by education level were utilized.

## **Findings**

### **Trends in Youth Unemployment in Korea**

According to the Korean National Statistical Office, the youth jobless rate reached 7.9% in 2004, which is more than double the nation's average of 3.5%. Aside from the level of youth unemployment, a more serious problem is that it is becoming chronic and structuralized (Chung & Kim, 2005; Lee, Ahn, & Jeon, 2001; Kim & Yang, 2004). Table 2 shows that during the past five years, youth jobless rates have remained at about 7% to 8 % even though economic situations have changed every year. Of note, the youth jobless rate did not slip even when economic growth rebounded in 2002 and 2004, reflecting the so-called “downward inelasticity” of youth joblessness. Although some researchers argue that the economic growth does not necessarily lead to the decrease in unemployment – for instance, Passmore (1983) notes frictional unemployment and cyclical unemployment may be possible in a thriving economy – the stabilizing aspect of youth unemployment under the fluctuating labor market situation deserves particular attention in the context of public policy. Based on these data, it may be argued that some degree of youth joblessness is associated with the supply factors which are not necessarily linked to the economic conditions.

Table 2

*Youth Unemployment Rate and GDP Growth Rate by Year (%)*

	2000	2001	2002	2003	2004
Unemployment					
National average	4.1	3.8	3.1	3.4	3.5
Youth	7.6	7.5	6.6	7.7	7.9
GDP Growth	8.5	3.8	7.0	3.1	5.1

*Note.* From “Economically Active Population Survey,” by NSO, 2000-2004.

A second distinguishing feature of youth unemployment in Korea is the increasing unemployment among college-educated young people (Chung & Kim, 2005; Lee, Ahn, & Jeon, 2001). As shown in Table 3, during the past decade the number of jobless workers with a college degree has continued to grow – from 110,000 in 1993 to 143,000 in 2003.

Table 3

*The Number of Unemployed Young People and College Graduates by Selected Years*

	1993	1997	2000	2001	2002	2003
Total	383	322	403	388	342	383
College graduates	110	90	121	127	123	143
(%)	(28.7)	(28.0)	(30.0)	(32.7)	(36.0)	(37.3)

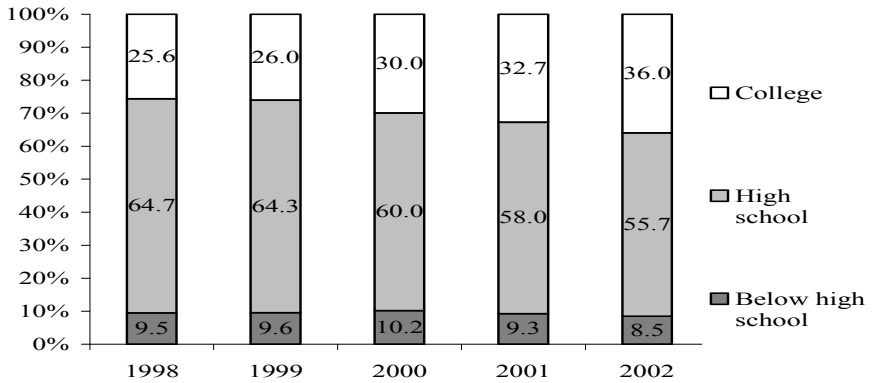
*Note.* Numbers expressed in thousands. From “Special Report on Youth Unemployment,” by PMO, 2004.

More importantly, the proportion of college graduates among all unemployed people is increasing (see Figure 2). In 2003, the unemployed college-educated young people accounted for more than one-third of the unemployed youth. In comparison, the percentage of high school graduates continues to decrease. This changing composite picture of the youth unemployment structure implies that a fundamental reconsideration is needed of the prevailing labor market misconception that a college degree is the key to employment (Gray & Herr, 2000; MOE, 2005).

Finally, the growth in joblessness of female workers with four-year college degrees is notable. According to the Samsung Economic Research Institute (SERI), one of the most respected economic research institutions in Korea, while the economic participation of the female labor force has continuously increased – from 47% in 1998 to 49.1% in 2002 – the percentage of college graduates of all unemployed female young workers is also rising – 18.9% in 1998 to 36.8% in 2003

(Lee & Chung, 2003). This aggravating employment situation for female university graduates also raises the question of how much a college diploma is valued in the labor market.

Figure 2. The youth unemployment structure by education level (1998-2002)



Note. From “Youth unemployment problems and policy measures,” by Lee, S. W., & Chung, K. T, 2003, *CEO Information (Samsung Economic Research Institute)*, p. 395.

## The Workforce Supply Structure and Youth Unemployment in Korea

The overarching assumption that youth joblessness is somehow associated with the labor supply mechanisms that are not directly determined by labor demands was partially evidenced by the data showing the “steadiness” of youth unemployment despite the fluctuating economic conditions. Accordingly, the next scholarly interest lies in the question of what mechanisms of the workforce supply structure contribute to the persistent generation of joblessness among young people. Examined in this section is the workforce supply structure in which youths’ educational transition patterns play a significant role followed by the review of aggregate employment data by education type and level. Next, the possible association between the workforce supply dynamics and youth unemployment is explored.

## Career and Technical Education

As we stated earlier, in reviewing the workforce supply structure, or dynamics, of the Korean labor market, examining educational transition patterns of young people is essential – more importantly, the key is the changes in enrollments overtime between CTE versus non-CTE institutions. The definition, and thus scope,

of CTE varies both in theory and practice. While the Korean Ministry of Education and Human Resources Development views CTE as all types of education and training that aim to enhance an individual's occupational skills and thus employability regardless of institution, this study, for simplicity, focused on the enrollments of two important CTE institutions, vocational high school and two-year college.

In Korea, vocational high schools “provide advanced general education as well as vocational training in agriculture, technology, commerce, fishery and oceanography, industry and home economics” and serve as “the major source of skilled manpower for the rapidly industrializing country” (MOE, 2003, p. 47), while general high schools comparatively emphasize academic preparation of students for college advancement. As of 2004, CTE high schools account for 34% of the total high schools (MOE, 2004). Two-year colleges are postsecondary programs which aim to produce mid-level technicians through teaching and researching technical knowledge and skills in every field of society and cultivating students' occupational talents (Lee, 2003). As of 2004, two-year college accounts for 39% of the total postsecondary institutions and 39% of students are enrolled in engineering and technology-related programs (MOE, 2004). Lee states that during the nation's rapid industrialization, Korean junior colleges have played a significant role in providing well-qualified technical manpower.

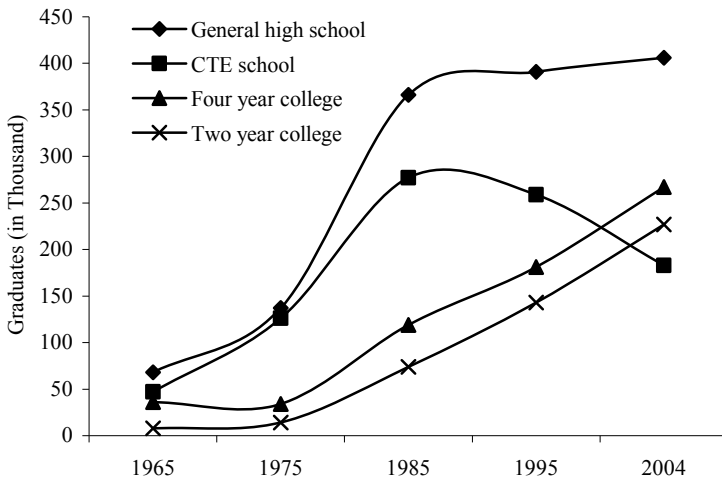
## **The Workforce Supply Structure**

Among the workforce supply issues, two factors were found to be important and influential in relation to youth unemployment problems: (a) the continuing “upward shift” in the level of education of the Korean labor force, and (b) the ongoing disdain for career and technical education. Regarding “educational upgrading” of Korean workers, notable is the rapid and continuous rise in college enrollment. National education statistics show that despite the declining student population, the number of college-educated people has increased by 2.6 times over the past two decades – from 192,511 in 1985 to 493,944 in 2004 (see Figure 3). In 2003, (a) 74.3% of high school graduates went to college – for the general high school graduates, 90.1%; for the CTE graduates, 62.3%. This remarkable growth in the higher educational enrollment is mainly due to the Korean government's aggressive support to expand educational opportunities and parents' unceasing “education fever” (Seth, 2002). This social phenomenon of the “going-to-college” syndrome again reflects the Korean society's widespread “one-way-to-win mentality” (Gray & Herr, 2000), meaning that a college degree is the key to postsecondary success, including job placement (Park, 2005).

The “ongoing disdain for CTE” is found at both the high school and college levels, but it appears to be much more serious at the high school level. During the 1965-2004 period, the number of the general high school graduates increased by 6

times, from 68,000 to 405,000. In sharp contrast, the number of CTE graduates that had increased with the educational expansion movement continued to fall after 1985. Considering the subsequent educational transition pattern, this disproportionate high school enrollment is intertwined with the Korean students' deep-rooted tendency toward a four-year degree rather than a two-year CTE program in their college choice. For instance, in 2003, 90% of the general high school graduates went to college; among them, about 70% chose the four-year college. By contrast, 57.6% of CTE graduates went to college; among them, 64.4% went to two-year colleges. As a result, four-year college graduates have always outnumbered two-year college graduates.

*Figure 3. Workforce supply structure by education level*



*Note.* From “Statistical yearbook on education in Korea,”  
by Korean Education Development Institute (KEDI)

### **Type and Length of Education and Employment**

By type of education, CTE programs are found to be more effective in promoting employability at both high school and college levels. At the high school level, 90% of the CTE completers, equipped with technical skills, have continued to be employed. Taking into account “voluntary unemployment,” this employment rate may be considered as full-employment. In sharp contrast, however, only one in five of non-CTE high school graduates have been able to find a job, suggesting that high school graduates without occupational skills are the highest at-risk youth group (see Table 4).

The same is true for the two-year college graduates to the four-year college graduates. The longitudinal employment data present that two-year college graduates continue to outperform those with a four-year degree in terms of job placement: In 2003, 79.7% of two-year college graduates were employed, while 59.2% of four-year college graduates found jobs. Based on employment statistics, researchers (Lee, 2003; Park, 2005) argue that Korean two-year colleges, especially technical colleges, have steadily and successfully provided well-qualified technician-level workers to the economy. Park states that the Korean government's policy to allow two-year colleges to become four-year colleges has contributed to increasing youth unemployment problems.

Table 4  
*Employment Rate by Education Level (%)*

	1995		2000		2001		2002		2003	
	Total	Female	Total	Female	Total	Female	Total	Female	Total	Female
High school										
General	26.4	28.5	15.5	16.8	18.9	19.4	18.1	18.5	19.1	19.1
Vocational	90.9	91.1	88.8	89.3	88.2	89.6	90.0	91.1	90.2	92.0
College										
Two year	74.2	70.9	79.4	78.2	81.0	79.8	80.7	79.2	79.7	77.7
Four year	60.9	50.0	56.0	53.4	56.7	54.1	60.7	59.1	59.2	56.7

*Note.* From “Statistical yearbook on education in Korea,” by KEDI

By length of education, the national employment statistics show that about two in five people with a four-year degree have had trouble in finding jobs, while almost all of the CTE high school completers have been employed upon graduation. Given that most teens decide to go to college with a hope to gain job security, this employment outcome is remarkably surprising. One plausible explanation for the relatively lower employment of college graduates is the impact of the dramatic educational expansion, which eventually outruns the rate of employment generation and thus causes the so-called “diploma disease” (Dore, 1976), meaning that people tend to pursue a higher level of education to compete for limited jobs with lowered “occupational currency” of a given level of education (Foster, 1977; Thurow, 1975).

Meanwhile, given the considerable underemployment of Korean young workers (Kim, 2003; Kim & Lee, 2000) and the empirical evidence of the negative impact of over-education on job satisfaction and intention to turnover in either Korean or US labor market settings (Kim, 2003; Sicherman, 1991; Tsang, Rumberger, & Levin, 1991), one may argue that the Korean underemployed college-educated workers are also vulnerable to employment instability. All this evidence suggests that the value of a college-degree in the Korean labor market is becoming



more questionable and is “being erased” as in the other advanced countries (Riccardi, 2005).

Finally, what has been discussed is equally applied to female workers (see Table 4). In particular, the employment rate gap between CTE high graduates and four-year college graduates for female workers has been greater than that for male workers. This implies that CTE programs play a greater role in promoting female young workers’ employability.

### **Future Job Opportunities by Education Level**

Due to the lack of information on projected job openings and required education by occupation, it is difficult to determine job prospects for each education group of workers. Nonetheless, the two sets of government statistics suggest insights for the future job market: (a) trends in employment by the top 30 Korean firms, and (b) job shortage for each education category.

According to data from the Korean Ministry of Labor, the top 30 Korean firms that are the biggest employers of college-educated young people have continued to reduce their employment since 1997 (see Table 5). Given such continuing decline in white-collar jobs and the increasing number of college graduates, it is reasonable to speculate that job opportunities for college-educated youths are not expected to grow dramatically. Moreover, the Korean firms’ efforts to downsize suggest little possibility of this situation changing any time soon.

Table 5  
*Employment by Top 30 Korean Firms by Year*

Year	1997	1998	1999	2000	2001	2002
Employment	939	807	762	761	708	703

*Note.* From “The Results of the 2004 Labor Demands Survey,” by MOL

To the contrary, employment opportunities for CTE program completers are predicted to grow due largely to the workforce shortage. Specifically, the 2003 Small and Medium Business Employment Survey points out that there is the greatest and growing labor shortage for the group of technicians and operators that typically require two-year college and high school level vocational education, respectively (see Table 6). Moreover, the manpower shortage in SMBs, according to the Ministry of Labor (2004), accounts for 93.6% of the total labor shortage. Reflecting this labor market situation, according to the Ministry of Education and Human Resources Development (2004), the applicants for CTE high schools outnumber available space in the 2005 school year.

Table 6  
*Job Shortage for Each Education Category in Small- and Medium-Sized Businesses*

Management /Clerical	Production				Service	Sales	Total
	Professional	Technician	Operators	Labor			
11,018	4,896	13,398	52,206	51,495	624	5,310	138,947

*Note.* “Professional,” “Technician,” and “Operators” are job categories that typically require a four-year degree or more, a two-year degree, and the high school level vocational training, respectively. From “Job Shortage Survey” by the Small and Medium Business Administration, 2003.

Meanwhile, Table 7 shows that the wage gaps between high school graduates and the other groups have continued to narrow during the past decade. Combined with the skyrocketing college tuition, this narrowing income gap leads to the declining return on investment on college education.

Table 7  
*Monthly Wage Levels by Educational Attainments*

	High school	Two-year college	Four-year college
1993	100.0	109.5	161.3
1995	100.0	108.4	155.9
1997	100.0	106.4	155.6
1999	100.0	104.7	159.5
2001	100.0	102.9	157.9
2003	100.0	101.3	155.4

*Note:* Monthly wage of high school graduates = 100.From “Survey Report on Wage Structure,” by NSO & MOL, each year.

**Conclusions and Discussion**

Reviewed in this paper were (a) the trends and distinguishing features of the workforce supply structure and youth unemployment in Korea, (b) the possible association between Korea’s youth unemployment and the dynamics of workforce supply in the Korean labor market, and (c) job opportunities for CTE completers. The association between type and length of education and employability was examined to explore whether, and how, the workforce supply structure influences youth unemployment.

Reviewing the national jobless data, the study found (a) the chronic and structural youth joblessness in conjunction with the fluctuating economic growth, (b) the increasing percentage of college graduates among all unemployed people, and (c) the declining employment of female university graduates despite the increased female working population. Analysis of the education statistics and employment data found two supply factors to contribute to high and persistent youth joblessness: (a) the continuing “upward shift” in the level of education of the Korean workforce, particularly the dramatic increase in college enrollment; and (b) the ongoing disdain for CTE at both the high school and the college levels.

Although the direct causation between those two factors and youth joblessness was not tested, findings support the assumption that some degree of youth unemployment is generated by the supply problems that are somewhat independent of the labor demands. Consistent with the previous studies pointing out that CTE is productive in job placement, this study suggests that labor market advantage comes from occupational skills, not length of schooling (Lee, 2003; MOE, 2005; Gray, 2004; Mane, 1999).

Implications are profound both in theory and practice. First, considerable public and academic attention should be paid to the fact that chronic youth joblessness is generated not only by worsening job opportunities but also by misguided workforce investment of young people fueled by the conventional misconception that a four-year degree would provide labor market advantage over specific occupational skills. Study results suggest that encouraging students to go to college without a specific career plan may entail an unintended consequence, chronic youth unemployment. From a policy standpoint, it is necessary to develop workforce education policy to help youths to have productive educational transition based on career maturity and thus to prevent pervasive youth unemployment.

Second, youth joblessness problems are a function of many interacting variables involving social, economic, and legal factors (Lee, Ahn, & Jeon, 2002a; Park, 2005; Passmore, 1982). In this regard, it is not claimed that CTE is a panacea for youth unemployment problems. It is maintained however, that CTE may be effective in preventing youth joblessness. In comparison with other groups of young people, job opportunities for CTE graduates are found to be greater. Furthermore, this is the case for both male and female workers as well as both at the high school and college level. Changing the institutionalized behavior and mindset – the “going-to-college” mentality and tendency to avoid CTE – is challenging, but not impossible. How to build the productive career guidance system is beyond the scope of this study, but it is argued that nothing can be changed when problems are taken for granted and ignored.

Third, special efforts should be made to help the highest at-risk group, those general high school graduates without specific occupational skills (Lee, 2004). Remarkably, only one in five of workers in this category have been able to find jobs. Consistent with Mane’s findings (1999), vocational education and training is found

to have a highly productive impact on job placement, especially for non-college-bound youths.

Finally, given that chronic youth unemployment has become a pressing global issue (O'Higgins, 1997), Korea's experience would provide valuable lessons for those countries to find the causes of and the solutions to youth unemployment. In particular, the findings of this study have important implications for policymakers and education leaders of the U.S. where the going-to-college mentality among teens and parents is becoming widespread (Gray, 2000).

### Limitations and Future Study

This study has several limitations. First, this current study investigated the relationship between youth unemployment and the workforce supply structure using two variables: type of education and length of education. Future study may be conducted with additional and more specific supply factors. For instance, areas of the study may be crucial in determining job placement.

Second, the main body of this study relies on descriptive statistics and focuses on longitudinal trends. Subsequent study could be conducted using more sophisticated statistical methods to measure the impact of supply factors on the degree of youth joblessness. In conjunction with aggregated data sets, individual data may be used to determine the impact of the workforce supply dynamics on youth unemployment.

Finally, results of this study may be applied to the Korean labor market. To better understand youth unemployment and contributing factors and generalize the findings, international and comparative studies on this issue are recommended.

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### **Authors**

**Sang Hoon Bae (Ph.D)** is a director in the Korean Ministry of Education and Human Resources Development, and a visiting scholar in Workforce Education and Development at Penn State, University Park.

**Ji Hoon Song** is a doctoral candidate and graduate research assistant in Workforce Education and Development at Penn State, University Park.

The authors can be reached at sanghoon\_bae@hanmail.net (Sang Hoon Bae) and jus205@psu.edu (Ji Hoon Song) or c/o The Pennsylvania State University, Workforce Education and Development, 301 Keller Building, University Park, PA 16802-1303, Phone 814-863-2596, Fax, 814-863-7532.





## **The Learning Organization Model across Vocational and Academic Teacher Groups**

**Joo Ho Park**

*South Korean Ministry of Education*

**Jay W. Rojewski**

*University of Georgia*

### **Abstract**

*Multiple-group confirmatory factor analysis was used to investigate factorial invariance between vocational and academic teacher groups on a measure of the learning organization concept. Participants were 488 full-time teachers of public trade industry-technical and business schools located within Seoul, South Korea. Statistically significant differences in factor structure, factor loadings, and factor correlations were not detected across the two teacher groups. Findings provide strong evidence that the learning organization model can be operationalized and equally applied to different teacher groups in Korean vocational high schools.*

Today, all organizations need to deal with the challenges stemming from environmental changes and major problems that confront structures, systems, and cultures. School organizations are also undergoing “a period of intense transition and transformation as we enter the global market, with global information systems and an awareness of ecological interconnectedness of all natural systems” (Diggins, 1997, p. 418). The adoption of the learning organization approach represents a positive management strategy which schools can use to successfully navigate myriad change they confront (Duffy, 1997; Fullan, 1995; Weller & Weller, 1997).

In school organizations, the decision to become a learning organization encompasses system changes including both “restructuring and reculturing” (Seller, 2001, p. 256). Weller and Weller (1997) argued that the school restructuring and reform movement, which originally started in the 1990s, has begun to reflect research findings from human resources and organizational theory, and that implementing the learning organization approach supports school efforts at achieving continuous improvement. Seller criticized existing educational research and practices because of the tendency to compartmentalize components of reform in order to control the scope. Duffy (1997) criticized major recommendations for school improvement (e.g., schools of choice, block scheduling, and teaching of ethics) because they did not consider the complexities of school systems represented by interwoven internal and external organizational environments. Fullan (1993) also argued that past school

reform efforts have failed because they did not consider the complex and intractable attributes of educational problems, as well as not addressing “fundamental instructional reform and associated development of a new collaborative culture among educators” (p. 57). This indicates that for successful school change and meaningful reform, all parts of the educational enterprise must be linked together according to a systems thinking or systemic concept.

A systemic change to schooling is understood as fundamental change in the whole educational system. It begins at the deepest level of purpose, values, beliefs about learning, and all corollary components that support student learning in schools such as curriculum, instruction, assessment, and policy (Jenlink, 1995). Major shifts in commonly held mindsets about school, schooling, and education, as well as how we approach educational change, are required. “Today piecemeal change efforts often characterized as fragmented or tinkering at the edges, have proven less than satisfactory” (p. 6). Therefore, schools need to make radical change in pedagogy (e.g., substantive changes in teaching strategies, assessment, and the teaching-learning process) to improve student achievement and meet the diverse learning needs of students.

In all advanced, as well as most developing countries, the rapid pace of change based on globalization and continuously innovating information technology is forcing educators, educational administrators, and policymakers to pay more attention to new ways of re-culturing and restructuring schools. As one approach to addressing change, research and practice on *schools as learning organizations* (e.g., Dalin, 1996; DuFour, 1997; Fullan, 1993, 1995; Keefe & Howard, 1997; Leithwood, Leonard, & Sharrat, 1998; O’Sullivan, 1997; Redding & Kamm, 1999; Senge, Cambron-McCabe, Lucas, Smith, Dutton, & Kleiner, 2000; Silins, Mulford, & Zarins, 2002; Zederayko & Ward, 1999) have increased over the last 15 years. In fact, with school reform movements focusing on reculturing and restructuring schools, many educational stakeholders advocate the concept of learning organization as a new school reform or change strategy (Fullan, 1993, 1995; Zedrayko, 2000).

Senge (1990) described a learning organization as consisting of five disciplines, including personal mastery, mental models, shared vision, team learning, and systems thinking. These five disciplines are divided into two categories according to a primary focus on individuals or groups. The first category includes personal mastery, mental models, and systems thinking which focus on individual behaviors and practices in an organization. Personal mastery is a discipline of “continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively” (p. 7). Mental models are “deeply ingrained assumptions, generations, or even pictures and images that influence how we understand the world and how we take action” (p. 8). When establishing mental models, Senge highlights that people need to maintain a balance between inquiry and advocacy, “where people expose their own thinking effectively

and make that thinking open to the influence of others” (p. 9). Systems thinking is a discipline to integrate all other disciplines and focuses on interconnectedness.

The second category includes the disciplines of shared vision and team learning, which “differ from the other three in that they are inherently collective in nature” (Senge, 1990, p. 375). Shared vision means that individual visions or goals are integrated into a shared organizational vision. Finally, team learning needs to be developed to create a learning organization. According to Senge’s argument, “unless teams can learn, the organization cannot learn” (p. 10). In spite of increased attention on the necessity and advantages of applying the learning organization concept to schools, empirical investigations to assess this phenomenon have been relatively rare (Griego & Gerory, 1999; Silins, Zarins, & Mulford, 1998; Zedrayko, 2000).

As adult learners, the two teacher groups enter the educational process and teaching context with their own educational and life experiences. Therefore, each group may function differently when learning new material, creating new concepts, and implementing new practices. Jacobs (1989) observed that some academic and vocational teachers feel highly territorial about their subjects and are threatened as new views of their subject content are promoted. Burrell (1993) found that academic teachers were more empathetic than vocational teachers toward students. In the process of developing and enacting actual reform policy to establish a comprehensive high school in Norway, Njerve and Sandvik (1997) concluded that “the lack of a parity of esteem between academic and vocational education stem from the teachers’ own attitudes towards each other as groups and towards the educational pathways that they represent” (p. 1). Little (1992) also identified differences between academic and vocational teachers’ professional identities and relationships within comprehensive high schools. Vocational teachers are often held in lower esteem by their peers and administrators. High school vocational and academic teachers often have little contact and little in common unless they serve on faculty committees or coach sports together. In addition, vocational teachers suffer from a lack of prestige and support from administrators, other teachers, students, and parents.

Further, given differences between academic and vocational teacher groups analysis provides a means of examining the validity of measurements of the learning organization concept in school organizations. Regarding application of the learning organization model, more specifically, the presence of two distinct teacher groups in vocational high school settings invokes a theoretical and practical question, *Does equivalency exist between vocational and academic teacher groups in their perceptions of the learning organization concept?*

## **Method**

### **Participants and Procedures**

Participants were 488 Korean vocational high school teachers employed by city and provincial Offices of Education during the 2005-2006 academic year. They

were selected from both full-time vocational and non-vocational (academic) teachers working in 65 public trade industry-technical and business schools located in Seoul, South Korea including the Seoul metropolitan city, Gyeonggi province, and Incheon metropolitan city. This geographic region functions as a hub in politics, the economy, social-culture matters, and education in South Korea. More than half of the total South Korean population (about 20 million people) lives within this defined area.

Lists of vocational high schools were obtained from each city and provincial Office of Education. After numbering each school, 17 (24.6%) of the 69 public vocational high schools located in Seoul were randomly selected using a random numbers table. All full-time teachers working in the selected 17 schools were included.

There were several specific activities completed to collect data. Necessary contacts with Seoul and Incheon Metropolitan Offices of Education and Gyeonggi provincial Office of Education in Korea were made to obtain permission to collect data and to assign school staff members as data collectors. One administrative staff member in each vocational high school served as a data collector. Designated staff members served in receiving, disseminating, and returning packages of survey questionnaires.

The sampling procedure resulted in a total of 976 teacher respondents, which yielded a final response rate of 71.29%. The corrected full sample ( $N=976$ ) was divided into two portions. Respondents with odd ( $n=488$ ) and even ( $n=488$ ) case numbers compassed the two groups. To avoid bias, individual cases were each coded in school sequence by using the Statistical Package for the Social Science (SPSS 12.0). Data from the group containing even case numbers ( $n=488$ ) composed the two groups. Data of odd case numbers were used for exploratory factor analysis to develop the instrument we used. The sample portion of even case numbers was used for analyses.

## Instrumentation

The Learning Organization Questionnaire for Schools (Park, 2006), which was developed to measure and evaluate the degree of the learning organization's *five disciplines* through teachers' attitudes or perceptions about educational practices and organizational behaviors, was used in the study. The Questionnaire consisted of three parts, including an introduction and instructions, demographic questions, and 35 item statements measuring beliefs or attitudes. The introduction gave participants a brief presentation of the purpose of the questionnaire and how to provide responses to its items. The demographic portion included items that would categorize respondents and school types (teaching subject, gender, age, year of teaching experience, and program of school). The final portion of the instrument included statements designed to elicit respondents' attitudes and perceptions with respect to schools as learning organizations. Items developed to reflect each construct were not randomly ordered, but sequenced to aid us in evaluating Senge's (1990) learning organization model by

identifying a theoretical index. Each item of the Questionnaire consisted of a 5-point Likert-type scale format which consisted of 1=Almost never true, 2=Usually not true, 3=Sometimes true or sometimes not true, 4=Usually true, 5=Almost always true.

Content validity of the Learning Organization Questionnaire for Schools was obtained in the English version. After creating operational definitions for each construct domain and the item pool, two procedures to determine *content validity* were used. First, the initial pool was reviewed and refined by a panel consisting of a professor and four doctoral students who were high school teachers or had teaching experience in American high schools. In the item refinement process, all initial items were reviewed for ease of understanding in the context of a school setting, consistency in wording and academic colloquialisms, and proper classification of each item into subscales. Second, the items refined by the first panel were reviewed by three scholars and expertise in learning organizations, human resource development, and social and contextual learning, respectively. These three experts separately reviewed items to ensure that (a) the meaning of each item was clearly stated and comprehensible, (b) all items appropriately reflected the intended domains, and (c) a broad perspective of the construct domain was covered. Specifically, based on the judgmental ratings of construct categories by the experts on a "content validity rating form" (Gable & Wolf, 1993, p. 99), a criterion level of unanimous agreement was employed for returning an item to a construct category. Through experts' rating procedure, final items were selected for the five constructs.

Validity for the Korean version was established through a panel review of a Korean professor and three Korean graduate students at the University of Georgia. The Korean panel indicated any words or phrases of the Korean translated items that were inappropriate or unclear compared with those of the English version. Based on their responses, the Korean version of the questionnaire was refined. The revised Korean version was then back-translated into English and compared to the English version. Most items showed similar meanings in their content between both versions.

To establish the Questionnaire's construct validity in the context of Korean vocational high schools, exploratory factor analysis (EFA) using data from 488 Korean vocational high school teachers was performed. The EFA was conducted using the methods of principal axis factoring for factor extraction and Promax of Kappa=5 for factor rotation. The EFA resulted in five distinct factors being derived from a total of 35 items. The names of the five factors coincide with the five disciplines (i.e., personal mastery, mental models, shared vision, team learning, and systems thinking) coined by Senge (1990). Table 1 shows the five sub-scales and item statements that were established from results of the EFA.

Reliability (alpha) coefficients for the five factors derived by EFA ranged from .856 to .897, with an overall internal consistency value for all 35 items equal to .954. The internal consistency of all subscales was considerably higher than the minimum level of .70 recommended by Nunnally (1978). This result showed that

questionnaire items could be responded to by a large sample of respondents without incurring problems.

Table 1. *The Five Learning Organization Subscales and Items*

Subscale	Item	Item statement
Personal mastery	P1	Our teachers at the school engage in continuous learning and reflection activities to achieve personal growth
	P2	Our teachers continually work to clarify their professional goals.
	P3	Our teachers view the current reality more clearly in terms of targeting their career goals.
	P4	Our teachers have learning opportunities in their teaching or other professional work
	P5	At the school, our teachers continually learn to bridge the gap between their current reality and the desired future
	P6	Our teachers strive to supplement their lack of skills and knowledge in their teaching and subject area.
Mental models	M7	Our teachers often reflect on assumptions of school activities with each other to ensure they are in line with educational principles.
	M8	Our teachers inquire about the appropriateness of their own course or program with respect to the goals of schooling.
	M9	Our teachers learn and change as a result of students' reactions during teaching.
	M10	Our teachers change their own pattern or unique teaching style to implement new approaches.
	M11	Our teachers and colleagues actively explore their assumptions and ideas with each other about educational practices.
	M12	Our teachers often use the significant events of classrooms to think about their beliefs of education and educational practices.
	M13	Our teachers are very aware of how their beliefs and assumptions affect their educational practices.
	M14	Our teachers can effectively explain their assumptions underlying their reasoning.
Shared vision	V15	Our teachers and staff together build the school's vision and goals.
	V16	Our teachers develop their personal goals to align with the whole school vision or goals.
	V17	Our teachers align personal class or teaching goals with the school vision and goals.
	V18	Our teachers feel comfortable in sharing ideas with other

		teachers about the school vision.
	V19	Our teachers are committed to a shared vision for the future of our school.
	V20	Our teachers agree on principles necessary to achieve school vision.
	V21	When changing educational practices, our teachers consider the impact on the school vision and goals.
Team Learning	T22	Our teachers feel free to ask questions of other teachers or staff regardless of gender, age, and professional status at the school.
	T23	In our school, group or team activities are used in teacher professional development activities.
	T24	Our teachers are treated equally in team or committee activities.
	T25	Our teachers share information across course subjects and grade levels with other colleagues.
	T26	Our teachers believe that sharing information or knowledge through team activities is useful for solving complex schooling problems.
	T27	Our teachers respect other colleague's ideas and opinions by viewing them from their colleague's perspective.
	T28	Our teachers participate in open and honest conversations to share their educational best practices.
Systems thinking	S29	When developing lesson plans, our teachers consider the different needs and abilities of students.
	S30	When changing educational practices, our teachers consider the impact on their results to the inside and outside of the school.
	S31	When dealing with a student discipline problem, our teachers consider the impact on other teachers.
	S32	At the school, our teachers regard educational issues as a continual process rather than with a snapshot or event.
	S33	Our teachers attentively link the current schooling with students' career pathways.
	S34	When changing and creating school rules, consistency with the policy of the governments and educational Acts is considered.
	S35	Our teachers consider the effect on students when dealing with school challenges.

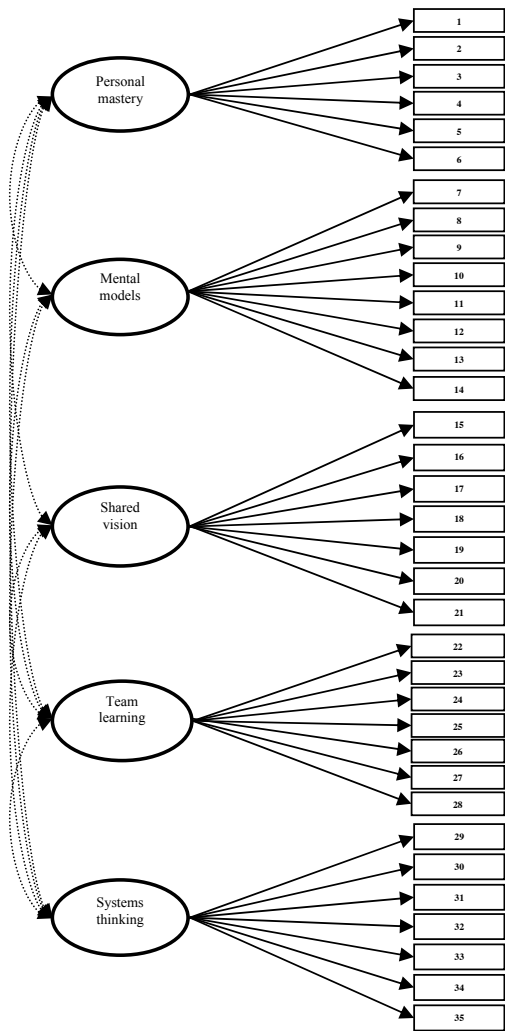
*Note.* P=Personal mastery; M=Mental models; V=Shared vision; T=Team learning; S=Systems thinking.

Analysis and Results

Using techniques of multi-group CFA with LISREL 8.3 (Jöreskog & Sörbom, 1996), we estimated the hypothesized model to examine the equivalency of the factor structure and loadings across two different teacher groups (vocational and academic) in Korean vocational high schools. The hypothesized test model in the multigroup CFAs comprised five latent factors and 35 observed variables (see Figure 1).

In multi-group CFAs, factorial invariance tests across multiple groups are often conducted in a hierarchical fashion that consists of subsequent procedures (Vandenberg & Lance, 2000). Factor structure and factor loadings invariance tests

Figure 1. The hypothesized model for multi-group CFAs.





were required. However, in this study, the multi-group CFAs included the four factorial invariant model tests to explore the overall factorial invariance for the two teacher groups. Invariance of factor structure implies that the same items load on the same factors, the same factors are correlated, and the same structure holds for the measurement error variance across groups. The test to examine invariance of factor structure is called a *test of configural invariance*. Invariance of factor loadings means that the value of factor loadings must be the same for all groups in terms of statistical meaning. An invariant test of factor covariance determines whether factor covariances are the same for all groups, in addition to invariance of the factor structure and factor loadings. The common procedure for invariant tests involves conducting an initial run of multi-group CFAs in which the only invariance constraint imposed is that the same parameters must exist for all groups. Subsequent runs add more and more invariance constraints. Consequently, a series of nested models can be tested against each other, using the chi-square difference test.

### Demographic Variables and Descriptive Statistics

Table 2 presents characteristics of the 488 participants used in the multi-group CFAs. The two teacher groups differed overall on some demographic measures. In the vocational teacher group, 66.1% were male, whereas 63.3% of academic teachers were female. In the academic group, 61.2% of teachers were less than 40 years old, compared to only 36.6% of vocational teachers. The vocational teacher group had a mean age of 41.62 (SD=8.475), whereas the academic teacher group had a mean age of 37.47 (SD=8.709). Teachers with 16 years or more of experience exceeded 50.7% in the vocational group, but only 37.3% of the academic group. Vocational teachers reported a mean of 15.19 years (SD=8.583) in teaching experience. Academic teachers had a mean of 11.94 (SD=9.329 years). A total of 55.5% of vocational teachers and 39.3% of academic teachers worked for trade-industry and technical schools. About 43% of the academic teacher group worked for business high schools.

Table 2. *Demographic Variables for Two Teacher Groups*

Variable	Category	Type of teacher			
		Vocational <sup>a</sup>		Academic <sup>b</sup>	
		<i>n</i>	%	<i>n</i>	%
Gender	Male	193	66.1	72	36.7
	Female	99	33.9	124	63.3
Age	Less than 29 years	33	11.3	40	20.8
	30-39 years	74	25.3	78	40.7
	40-49 years	155	53.1	55	28.6
	More than 50 years	30	9.9	21	10.3
	Missing	—	—	2	—

Table 2 (continued). *Demographic Variables for Two Teacher Groups*

Variable	Category	Type of teacher			
		Vocational <sup>a</sup>		Academic <sup>b</sup>	
		<i>n</i>	%	<i>n</i>	%
Teaching experience	Less than 5 year	55	19.0	68	35.2
	6-15 years	88	30.3	53	27.5
	16-25 years	117	40.4	54	28.0
	More than 26 years	30	10.3	18	9.3
	Missing	2	—	3	—
School/program type	Trade-industry / technical	162	55.5	77	39.3
	Business	103	35.3	84	42.9
	Comprehensive vocational	27	9.2	35	17.9

Note. <sup>a</sup>n=292. <sup>b</sup>n=196.

Table 3 shows the means and standard deviations of the 35 items for the two teacher groups. Korean vocational school teachers held relatively high mean scores on the five subscales. Considering each item was measured using a 5-point Likert-type scale, Korean vocational teachers’ responses were positive.

Table 3. *Items for Vocational and Academic Teacher Groups*

Item	Vocational teachers		Academic teachers	
	Mean	SD	Mean	SD
1p	3.95	.725	3.93	.691
2p	3.93	.697	3.90	.713
3p	3.68	.755	3.63	.757
4p	3.86	.749	3.79	.725
5p	3.93	.736	3.76	.678
6p	4.09	.700	4.01	.698
7m	3.55	.813	3.62	.829
8m	3.64	.780	3.66	.758
9m	3.78	.776	3.89	.733
10m	3.54	.761	3.55	.725
11m	3.66	.781	3.54	.819
12m	3.53	.788	3.62	.798
13m	3.77	.716	3.80	.810
14m	3.54	.724	3.47	.754

Table 3 (continued). *Items for Vocational and Academic Teacher Groups*

Item	Vocational teachers		Academic teachers	
	Mean	SD	Mean	SD
15v	3.30	.848	3.11	.943
16v	3.44	.791	3.22	.877
17v	3.36	.768	3.27	.817
18v	3.40	.825	3.32	.896
19v	3.32	.784	3.20	.898
20v	3.50	.744	3.40	.863
21v	3.53	.724	3.49	.807
22t	3.47	.879	3.53	.984
23t	3.35	.796	3.19	.935
24t	3.41	.806	3.20	.981
25t	3.50	.748	3.46	.896
26t	3.60	.723	3.63	.810
27t	3.67	.704	3.63	.750
28t	3.47	.775	3.52	.826
29s	3.65	.751	3.67	.768
30s	3.66	.708	3.56	.824
31s	3.68	.767	3.68	.813
32s	3.79	.728	3.80	.691
33s	3.80	.813	3.77	.825
34s	3.71	.728	3.62	.889
35s	3.99	.760	3.96	.803

*Note.* Items 1p-6p measure personal mastery. Items 7m-14m measure mental models. Items 15v-21v measure shared vision. Items 22t-28t measure team learning. Items 29s-35s measure systems thinking.

### **Preliminary Analysis**

Before conducting the multi-group CFAs to test the measurement model, some preliminary analyses were conducted. Values for skewness and kurtosis were examined as part of a data screen process to check the distribution of scores, and were all less than |2.0|. As a general rule of thumb, unless the skewness value for any item is greater than |2.0| or kurtosis is greater than |7.0|, the item is not seriously nonnormally distributed (Fabrigar, Wegener, MacCallum, & Strahan, 1999).

Considering this rule, there were no items found to be nonnormally distributed. The multivariate normality test was conducted using PRELIS 2.53, with a relative multivariate kurtosis value of 1.112. This result indicated there were no serious deviations from multivariate normality. It also verified the appropriateness of maximum-likelihood estimation used in this study (Bandalos, Finney, & Geske, 2003).

To check for outliers, the dataset was screened using *normtest macro* developed by DeCarlo (1997) via SPSS 12.0. DeCarlo's *normtest* identified five outliers (Cases 261, 405, 156, 292, 464) with  $F$  values bigger than critical  $F$  values (critical  $F_{(.05/n)} (df=41, 446)=79.77$ ; critical  $F_{(.01/n)} (df=41, 446)=84.73$ ). The five cases had considerably large  $F$  values of 140.13, 134.71, 127.15, 118.55, and 116.37, respectively. These five outliers were significant at both .05 and .01 levels. These five outliers were not included in our analyses because a few model fit indexes (e.g., Comparative Fit Index, Incremental Fit Index) are slightly different when outliers are included. A final screening procedure to check for missing data did not detect any missing values for variables.

CFA, including multi-group CFA, generally requires an assumption of the non-existence of collinearity among variables. Collinearity exists when "absolute values of one or more of the zero-order correlation coefficients between independent variables are relatively high, say .70 or larger" (Mueller, 1996, p. 21). Inspection of the correlation matrix showed no correlation coefficients larger than .70. Therefore, the problem of collinearity did not exist.

### **Factorial Invariant Tests of Hypothesized Model**

To test factorial invariance, the initial step involved examining separate covariance matrices for the two teacher groups, using PRELIS 2.53. Then, four multi-group CFAs were conducted in a hierarchical procedure. In each multi-group CFA, the metric of the factors was established by setting the loading of one variable from each factor to a value of 1. Setting the factor variance to a value of 1 was avoided because factor variances were not assumed to be identical across groups. The variables set to a value of 1 were Items 2p, 11m, 15v, 25t, and 32s. These items were selected because they each had the highest loading values in the five factors identified by the exploratory factor analysis to develop the Questionnaire (see Park, 2006) used in the study.

The initial multi-group CFA was run on the *invariant tests of factor structure* across the two different teacher groups. Then, three subsequent invariant tests from *invariance of factor loadings* to *invariance of factor variances* were computed. Subsequent runs imposed increasingly restrictive constraints across the two teacher groups, and incorporated into the LISREL syntaxes (see Appendix A). As an initial step, the *invariant test of factor structure*, referred to as *tests of configural invariance* (Vandenberg & Lance, 2000), included the following specifications: (a) the same numbers and patterns of both factors and their loadings were freely estimated factor loadings for each teacher group, (b) factor variances and correlations were freely estimated and allowed to be heterogeneous across the two teacher groups, and (c) the

error variances of all items were freely estimated and allowed to be heterogeneous across the two teacher groups. The second step in the analysis tested the *invariance of factor loadings*. The factor loadings of all items were constrained to be equal across the two teacher groups, whereas the error variances for all items, factor variances, and factor correlations were freely estimated and allowed to be heterogeneous across the two teacher groups. The third step, the *invariant test of measurement errors*, tested the invariance of factor loadings and measurement error variances. In this step, as additional constraints, the factor loadings and error variances for all items were held to the same values across the two teacher groups, whereas factor variances and factor correlations were freely estimated and allowed to be heterogeneous across the two teacher groups. The fourth step, the *invariant test of factor variances*, tested invariance of factor loadings, measurement error variances, and factor variances. In this test design, the factor loadings and error variances for all items, as well as factor variances were additional invariance constraints. Thus, they were held equal across the teacher groups. Only the parameter of factor correlations in the fourth test design was freely estimated and allowed to be heterogeneous across the two teacher groups. Table 4 shows results of these four invariant tests which were all designed to examine factorial invariance across academic and vocational teacher groups.

Table 4. *Results of Factorial Invariant Tests across the Vocational and Academic Teacher Groups*

Tested model	$\chi^2$ (df)	$\chi^2/df$	$\Delta\chi^2$ ( $\Delta df$ )	SRMR	RMSEA	NNFI	CFI
Invariant test of factor structure	2127.23* (1111)	1.92		.070	.061	.97	.97
Invariant test of factor loadings	2152.36* (1141)	1.89	25.13 (30)	.086	.060	.97	.97
Invariant test of measurement errors	2201.90* (1176)	1.87	49.54 (35)	.090	.061	.97	.97
Invariant test of factor variances	2201.90* (1176)	1.87	0.0 (0.0)	.090	.061	.97	.97

Note.  $\chi^2$  difference tests were conducted between each subsequent test and the previous test. \* $p < .01$

No index of model fit is generally accepted as superior to the others, so several fit indexes are needed to ensure that multiple aspects of model fit can be captured (Hu & Bentler, 1995). Accordingly, indices for evaluating the overall model fit

included the chi-square ( $\chi^2$ ), SRMR, RMSEA, NNFI, and CFI based on the related literature (e.g., Gable & Wolf, 1993; Hoyle & Panter, 1995; Hu & Bentler, 1998; Vandenberg & Lance, 2000; see Table 4).

Although all values of SRMR were moderately high, they did not exceed the cut-off value of .10 or less recommended by Kline (1998). The values of RMSEA in the five invariant tests were less than .061. Compared to a cutoff value close to .06 cited by Hu and Bentler (1998), or a cutoff value of less than .08 recommended by Vandenberg and Lance (2000), these values are acceptable and indicate well-fitting models. The values of NNFI and CFI were .97 in all test models and indicate reasonable model fit. Consequently, results of the good fit indices indicated that the hypothesized learning organization models to test factorial invariance should not be rejected. Thus, the four parameters (factor structure, factor loadings, measurement error variances, and factor variances) were equivalent across the vocational and academic teacher groups in Korean vocational public high schools.

In addition to evaluating overall model fit, differences in chi-square values were examined to determine the invariance of related parameters across the two teacher groups from the four subsequent invariance tests (Cheung & Rensvold, 1999, 2000; Vandenberg & Lance, 2000). As an assessment of invariance constraints in factorial invariant tests, the most frequently used approach for testing the difference between any two adjacent test models is the chi-square difference test (Vandenberg & Lance). In this study, the invariance in the model of each subsequent test was determined by examining whether adding invariance constraints to the model resulted in a statistically significant increase in the chi-square statistic between any two adjacent test steps. For example, a statistically significant difference in the chi-square statistic between the invariant test of factor structure and the invariant test of factor loadings indicates that at least one of the factor loadings has significantly different values for the two teacher groups. Similarly, a significant increase of the chi-square statistic from the invariant test of factor loadings to the invariant test of measurement error may lead to a conclusion that at least one of the error variances for each item is significantly different across the two teacher groups. Tests of  $\chi^2$  differences between adjacent models were not all statistically significant at the .01 level (see Table 4).

These results strongly support a finding of no statistical differences between the invariance test models. Conversely, adding the invariance constraints imposed by each subsequent test model did not produce a significantly poorer model fit compared to the test models with fewer constraints. This indicated that the factor structure, factor loadings, error variances, and factor variances are not significantly different across the two teacher groups.

Additionally, the change of CFI statistics between the invariance test models was examined as a criterion of factorial invariance. Regarding the factorial invariance tests, Cheung and Rensvold (1999) argued that changes in CFI of -.01 or less indicate that the invariance hypothesis should not be rejected, but when

differences lie between -.01 and -.02, the existence of differences between groups should be suspected. Distinct differences between invariant test models exist when the change of CFI values are greater than -.02. Data in Table 4 reveals that CFI values between the four invariant test models are consistently at .97. The consistency of CFI values between the models supported the factorial invariance of the hypothesized models across teacher groups. Specifically, the consistency of CFI values offers additional evidence that the factor structure, factor loadings, measurement error variances, and factor variances were not significantly different across the two teacher groups.

It should be noted that the factorial invariance that resulted from these tests was determined on an entire set of parameters such as all factor loadings or measurement errors of all items. For example, in this study, the invariance test of factor loadings revealed the equivalency of factor loading values across the two teacher groups. However, the loading values on each item and some parameters, which were produced from the invariance test of factor loadings, were not the same between the two groups, although they were very similar (see Table 5).

*Table 5. Item Loadings, t-values, and R<sup>2</sup> of Vocational and Academic Teachers*

Item	Vocational teacher group		Academic teacher group	
	Loading (t) value	R <sup>2</sup>	Loading (t) value	R <sup>2</sup>
1p	0.73 (15.98)	0.53	0.76 (15.98)	0.57
2p	0.75	0.56	0.77	0.59
3p	0.66 (14.00)	0.43	0.65 (14.00)	0.42
4p	0.65 (14.01)	0.42	0.66 (14.01)	0.44
5p	0.72 (15.86)	0.51	0.76 (15.86)	0.57
6p	0.77 (16.49)	0.59	0.75 (16.49)	0.56
7m	0.64 (12.30)	0.41	0.61 (12.30)	0.38
8m	0.73 (13.96)	0.53	0.73 (13.96)	0.53
9m	0.57 (11.40)	0.33	0.58 (11.40)	0.34
10m	0.55 (11.06)	0.31	0.57 (11.06)	0.32
11m	0.68	0.46	0.64	0.41
12m	0.71 (13.71)	0.51	0.71 (13.71)	0.51
13m	0.63 (12.06)	0.40	0.59 (12.06)	0.35
14m	0.66 (12.50)	0.43	0.61 (12.50)	0.37

Table 5 (continued). *Item Loadings, t-values, and R<sup>2</sup> of Vocational and Academic Teachers*

Item	Vocational teacher group		Academic teacher group	
	Loading (t) value	R <sup>2</sup>	Loading (t) value	R <sup>2</sup>
15v	0.71	0.50	0.70	0.49
16v	0.75 (15.19)	0.56	0.71 (15.19)	0.51
17v	0.75 (15.85)	0.56	0.80 (15.85)	0.63
18v	0.75 (15.45)	0.57	0.74 (15.45)	0.55
19v	0.75 (15.61)	0.56	0.76 (15.61)	0.58
20v	0.75 (15.30)	0.56	0.72 (15.30)	0.52
21v	0.76 (15.30)	0.57	0.71 (15.30)	0.50
22t	0.56 (11.20)	0.32	0.55 (11.20)	0.30
23t	0.65 (12.69)	0.42	0.61 (12.69)	0.38
24t	0.69 (13.60)	0.48	0.67 (13.60)	0.45
25t	0.70	0.48	0.68	0.47
26t	0.74 (14.45)	0.55	0.72 (14.45)	0.51
27t	0.73 (14.14)	0.53	0.69 (14.14)	0.48
28t	0.71 (14.05)	0.50	0.71 (14.05)	0.50
29s	0.67 (13.58)	0.45	0.67 (13.58)	0.45
30s	0.76 (14.85)	0.58	0.69 (14.85)	0.48
31s	0.64 (12.61)	0.40	0.60 (12.61)	0.36
32s	0.70	0.48	0.71	0.50
33s	0.72 (14.57)	0.52	0.73 (14.57)	0.53
34s	0.69 (13.48)	0.48	0.62 (13.48)	0.38
35s	0.72 (14.45)	0.52	0.71 (14.45)	0.51

*Note.* Standardized loading values were used. \* $p < .05$ . An absolute  $t$ -value of greater than or equal to 2.0 was the cut-off value used to determine statistical significance.

The overall goodness-of-fit indexes, the nonsignificant statistical difference of  $\chi^2$  between adjacent invariant models, and a consistent value of CFI, supported inferences of factorial invariance in the learning organization measures across the two teacher groups. Vocational and academic teacher groups in Korean vocational high schools were invariant or equivalent with respect to the parameters (factor structure, factor loadings measurement error, and factor variance) on which constraints were imposed. Therefore, in measuring the learning organization model



suggested by Senge (1990), we conclude that there were no statistically significant differences in factor structure, factor loadings, and factor correlations between academic and vocational teachers in Korean vocational high school contexts.

### **Discussion and Implications**

In this study, the multi-group CFA referred to the factorial invariance tests that examined how generalizable the hypothesized learning organization model was for the two Korean teacher groups. Results of the four invariant tests produced reasonable fit between the model and data. Further, the overall model fit of each invariant test reflected the significant role of each factor in appraising the test for invariance across groups (Vandenberg & Lance, 2000). The four factorial invariant tests indicate that the factor structure, loadings, and all other parameters underlying the set of questions used to measure learning organization were equivalent between Korean vocational and academic high school teachers. Thus, a measurement model for learning organization is plausible across the two groups. In terms of a practical implication, using a measurement model for these two groups can be less intricate, and it is not problematic regarding validity of measuring the learning organization.

Results provide evidence that the five disciplines of Senge's (1990) learning organization theory can be operationalized and equally applied in the two distinct Korean teacher groups. More specifically, results provide evidence that Senge's five disciplines of the learning organization model provide the same understanding and meaning for both Korean teacher groups. In terms of learning organization theory, the presence of factorial invariance means that the same items loaded on the same factors, and that the same factor structure held across groups. Importantly, results of the four invariance tests verify the generalizability of Senge's theory of learning organization as a manifestation of five factors in Korean vocational high schools.

Use of the multi-group CFA and examination of invariance tests of the factor structure and loadings for the two teacher groups clearly demonstrated the validity of the instrument for measuring the learning organization model. If non-factorial invariance was detected, we would have concluded that the instrument was measuring the construct differently for different groups in the same population, or that the construct did not exist in the same form for all groups. This, however, was not the case. Differences in the factor structure or factor loadings might have resulted if indices (i.e., questionnaire items) for the learning organization model had different relevance or meaning to the different teacher groups. This is an issue of validity in that constructs underlying the learning organization model are, to some degree, not the same for everyone in the population. Ultimately, in this study, evidence of factorial invariance across the two groups, each with some common and some critically different characteristics and professional experiences, provides empirical support for the construct validity of the measurement model to adequately describe (and of the instrument to measure) the theory of learning organization.

The effort to improve educational quality or reform schooling has been a key agenda to many educators and school administrators in both the U.S. and Korea as the education authority of these and other countries continue to push for improvement in school performance. Application of the learning organization concept to schools has been considered as a strategy to address the failure of education and school reforms to improve school performance, often measured by student academic achievement (Duffy, 1997; Fullan, 1995; Hannay, Erb, & Ross, 2001; Seller, 2001). Also, theoretically, the need for empirical research on the theory of learning organization as a measurement issue has been established (Griego & Gerory, 1999; Moilanen, 2001; Silins et al., 1998; Yang, Watkins, & Marsick, 1998; Zedrayke, 2000). This study was a first step toward an empirical test of the learning organization model promoted by Senge's (1990) five disciplines in vocational public high schools by analyzing the perceptions of two different teacher groups. Ultimately, this study may provide substantial clues in both practice and theory for developing a school change policy and for building learning organizations in educational settings.

Actually, many schools of the United States have followed the disciplines and guides offered by the learning organization model in developing their organizations (Wyckoff, 1998). It also seems that applying the learning organization concept to Korean schools, specifically vocational high schools, is essential to comprehensively deal with current organizational problems such as the explosive increase in vocational student advancement to higher education, the existence of severe stigma on the education received from vocational high schools, and dramatic decreases in student enrollment to vocational high schools. In a similar vein, the Korea Research Institute for Vocational Education and Training (2000) reported that systemic changes to secondary vocational education in South Korea are needed in the areas of program types, curriculum, and career opportunities in accordance with changes in the nature of work, continuing education, and a decline of the school-age population. In this situation, we tested the learning organization model across the two different teacher groups in Korean vocational high schools. Results demonstrate that the concept of learning organizations is applicable to both groups of Korean vocational high school teachers.

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## Appendix A

### LISREL syntax for factorial invariance tests

#### 1. Invariant test of factor structure

observed variables

p1 p2 p3 p4 p5 p6 m7 m8 m9 m10 m11 m12 m13 m14 v15 v16 v17 v18 v19 v20  
v21 t22 t23 t24 t25 t26 t27 t28 s29 s30 s31 s32 s33 s34 s35

covariance matrix from file: voc.cov

sample size 290

latent variables: PM MM SV TL ST LO

relationships:

$v15 = 1 * SV$

$v16 v17 v18 v19 v20 v21 = SV$

$p2 = 1 * PM$

$p1 p3 p4 p5 p6 = PM$

$t25 = 1 * TL$

$t22 t23 t24 t26 t27 t28 = TL$

$m11 = 1 * MM$

$m7 m8 m9 m10 m12 m13 m14 = MM$

$s32 = 1 * ST$

$s29 s30 s31 s33 s34 s35 = ST$

options mi

group 2: Academic

covariance matrix from file: aca.cov

sample size 193

latent variables: PM MM SV TL ST LO

relationships:

$v15 = 1 * SV$

$v16 v17 v18 v19 v20 v21 = SV$

$p2 = 1 * PM$

$p1 p3 p4 p5 p6 = PM$

$t25 = 1 * TL$

$t22 t23 t24 t26 t27 t28 = TL$

$m11 = 1 * MM$

m7 m8 m9 m10 m12 m13 m14 = MM

s32 = 1\*ST

s29 s30 s31 s33 s34 s35 = ST

set the error variances of p1 – s35 free

set the correlations of PM MM SV TL ST free

set the variances of PM MM SV TL ST free

options mi sc

## **2. Invariant test of factor loadings**

observed variables

p1 p2 p3 p4 p5 p6 m7 m8 m9 m10 m11 m12 m13 m14 v15 v16 v17 v18 v19 v20  
v21 t22 t23 t24 t25 t26 t27 t28 s29 s30 s31 s32 s33 s34 s35

covariance matrix from file: voc.cov

sample size 290

latent variables: PM MM SV TL ST LO

relationships:

v15 = 1\* SV

v16 v17 v18 v19 v20 v21 = SV

p2 = 1\*PM

p1 p3 p4 p5 p6 = PM

t25 = 1\*TL

t22 t23 t24 t26 t27 t28 = TL

m11 = 1\*MM

m7 m8 m9 m10 m12 m13 m14 = MM

s32 = 1\*ST

s29 s30 s31 s33 s34 s35 = ST

options mi

group 2: Academic

covariance matrix from file: aca.cov

sample size 193

latent variables: PM MM SV TL ST LO

relationships:

!v15 = 1\* SV

!v16 v17 v18 v19 v20 v21 = SV

!p2 = 1\*PM

!p1 p3 p4 p5 p6 = PM

!t25 = 1\*TL

!t22 t23 t24 t26 t27 t28 = TL

!m11 = 1\*MM

!m7 m8 m9 m10 m12 m13 m14 = MM

!s32 = 1\*ST

!s29 s30 s31 s33 s34 s35 = ST

set the error variances of p1 – s35 free

set the correlations of PM MM SV TL ST free

set the variances of PM MM SV TL ST free

options mi sc

### **3. Invariant test of measurement error**

observed variables

p1 p2 p3 p4 p5 p6 m7 m8 m9 m10 m11 m12 m13 m14 v15 v16 v17 v18 v19 v20  
v21

t22 t23 t24 t25 t26 t27 t28 s29 s30 s31 s32 s33 s34 s35

covariance matrix from file: voc.cov

sample size 290

latent variables: PM MM SV TL ST LO

relationships:

v15 = 1\* SV

v16 v17 v18 v19 v20 v21 = SV

p2 = 1\*PM

p1 p3 p4 p5 p6 = PM

t25 = 1\*TL

t22 t23 t24 t26 t27 t28 = TL

m11 = 1\*MM

m7 m8 m9 m10 m12 m13 m14 = MM

s32 = 1\*ST

s29 s30 s31 s33 s34 s35 = ST

options mi



group 2: Academic  
covariance matrix from file: aca.cov  
sample size 193  
latent variables: PM MM SV TL ST LO  
relationships:  
!v15 = 1\* SV  
!v16 v17 v18 v19 v20 v21 = SV  
!p2 = 1\*PM  
!p1 p3 p4 p5 p6 = PM  
!t25 = 1\*TL  
!t22 t23 t24 t26 t27 t28 = TL  
!m11 = 1\*MM  
!m7 m8 m9 m10 m12 m13 m14 = MM  
!s32 = 1\*ST  
!s29 s30 s31 s33 s34 s35 = ST

!set the error variances of p1 – s35 free  
set the correlations of PM MM SV TL ST free  
set the variances of PM MM SV TL ST free  
options mi sc

#### **4. Invariant test of factor variance**

observed variables  
p1 p2 p3 p4 p5 p6 m7 m8 m9 m10 m11 m12 m13 m14 v15 v16 v17 v18 v19 v20  
v21  
t22 t23 t24 t25 t26 t27 t28 s29 s30 s31 s32 s33 s34 s35  
covariance matrix from file: voc.cov  
sample size 290  
latent variables: PM MM SV TL ST LO  
relationships:  
v15 = 1\* SV  
v16 v17 v18 v19 v20 v21 = SV  
p2 = 1\*PM  
p1 p3 p4 p5 p6 = PM

$$t25 = 1*TL$$

$$t22\ t23\ t24\ t26\ t27\ t28 = TL$$

$$m11 = 1*MM$$

$$m7\ m8\ m9\ m10\ m12\ m13\ m14 = MM$$

$$s32 = 1*ST$$

$$s29\ s30\ s31\ s33\ s34\ s35 = ST$$

options mi

group 2: Academic

covariance matrix from file: aca.cov

sample size 193

latent variables: PM MM SV TL ST LO

relationships:

$$!v15 = 1* SV$$

$$!v16\ v17\ v18\ v19\ v20\ v21 = SV$$

$$!p2 = 1*PM$$

$$!p1\ p3\ p4\ p5\ p6 = PM$$

$$!t25 = 1*TL$$

$$!t22\ t23\ t24\ t26\ t27\ t28 = TL$$

$$!m11 = 1*MM$$

$$!m7\ m8\ m9\ m10\ m12\ m13\ m14 = MM$$

$$!s32 = 1*ST$$

$$!s29\ s30\ s31\ s33\ s34\ s35 = ST$$

!set the error variances of p1 – s35 free

set the correlations of PM MM SV TL ST free

!set the variances of PM MM SV TL ST free

options mi sc

**“Goin’ Somewhere”:  
How Career Technical Education Programs Support and Constrain  
Urban Youths’ Career Decision-Making**

**Amy E. Ryken**

*University of Puget Sound*

**Abstract**

*This study analyzes urban youths’ career decision-making in a career and technical education program that provided work-based learning experiences and a pathway linking high school, community college, and work in biotechnology laboratories. The program provided work experiences not generally available to adolescents, and enabled students underrepresented in the sciences to experience and envision a scientific career. Case studies reveal tensions in students’ career decision-making as they gained knowledge/skills and kept career and educational options open; students saw increasing options for their future and the limits of program experiences. Students should be supported to take on active roles and to shape educational and career programs to fit their unique goals.*

New vocational education works to balance the tension between providing students with job-specific experiences while also exposing them to the breadth of options in the field (Grubb, 1996). Balancing this tension is a significant challenge, as evidence has shown that skills learned in internships are often not integrated with a broader sense of work organization or an occupation (Bailey, Hughes, & Moore, 2004). In this paper, the analysis of a best practice biotechnology-focused career and technical education (CTE) program reveals how one program balances the tension between providing broad options versus specific training.

**Aligning Educational and Occupational Goals**

Researchers have suggested that CTE reforms can lead to changes in pedagogy and content (Bailey et al., 2004; Grubb 1996; Urquiola, Stern, Horn, Dornsife, Chi, Williams, Merritt, Hughes, & Bailey, 1997). Students who have participated in programs that link high school, college and work have the opportunity to participate in a community of practice, where instruction is personalized through sustained, caring interactions with peers, teachers, and employers. In addition, students who have been engaged in active pedagogy with hands-on experiences in labs and classes can apply school learning to work site responsibilities (Crain, Allen, Thaler, Sullivan, Zellman, Warren Little, & Quigley, 1999; Grubb, Badway, Bell, Kraskouskas, 1996;

Moore, 1999; Stern, Raby, & Dayton, 1992). Through these experiences, participating students have had opportunities to build particular skills (e.g., technical, personal and social competence) as well as gain knowledge of the labor market and potential career pathways (Grubb et al., 1996; Hamilton & Hamilton, 1997; Schneider & Stevenson, 1999). Aligning educational and career ambitions is a key goal of CTE.

Adolescents with aligned ambitions have complementary educational and occupational goals, those with misaligned ambitions have goals that are not realistically connected to a particular occupation (e.g., they may overestimate or underestimate the amount of education needed). Those with aligned ambitions “see life events as sequentially organized” (Schneider & Stevenson, 1999, p. 85) and are more likely to strategically plan their actions to reach their goals. Defining an educational and career pathway for high school and college students, one that links high school, college, and work, makes a pathway explicit for students, enables them to experience career options, and supports their decision-making (Ryken, 2006).

CTE programs are designed with the intent to help students align educational and occupational goals and are inclusive of initiatives such as Tech Prep, work-based learning, and school-to-career. Tech Prep initiatives are different from conventional vocational education in that the focus is on applied academics, articulation with college, workplace experiences, career pathways, and includes students of a variety of backgrounds and ability levels (Bragg, Puckett, Reger, Thomas, Ortman, & Dornsife, 1997), whereas conventional vocational education typically did not provide the academic background for, or connections to, college programs. Initiatives involving work-based learning include apprenticeships, internships, cooperative education, service learning, volunteer work, school-based enterprises, and visits to employers. Advocates of work-based learning have emphasized the importance of learning skills in the context in which they will be used (Bailey, et al., 2004). More recently, school-to-career initiatives have focused on connecting school-based and work-based learning, articulating high school and college courses, and providing workplace experiences (Urquiola et al., 1997). Compared to these experiential career development activities, many career guidance interventions (e.g., career interest inventories) have been inauthentic (Hughes & Karp, 2004).

Within all of these initiatives, career development interventions that have focused on specific career skills have been more effective than those that have concentrated on general career preparation (Hughes & Karp, 2004). Organizing instruction with an occupational focus has helped to integrate the normally disconnected course offerings found in comprehensive high schools and community colleges around a theme, making career pathways visible, supporting academic and career planning, and emphasizing relationships between school and work (Grubb, 1996; Hughes, Bailey & Mechur, 2001; National Research Council & Institute of Medicine, 2004, chap. 7; Stern, Raby, & Dayton, 1992). CTE programs have helped students develop life plans and integrate curricular experiences. They have created

learning communities of teachers and students, utilized co-enrollment, and recognized work places as potential learning sites (Bragg et al., 1997; Castellano, Stringfield, & Stone, 2003; Conchas & Clark, 2002; Grubb, 1996; Pedraza, Pauly, & Kopp, 1997; Stasz & Kaganoff, 1997). While developing a career identity and an understanding of a particular labor market are not common practices in high school, within these programs work-based learning experiences assisted students in establishing a career identity and gaining labor market knowledge related to a specific occupational area (Stasz & Kaganoff, 1997).

### **Conceptual Framework: Supports and Constraints**

Aligned ambitions, in the context of participation in a CTE program, both propel and inhibit educational and career trajectories. Or, as one student participant of a school-to-career program aptly observed, “You can’t be goin’ somewhere later if you aren’t goin’ somewhere now.” This statement reflects the tension in structured academic and vocational programs, which both support and constrain career decision-making. While the student emphasized the importance of having experiences that connect to future opportunities, the use of the term “somewhere” reveals the constraining nature of decision-making within a program structure; where is the “somewhere” that he is going to, and is there only one “somewhere?” Every program’s sanctioned destination provides a career destination that does not fit all participants. There is a tension between helping students prepare for employment and keeping their career and educational options open (Simon & Dipbo, 1987).

One problem of conventional vocation education has been that it provides preparation for specific entry-level jobs, but not preparation for more advanced jobs or life-long careers (Grubb, 1996). Some researchers have argued that school-to-career programs fragment high school curriculum and may not prepare students academically for demanding 4-year colleges (Kantor, 1994). Furthermore, the evidence of barriers to linking high school and 4-year institutions includes the narrow focus on particular occupations and the academic rigor of the college courses. Students in CTE programs may have taken course work aligned with a particular job, rather than a disciplinary area. In addition, they may not have experienced academically rigorous programs in high school (Urquiola et al., 1997).

Rather than focusing on academic areas of study, recent educational reform and workplace development initiatives have emphasized learning in context or teaching skills in the environments in which they will be used (Belfiore, Defoe, Folinsbee, Hunter, & Jackson, 2004; Hughes, et al., 2001). Work-based learning initiatives have contributed to youth development by providing opportunities for students to learn about themselves and their interests, and encouraging students to “think in new ways not generally available to them in school classrooms” (Bailey, et al., 2004, p. 151); for example, they define problems, work in groups, and access the physical and social resources of the workplace. Students who have obtained jobs

through school-to-work programs have access to a variety of workplaces, receive training and feedback about their work performance, and are provided access to meaningful career paths (Bailey, et al., 2004).

Comprehensive developmental models for school-based career counseling have suggested that guidance be framed as “a structured program, not an individual-level process” offered by a counselor (Hughes & Karp, 2004, p. 6); for example, School-to-Work Opportunities Act reforms focused on academic curriculum rather than the involvement of career counselors. Guidance and academic counseling activities provided by counselors have included comprehensive guidance programs, career courses, counseling interventions, and computer-assisted guidance. A recent review of school-based career development research found that high school counselors spend their time split between scheduling courses, college admissions, and student attendance and discipline, and thus have limited time to assist students with career planning (Hughes & Karp, 2004). People underrepresented in the sciences often need support systems in order to pursue scientific or engineering careers (Mau, 2003). CTE programs are one way to create a structural experience, or support system, for career guidance where the focus of reform shifts from individual interventions to programs as interventions.

### **Research Questions**

This investigation focused on how students perceive the supports and constraints of a CTE program and analyzed the students’ educational and career decision-making. The central image that informs this work is that of students progressing on a career pathway. Getting on a path leads to particular outcomes (e.g., entrance to college, and/or finding a job in biotechnology). The path broadens as students have opportunities to gain laboratory skills, and scientific knowledge, and learn about careers in biotechnology. Supporting the progression on the pathway are the students themselves, by taking active roles in their own education, and the community of peers, teachers, and employers that offer help and guidance. This paper considers the following questions:

- How does the program balance the tension between providing broad options versus specific training? How do program structures support and constrain students’ educational and career progression?
- How do students perceive the relationships between high school, college, and work? How do students support their own educational and career development?

### **Case Study Method: Focus on Student Experiences**

In this inquiry, a case study method was used to examine how students experience challenges and opportunities as they make the transition from high school to college. Researchers have rarely studied how work-based learning experiences

enhance or inhibit students’ academic and occupational development or how students experience work-based learning (Stasz & Kaganoff, 1997). Students are important actors with unique points of view about CTE programs; as Erickson (1986) noted, researchers should focus on the “immediate and local meanings of actions, as defined from the actors’ point of view” (p. 119).

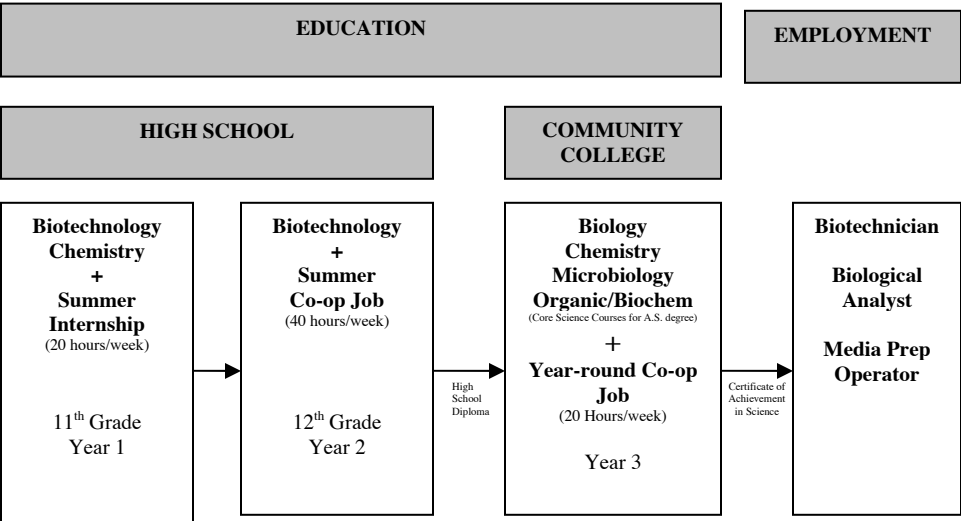
In fact, student perspectives may be very different from those of educators and employers. Bragg (1997) asked students, employers, and educators to sort statements about desired Tech Prep outcomes. She found that students sorted the outcome statements quite differently than teachers and supervisors. Students attributed greater value to educational outcomes (e.g., graduating from high school, advancing to college) and work skills (e.g., personal initiative, using technology and information), rather than academic outcomes, especially in math and science.

Case studies are especially well suited to investigations that examine contextual conditions (Yin, 1994). In this study, student participants are “an embedded unit of analysis” (Yin, 1993, p. 83) within the case of a best practice CTE program; thus, student experiences are “a particular phenomenon” and the CTE program is “the *context* [italics added] within which the phenomenon is occurring” (Yin, 1993, p. 31). Studying multiple cases was undertaken with the aim “. . . to see processes and outcomes across many cases, to understand how they are qualified by local conditions. . .” (Miles & Huberman, 1994, p. 172).

## **Research Site**

At the research site, students participated in a coherent sequence of work-based and school-based learning activities, including science course work during two years of high school and one year of community college, paid summer internships as high school students, and paid year-round co-op jobs as community college students. The population studied over seven years was a group of 256 students participating in a biotechnology CTE program that linked two high school career academies, one community college, and over 40 biotechnology laboratories in the San Francisco Bay Area. Figure 1 summarizes key experiences in the core program. This pathway is simultaneously rigid (core requirements) and fluid (multiple exit and entry points, enabling students to use the pathway differently).

Figure 1: Program Pathway



Program participation was voluntary and targeted to ethnically and linguistically diverse students who may not have otherwise had access to either the community college environment or biotechnology laboratory settings. Fifty-three (53.6%) percent of program participants were African American, 21.6% Latino/a, 16.5% Asian, and 8.1% White. Women and men were equally represented. Over 50% of students were the first in their family to graduate from high school and over 80% were the first in their family to be enrolled in a post-secondary program.

Analysis of student participation in the program revealed that over 50% of community college entrants completed the biotechnology certificate and that internships and co-op jobs were an important factor in community college retention and completion (Ryken, 2004). In contrast, a study of the sub-baccalaureate labor market, which includes three-fifths of all workers in the United States (including those with a high school diploma or “some college,” but not a bachelor’s degree) found that only 30% of community college entrants seeking a degree/certificate earn sub-baccalaureate credentials and that 50% drop out without completing any credentials (Grubb, 1996).

Case Study Design: Replication Logic

As shown in Table 1, this case study was organized using cross-case replication logic where cases were intentionally selected to mirror similar



intervention conditions. Yin (1993) emphasizes that “Multiple-case studies should follow a replication, not sampling logic. This means that two or more cases should be included precisely because the investigator predicts that similar results (replications) will be found” (p. 36). The experiences of three students are situated within the larger research study of 256 participants to demonstrate that the analysis and interpretations presented are based on a cross-case analysis of 61 student participants, and thus the cases are not unusual or unique (except that they are individuals’ experiences), but instead reflect the patterns and trends discovered in the larger study.

Table 1: *Case Study Replication Logic*

Unit of Analysis: Biotechnology CTE Program		
<b>Research Questions Relating to Program</b> <ul style="list-style-type: none"> <li>How is the occupational focus of the program articulated and organized? Does the focus emphasize connections to both college and work?</li> <li>How does the program balance the tension between providing broad options versus specific training?</li> <li>How do program structures support and constrain students’ educational and career progression?</li> </ul>		
Number of Students	Replication Logic <sup>1</sup>	Data Sources
256	Best Practice Program. No comparison case at program level of analysis.	Program documents (e.g., program descriptions, curriculum material, mission statement). Analysis of company participation in work experiences by company type.
Embedded Unit of Analysis: Student Participants		
<b>Research Questions Relating to Student Experiences</b> <ul style="list-style-type: none"> <li>How do students perceive the relationships between high school, college and work?</li> <li>How do students support their own educational and career development?</li> </ul>		
Number of Students	Replication Logic	Data Sources
256	All participants.	Longitudinal cohort analyses, calculating persistence and attrition rates for nine cohorts.
61	Representative percentages, based on cohort analysis, of students who had gone to a 2-year or 4-year college, those who completed the community college biotechnology certificate, and those who had dropped out.	Program Files: program application, applications for internships and co-op jobs, written learning objectives, supervisors’ ratings, written co-op papers, community college applications and resumes.
22	Students who had gone to a 2-year or 4-year college, those who completed the community college biotechnology certificate or were still enrolled, and those who dropped out.	Interview: Interview guides focused on experiences in community college and high school, co-op jobs and internships, and structures that helped students complete the program.

<sup>1</sup> Identifying similar and different intervention conditions

3	Three African American female students who entered the community college program and reached different career and educational destinations.	All data sources listed above.
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Table 1 summarizes the research design and data sources used, emphasizing the logic used at each phase of data collection, and demonstrating a comprehensive research strategy that included program document analysis, quantitative cohort analysis of all 256 student participants, file analysis of 61 of the participants, and interviews with 22 students whose files were analyzed. Different research questions and instruments were used for each unit of analysis; Table 1 reflects the use of Yin’s (1993) suggestion that “when embedded case designs are used, different research questions and instruments are needed for each unit of analysis” (p. 33). Program files contained important student employment and academic documents: internship and co-op job applications, written learning objectives, supervisors’ ratings, written co-op papers, community college applications and resumes. Each interview was approximately one hour long, directed by interview guides covering topics related to experiences in community college and high school, co-op jobs and internships, relationships between school and work, and structures that helped students complete the program.

Because African American women are underrepresented in the sciences (National Science Foundation, 2000) and more than half of the program participants were African American, the experiences of three African American female students are used to illustrate patterns found in the cross-case analysis of the 61 focal students. Selection of the profiled students was based on their completion of program milestones. Note that Table 1 situates data collected about three students within a broader research design framework. The three students’ experiences reflect similar intervention conditions, but different final career and educational outcomes; one graduated from the program and took a job in a biotechnology laboratory, one graduated and did not take a full-time job in an effort to continue her college education, and one dropped out because the program did not support her career interests. These different outcomes highlight how program participants navigated the tensions between specific career training versus seeking educational and career options.

The data sources are unusually comprehensive in that they represent program participation over a three to six year period for each student, across three diverse settings—high school, community college and work. The data sources provide detailed evidence about how students make decisions to continue (or not) on an educational and career pathway.

**Data Analysis and Interpretation**

The role of work-based experiences in retention (Ryken, 2004) and the importance of flexible entry and exit points to meet students’ needs (Ryken, 2006),

have been examined elsewhere. Because the concept of using educational and career pathways as structural career guidance is central to CTE, the goal of this particular analysis is to investigate and make visible the details of students’ educational and career decision-making within the context of a program pathway.

Miles and Huberman (1994) recommend data reduction, display, and verification, and accordingly, the file analysis began with organizing materials chronologically to understand each student’s educational and career decision-making over time. After completing the initial inventory, each file was read again and notations were made about common themes. During this initial coding, the themes included: social support, career and educational goals, high school versus college, work versus school, expectations, industry knowledge, equipment/instruments, combining theory and practice, communication/language, time, motivating factors, and future plans. Those themes were then consolidated into four major categories/codes: 1) Skill Building, 2) Career Pathway, 3) Relationship Building, and 4) Youth Participation. Table 2 shows the relationship of the initial codes to the final four consolidated codes. The consolidated codes were consistent with research findings about important elements of youth development programs (Benson & Saito, 2000).

Table 2: *Case Study Analytical Coding*

<b>Initial Coding</b>	<b>Consolidated Codes</b>
high school vs. college work vs. school equipment/instruments combining theory and practice	Skill Building
career and educational goals industry knowledge future plans	Career Pathway
social support high school vs. college work vs. school expectations motivating factors	Relationship Building
high school vs. college work vs. school communication/language time	Youth Participation

Interview transcripts were analyzed using the coding scheme to verify findings in the file analysis. Twenty-three percent (5/22) of the student files, including interview transcripts, were coded by colleagues to verify codes thorough “intersubjective consensus” (Miles and Hubberman, 1994, p. 11). In addition, these themes were double checked and verified with program staff and student participants. The Career Pathway coding category (the focus of this analysis) included information on the variety of ways that students used the program structures, and resources outside program experiences, to meet their goals.

In case study construction, researchers are “. . . writers who construct others’ lives” (Dyson, 1995, p. 4) who “. . . *can* work to make another’s life world more perceptible, more accessible, by respecting the details of that world . . .” (p. 5). Because language is an important mediating factor in all learning contexts (Cazden, 2001; Gee, 1999; Heath, 1983), quotes from written documents and student interviews appear as written or spoken, even if in non-standard English. Students’ written and spoken language communicated that they understood the program pathway and had goals, and demonstrated their excitement about and ability to reflect on experiences. Although readers may perceive that the students did not possess the necessary language skills for college or employment, in fact all three of these students experienced success in both the school and work components of the program. The direct quotations enable readers to hear directly from students the ways in which students utilized the program to support and shape their own goals. Secondly, readers are encouraged to ponder questions such as: What communication skills are *really* necessary for success in school and work? Do student language patterns change over time?

### **Career Development of Three Students**

Careers can be conceptualized “as self-realization, growing experiences, and context conceptualization” (Chen, 2003, p. 203). In the context of the CTE program studied, there is evidence of students’ learning about themselves and their interests, gaining experiences in college and biotechnology laboratory settings, and a complex set of interrelationships between students’ backgrounds, interpersonal relationships, and labor market demands. As students progressed through the biotechnology program their career plans became more articulated and specific. While they indicated that the program pathway helped them look at educational and career options, each student was on her *own* pathway, utilizing the program in an effort to reach her goals.

Because the program pathway was not an endpoint, but a coherent sequence of experiences that students used differently, it is essential to understand how students made choices within the structure of the program. In all case study research “we are faced with the tension between the particular and the universal: reconciling an individual case’s uniqueness with the need for more general understanding of generic

processes that occur across cases” (Miles & Huberman, 1994, p. 173). By presenting an “individual’s developmental history over time” (p. 173) the cases represent *both* the uniqueness of the case *and* the larger patterns in the program; “case-oriented analysis is good at finding specific, concrete, historically-grounded patterns. . .” (p. 174).

The following section includes portraits of three African American female students who utilized the structured academic and vocational pathway in different ways. These cases are summarized in Table 3 and were selected to demonstrate the range of student experiences within one program and reflect the patterns found in the cross-case analysis of 61 students’ experiences. The tension between the program’s supporting and constraining roles, as well as the consequences for individual students, is seen in each portrait.

Table 3: *Summary of Students’ Trajectories*

<b>Student</b>	<b>How Student Used Pathway</b>	<b>Educational &amp; Career Outcomes</b>	<b>Tensions Illustrated by Case</b>
Antionette	Prepared for skilled-technical job (as the program pathway is designed)	Earned certificate, hired into full-time job	Individual career goals vs. program pathway  Finding challenging work
Latasha	Prepared for 4-year college	Earned certificate, continued taking transfer course work	Individual career goals vs. program pathway  Defining meaningful work (job vs. career)
Antisha	Clarified career goal	Dropped out of program and community college	Individual career goals vs. program pathway  Finding non-curricular supports

### **Antoinette: Creating Learning Opportunities by Asking Questions**

Antionette graduated from the program and was hired by a biotechnology laboratory. This portrait illustrates how internships and co-op jobs give meaning to school course work and allow students to shape their own learning within work settings.

Antoinette is the youngest child in her family and the first of her six brothers and sisters to go to college. Only she and one other sister graduated from high school. She participated in an internship during the summer between 11<sup>th</sup> and 12<sup>th</sup> grade, and had a co-op job her first year of college. On the summer internship application completed when she was an 11<sup>th</sup> grader, Antoinette highlighted her desire to gain work experience and apply lab skills she had learned in school with her long-term interest in a career as a biologist.

I would like to participate in the internship program because I want to have more work experience and to apply my lab skills toward a job, and my long term goals is to become a researcher biologist.

That summer she worked in a government laboratory. Her primary responsibility was data entry for a water sample database. In reflecting about her internship she wrote,

In thinking about my internship here it made me want to make sure I will always perform my best at all times, ask my supervisor many questions so I can understand and grow with my days here and maybe see or even learn how they take a sample from the water and learn what types of instruments they used and last but not least to maybe even observed in the lab of when they test the samples of water.

On the job at the internship, by expressing her desire to learn lab skills Antionette directed her own learning experiences. Her supervisor wrote on the intern performance evaluation, “Antoinette requests to gain skills in analytical techniques by observing and practicing work in the main lab.” Through her internship, Antoinette had had the opportunity to work in a laboratory and became interested in the sampling procedures and instruments used to test water quality. By asking questions and repeatedly expressing a desire to apply her laboratory skills, she shaped her internship into a rich learning experience. Here a complex set of factors was at work—Antionette’s effort to ask questions, a supervisor attentive to Antionette’s questions, and a laboratory context with particular instruments to support Antionette’s learning goals.

Two years later, when she began taking community college classes, Antionette worked in a co-op job as a laboratory assistant at a large biotechnology production facility. She recognized the critical role played by the co-op job in helping her understand the scientific concepts covered in the community college courses and textbooks.

This program gives you the curriculum and work experience all at once. I feel it is harder to understand material by just reading because I feel when you are able to read the material with hands on experience with the material you grasp,

and remember things a lot better; everything began to come to me like second nature.

While on the co-op job site, Antoinette once again shaped her own learning experiences by asking questions and asking for additional responsibilities and more challenging work.

By the third or fourth month of my co-op job curiosity began to build in me more and more because I always felt that internship is about learning as much as you can while being there. So I began to ask the lab technicians about how I could learn more what they were doing. The great thing about it is that they did let me do more things and that’s only because I asked and kept on asking until they made the time for me to learn how to do it.

In reflecting on her school and work experiences, Antoinette emphasized the role of teachers and co-workers as supports.

I love the people to death in my lab, they’re totally cool. You feel more comfortable, it makes it easier when you have a teacher you could talk to, ‘Well I didn’t have a good weekend this weekend because this and this happened and I was really upset about it.’ You can talk to them about things that happened and you can talk to them about your goals and your dreams, to let them know you. I think it’s important to have a nice strong relationship with your teachers and your co-workers at work.

When Antoinette graduated from the program she began a job as a media operator at large biotechnology manufacturing facility, earning \$16.57 per hour<sup>2</sup>. Her experiences illustrate how internships and co-op jobs provide students access to scientific knowledge and skills, allowing students to connect work and school learning to their interests, and supporting their own progression on a career pathway. In both her internship and co-op job Antionette asked questions and asked for additional laboratory-related responsibilities. She also recognized the role teachers and co-workers play in helping students meet the challenges of life, college, work, and making plans for the future. All of these factors are evidence of the ways in which Antionette used program experiences to support her career decision-making.

On the other hand, the particular types of instruments used, and work contexts experienced (e.g., government laboratory and biotechnology production facility), constrained Antoinette’s vision of other options. Although it is clear that her experiences in the workplace helped her understand scientific material covered in college courses, it is less clear how these experiences related to her stated goal to become a “researcher biologist.” Additionally, there was no mechanism in the

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<sup>2</sup> An hourly wage three times the federal minimum wage for that year (\$5.15); equivalent to an annual salary of \$34,000.

program for her to go on to a 4-year college for the degrees necessary for a research career.

### **Latasha: Seeing Beyond the Limits of the Program**

Latasha graduated from the program and did not take a full-time laboratory job in an effort to continue her college education. This portrait illustrates how students see beyond the limits of programs and envision multiple options for their future.

Latasha lived with her mother and younger brother and had two sisters attending college. She had a summer internship in a hospital research laboratory and completed the college certificate while working in a co-op job at a government laboratory, then, after earning the certificate, decided to take a part-time entry-level position (rather than a full-time position) at an agricultural research facility. She chose a part-time job so that she could attend community college as a full-time student in order to complete general education requirements for transfer to a 4-year college.

On her application to enter the program in the 11<sup>th</sup> grade, Latasha gave a rather flippant one sentence response to the question, “Why do you want to be in the biotech academy?” She wrote, “I want to play with DNA and design my own virus.” Her focus was not on a particular career future, but instead on a particular scientific interest.

Two years later, in a paper about her co-op job in a state crime laboratory, Latasha wrote about the differences between a job and a career. She clearly articulated a career was something she would need to enjoy doing, and that she did not have passion for forensics. Cataloging DNA samples of convicted felons was not of interest because she was troubled by the origins of the samples and what they reflected about society.

The difference between a job and a career is that jobs such as a bus driver are tools to survive, but a career is something that you enjoy doing and get paid to do it. I believe the Department of Justice cannot help me get a career because I would never have passion for the kind of work they have to offer me. I would always think in terms of why the databank receives so many samples and what that reflects about our ‘civilized society.’

Here Latasha defined, for herself, what career meant to her—having a passion for one’s work. She noted the complex factors that shaped the context of her work and described the relationships between society’s values and her own values.

Finally, in an interview conducted five months after Latasha earned the college certificate, she described why she decided to continue her education beyond the community college certificate. Her comments reflected a sophisticated understanding



of labor queues, where the least credentialed and last hired are often the first to be laid off.

The golden carrot is the money. Students see they can get a car, but they don’t always know that it is more than a flash. Lab tech jobs are not secure if there are layoffs. You need to think about long-term job security, and about what companies will accept your certificates. Companies want to know what you know and what you can do coming in the door.

Latasha’s descriptions of her own needs and interests became increasingly elaborated as she participated in high school course work, an internship, college course work, and a co-op job. The program pathway supported Latasha’s efforts to formulate her own definition of meaningful work. Her experiences in the program allowed her to see the limits of the community college certificate and motivated her to continue college studies. Latasha’s vision for her future was not constrained by the sanctioned program pathway. She decided to continue on the college educational path, even though it meant temporarily giving up a well paying, full-time job.

### **Antisha: I Want to Be a Mortician**

Antisha dropped out of the program shortly after beginning community college courses. This portrait illustrates the importance of matching student interests to program experiences.

As a high school student, Antisha ran track and was a cheerleader. She did not have a permanent home, and moved between the homes of two aunts about every six months. Antisha participated in an internship in high school but did not complete the co-op job she started.

During the first summer internship, Antisha’s written reflections showed a strong sense of engagement in her work. Her internship in a hospital laboratory provided opportunities to see a working morgue and participate in autopsies; these experiences were consistent with her career goal to be a mortician. Her interest in the job gave her confidence to ask questions and fueled her desire to be a keen observer of the laboratory’s activities.

I had seen a real autopsy on this old lady. Let me tell you what I learned doing the autopsy. It started like this, there was two ladies and me. We had to put on gowns, gloves, hats, shoes, face masks. And they got the tools. They put the body on the table and they cut an X by each shoulder and started down by her stomach after that they had took out all the organ that they need and they put everything back in and then stitched back up her bodies. That was the most interesting thing I had seen since I been at my job. The next day after that I learn how to go to this lady in the morgue and ask her questions about dead people. I saw and learned why was this baby girl was in there, and how two

white ladies was in there. It was quite interesting to see why people die, and where they are kept.

In 12<sup>th</sup> grade Antisha debated between attending a 4-year college or continuing on the program pathway to attend community college. Her goal at that time was, “To go to college and get a job being a mortician.” She filled out a co-op job application stating; “Last year I had got a good job from it. And it help me decide on the fields that I would want to be in.” Antisha emphasized that her internship experiences had helped her decide to become a mortician. Her application also emphasized a desire to attend a school where other students shared her career goals.

I am interested in being a program that has morticians school and has the same career goals as me. I would like to let you know this program has brought me a long ways. I hope to continue and stay in this program. I plan to go on in life and succeeded in my goals so I hope you will take heated in what I wrote.

Her comments suggested that although the program had helped her move along a pathway, it did not quite match her career aspirations. Four weeks after her co-op job in a biotechnology laboratory began in June, Antisha, without explanation, stopped reporting to work. After missing three weeks, she telephoned, hoping to return to work. Antisha’s supervisor informed her that she no longer had a job, feeling strongly that offering Antisha a chance to return would send the wrong message about the importance of communication and attendance in the workplace. Antisha decided to continue on with the community college program without a co-op job. However, when the fall semester began in September, she did not sign up for courses.

Antisha’s goal was to become a mortician. Although the hospital internship gave her the opportunity to participate in autopsies and observe how a morgue operated, she wanted to attend a college mortician training program. While Antisha’s internship in the hospital setting was closely aligned with and supported her interests, her co-op job, focused on biotechnology, did not provide the same opportunities or supports to explore those interests. In addition, the program, with its focus on biotechnology, did not match her career goals, and thus constrained her ability to reach those goals. Antisha’s experience emphasizes the importance of alignment between students’ needs and interests and program structures. The program supported her with one work-based experience that reflected her interests and constrained her by providing another experience that did not relate to her goals.

Other factors also influenced Antisha’s path. Her needs for a stable living arrangement were not addressed by the program and got in the way of her participation, despite her interest in continuing her studies at the college level. Tang (2003) notes that “career intervention programs are not sensitive to the restraints and resources in an individual’s environment” (p. 63). The program was unable to serve

as a safety net for whatever crisis Antisha experienced that prevented her attendance at her co-op job and thus, resulted in her losing her job and connection to the community college courses.

### **Career Decisions Tied to Work-based Learning Experiences**

The program studied enabled students underrepresented in the sciences to experience and envision a scientific career and discover their own career preferences. Students were supported on an educational and career pathway by having access to work experiences and a clear program that linked high school, college, and work. It is through their participation over a three-year period, in both science courses and scientific workplaces, that students saw increasing options for their future, as well as the limits of program experiences. Just as Tolley (2003) documented, for these students studying “science in college or deciding to become a professional scientist are decisions made only at the end of a far longer process, during which individuals subjectively qualify or disqualify themselves as suited to the field” (p. 148). Through work-based learning experiences and exposure to the community college environment, students gained the ability to envision a pathway beyond the community college certificate, to a degree, and beyond a laboratory job, to a career in science.

The range of student experiences reported in the case studies reveals that education/career decisions evolve over time and are tied to experiences in the labor market, and suggest that there is a complex interaction between students’ needs and interests and program structures. Consistent with Chen’s (2003) concept of career, students participating in CTE programs gain experiences, actively shape and are shaped by contextual factors, and learn about themselves. For example, Antionette actively shaped her learning experiences by asking questions, and Antisha confirmed her goal to become a mortician through her experiences in a hospital laboratory. The case studies demonstrate the tension between how programs support career decision-making by providing experiences that help students envision future career opportunities and constrain career decision-making by focusing on one progression of experiences. The findings suggest that an occupational focus should be envisioned as a life-long journey involving education and employment, rather than as participation in a short term program during the high school and college years (Hamilton & Hamilton, 1997; School-to-Work Task Force, 1999).

### **Implications**

The findings of this investigation have implications for both CTE programs and students. Using a “critical/reflective strategy” (Bailey, et al., 2004, p. 217) toward work experiences can help program designers, career counselors, and students

consider how programs both provide learning resources and limit career decision-making. Thus, the research questions that focused this study are important reflection questions for program designers and students to ask themselves.

## **Implications for Career Technical Education Programs**

While the aligned ambitions that CTE programs seek to foster can propel participants, the intended destination (career and educational) inhibits some because the “somewhere” is defined; a defined program pathway inherently rules out some options that might be better aligned with student interests. Programs that link school and work settings can provide resources to support long-term planning, but program designers should seek ways to help participants see multiple options for their futures. Additionally, students should be involved in ongoing discussions in which the costs and benefits of “goin’ somewhere” and program participation are considered.

School-based career development interventions typically focus on student knowledge and attitudes, rather than behaviors such as course taking or academic achievement (Hughes & Karp, 2004). These interventions are often organized around some perceived or identified labor market need (Grubb & Lazerson, 2004) and sometimes overemphasize the college admission process (Schneider & Stevenson, 1999). Fostering work experiences in adult work settings supports student growth by providing a network of supportive adults (Hughes, et al., 2001; National Research Council & Institute of Medicine, 2004, chap. 7) and emphasizes a team approach to career development (Hughes & Karp, 2004). As the case studies demonstrate, employers are uniquely situated to help students connect work experiences to educational and occupational goals. For example, Antionette’s work supervisor supported and encouraged Antionette’s biologist career goals by allowing her to work in the main laboratory.

Despite clear program pathways and multiple internship and co-op job experiences, there is an inherent tension within any program design. Program designers need to put options on the table for students, in both program promotion efforts and documentation. For example, visual diagrams of educational and career pathways should situate program experiences within a broader set of related educational and career options, including those beyond the prescribed program experiences. Raising questions about the limiting aspects of a program is one way to implement a critical/reflective strategy. Important reflection questions include:

- In what ways do work and educational experiences broaden students’ educational choices and progression? In what ways do those experiences constrain future choices?
- How is the tension between gaining knowledge/skills required for employment, and keeping career and education options open, addressed?

- Are students supported to seek pathways outside the sanctioned program?

Career development is enhanced by asking questions, volunteering for additional tasks, and articulating needs and interests. Students should be supported in their efforts to take on active roles and to align the educational and career pathway with their unique goals. Two important skills that CTE programs can emphasize are negotiating increasing responsibility with work supervisors and asking questions about how work-based learning experiences relate to students’ own changing educational and career ambitions.

## **Implications for Students**

As revealed by this study, students are not passive recipients of information or program experiences, but rather are co-creators of their own knowledge. Students propel their own learning by asking questions and some students come to see the limits of program experiences by focusing on their own career goals, rather than a prescribed program pathway. For example, Latasha temporarily deferred taking a full-time job in order to continue her education (beyond the program pathway) at the community college.

Researchers have documented the “centrality of self in relation to learning” and the role of relationships as students consider questions such as, Who am I? Who am I becoming? (Thompson & Windschitl, 2002, p. 1). Work-based experiences provide students with a structured opportunity for self-evaluation by reviewing goals, plans and performance (Mithaug, 1994). For example, Antisha, in realizing that she really wanted to be a mortician rather than a biotechnician, found that the program pathway did not support her career goal. As the case studies demonstrate, all three students had career goals and used the program pathway to re-evaluate and further define their goals over time. In addition, they valued the network of adults who support their goals and efforts.

Students can take a critical/reflective stance toward their own educational and career development by asking themselves about the relationships between their goals, needs and program experiences:

- What do I want to learn from these experiences?
- Who do I hope to become? Will this program help me reach my goals?
- How does this program support my needs and interests? How does it not?
- How is my thinking about my future changing?

Students make the goals of CTE attainable in a number of ways: by negotiating in a variety of contexts (e.g., high school, college, and work); by shaping their own learning by asking questions; by making choices to spend their time engaged in activities that emphasize educational and career development; by linking school and work (by providing feedback to teachers and employers about their experiences in each setting); and finally, by viewing adults and peers as learning

resources and accessing allies who can provide academic and social support to reach educational and career goals.

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### **Author**

Amy E. Ryken is an Assistant Professor in the School of Education at the University of Puget Sound in Tacoma, WA. She teaches math and science education courses to elementary and secondary pre-service teachers. Her research interests include work-based learning, science education partnerships, and environmental education.

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