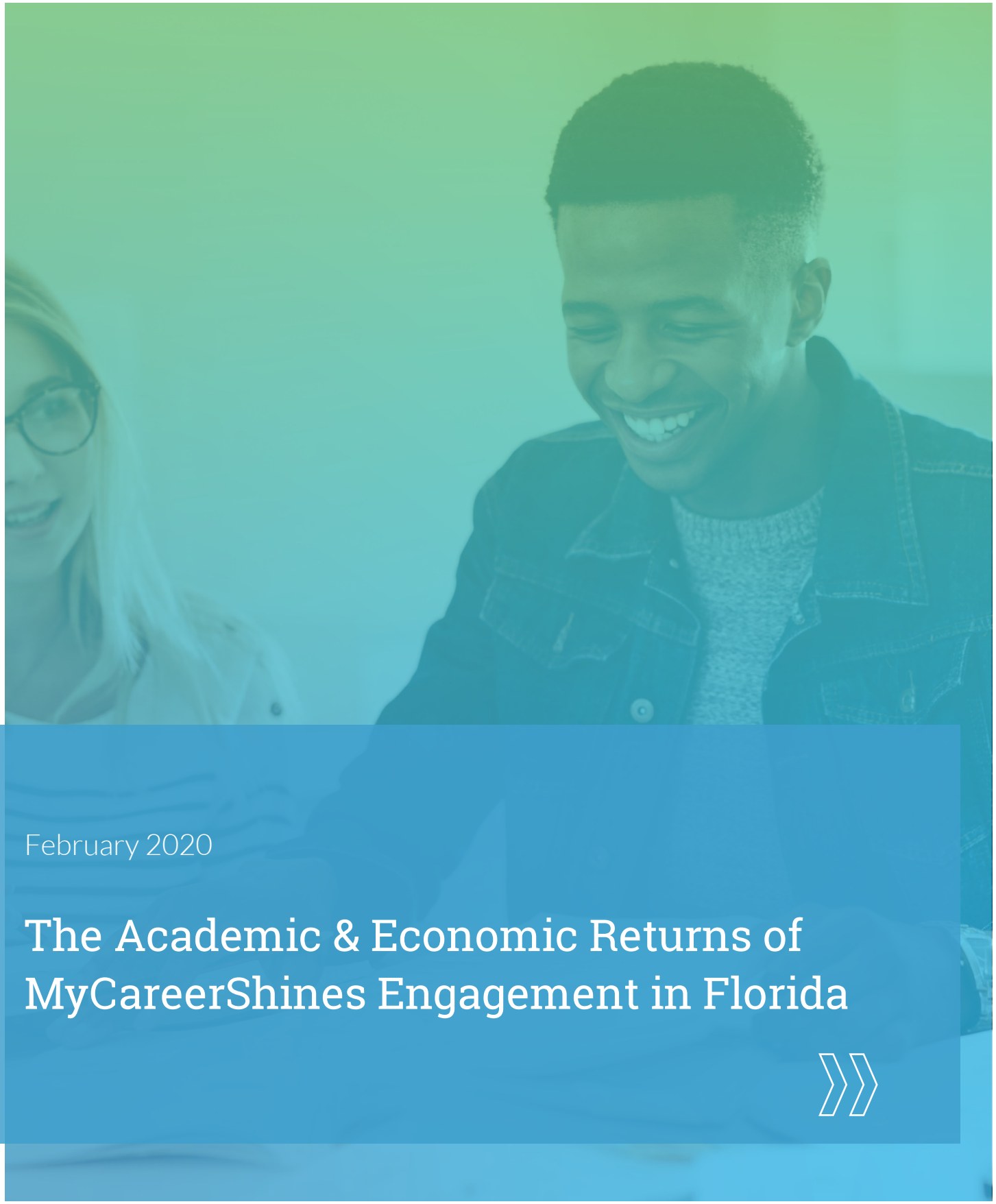

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The Academic & Economic Returns of MyCareerShines Engagement in Florida

MyCareerShines powered by Kuder®

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BACKGROUND

When investigating the effectiveness of Kuder Navigator® (Navigator) — an all-in-one online education and career planning system that includes three evidence-based career assessments to helps students in grades six through 12 visualize their futures after discovering personal interests, skills, and work values — researchers find feedback from students overwhelmingly positive.

In reviewing the collective results of several qualitative studies in which Kuder surveyed hundreds of former Navigator users from across the U.S. regarding the utility of the core system and its resources, respondents have consistently reported notable improvements in:

- Self-awareness (discovering interests, skills, and values).
- Awareness of educational and career opportunities.
- Setting educational and career goals and making plans.
- Developing motivation for education and career.
- Generating hope for the future.
- Increased motivation to in class and improve academic performance.

These findings provide significant insight as to how an individual user can benefit from academic and career planning. Additionally, they help Kuder researchers to hypothesize how perceived improvements at the individual level might translate to quantifiable changes in academic accomplishment at an aggregate level.

Consistent themes regarding these student reports are improved motivation, planning, and the uncovering of the underlying attainability of academic and professional opportunities. Given that these qualities are conducive to academic success, the research hypothesis of this analysis is that a positive relationship exists between the use of MyCareerShines, powered by Kuder® (MCS) and the timely completion of high school.

This report will seek to showcase this relationship, as well as the associated economic returns that add value to the state economy of Florida.

DATA & METHODS

The data on student outcomes used within this study was obtained from the interactive reporting tools and archives of the Accountability, Research, and Measurement section of the Florida Department of Education (FLDOE) website. The FLDOE calculation of graduation rate measures the percentage of students who graduate within four years of their first enrollment in ninth grade and excludes those receiving general education diplomas (GED) and other special diploma recipients. This measure serves as the dependent variable in the models included in this analysis, as a chief intention of MCS is to aid students in timely academic completion.

The analysis included observations from 485 high schools over the course a four-year period ranging from the 2015-16 to 2018-19 school years.

Within each school were a maximum of four cohorts to be tracked, corresponding to each year of observation.

The total number of cohorts included in the analysis totaled 1,691.

Student cohort totals within each school were also collected from the FLDOE's SAS information portal. To measure system participation, user totals were collected from the Kuder online database and observed as a percentage of each cohort within each school. To help improve the predictive ability of the models used in this analysis, achievement measures in core subject areas were collected from the FLDOE School Grades Archives.

These measures are described as follows:

"The four achievement components are English Language Arts, Mathematics, Science, and Social Studies. These components include student performance on statewide standardized assessments, including the comprehensive assessments and end-of-course (EOC) assessments. The components measure the percentage of full-year enrolled students who achieved a passing score."

To isolate the effect of MyCareerShines engagement, both fixed (FE) and random-effects (RE) models were used to control for differences across institutions. An FE model is used to control for potential unobservable characteristics of each institution if these characteristics are time-variant and systematically correlated with changes in the independent or dependent variables.

This method allows for the estimation of effect magnitudes while adjusting for omitted variable bias, or the misattribution of variance in graduation rates to the included variables. Alternately, the RE model is appropriate if the unobservable differences between schools are not correlated with the variables in question.

RESULTS

Figures 1 and 2 summarize the results from the fixed and random effects models, respectively[1] (see Appendices section for estimation details).

Figure 1

Fixed Effects Model (n = 1,691)

	Coef.	*Std. Err.*	*t*	*P>|t|*
MyCareerShines_PR	.048***	.006	7.12	0.000
English & Language Arts Achievement	.219***	.034	6.29	0.000
Mathematics Achievement	.078***	.016	4.77	0.000
Science Achievement	.018	.0156	1.16	0.245
Social Studies Achievement	.026	.021	1.23	0.220
_cons	70.42	2.06	34.22	0.000
	Prob > F = 0.0000			

Figure 2

Random Effects Model (n = 1,691)

	Coef.	*Std. Err.*	*z*	*P>|z|*
MyCareerShines_PR	.044***	.006	6.98	0.000
English & Language Arts Achievement	.190***	.024	7.80	0.000
Mathematics Achievement	.071***	.015	4.64	0.000
Science Achievement	.039**	.015	2.60	0.009
Social Studies Achievement	.042*	.019	2.15	0.031
_cons	69.50	1.26	54.98	0.000
	Prob > chi^2 = 0.0000			

[1] Significance levels of α = 0.05 (*), α =0.01 (**), and α =0.001 (***).

Figure 3 summarizes the results of a Hausman test conducted to determine whether the model error terms are correlated with the predictive variables.

Figure 3

Hausman Test

	FE (b)	*RE (B)*	*Diff .(b-B)*	*Std. Err.*
MyCareerShines_PR	.048	.044	.004	.002
English & Language Arts Achievement	.219	.190	.029	.025
Mathematics Achievement	.078	.071	.007	.006
Science Achievement	.018	.039	-.02	.005
Social Studies Achievement	.026	.042	-.016	.008

chi^2	=	(b-B)'[(V_b-V_B)^(-1)](b-B)
	=	33.31
Prob > chi^2	=	0.0000

The intraclass correlation values were approximately 0.82 and 0.79 for the FE and RE models, respectively. This indicates 80 percent of variance among Florida graduation rates is attributable to unobservable differences across schools rather than within schools over time.

The results with respect to MCS participation rate variable indicate a strong degree of significance in both models, where the effect size is approximately 0.05 percent marginal improvement in graduation rates for every 1 percent increase in Navigator participation[2]. Contextually, this means the model estimates a cohort with a participation rate of 50 percent graduates an additional 2.5 percent of its students that otherwise would not have. This estimated effect is robust, as the P-values in both models for this coefficient are significant at the $\alpha = 0.001$ level.

INDIVIDUAL ECONOMIC RETURNS FROM ACADEMIC COMPLETION

In reviewing data pertaining to the economic impact of academic success, there is a significant evidence to support the positive correlation high school completion has with respect to earning

[2] The results of the Hausman test of endogenous regressors suggests that the error terms are correlated with the explanatory variables, making the Fixed Effects model the appropriate estimation method, in which the $\beta = 0.048$ with respect to MCS_PR variable.

potential and employment. To accurately quantify the short-term impact of an increase in diploma recipients, it is necessary to consider additional factors that affect the ability to earn. These factors include labor force participation, part-time and full-time employment, and annual earnings. Figure 4 highlights the first of these factors.

Figure 4: Labor Force Participation of Individuals aged 18-24[3]

2016 Population	**30,843,811**	**100%**	
Civilian non-institutionalized	29,441,000	95%	
Civilian labor force	19,075,700	62%	
part-time	6,815,400	22.1%	
full-time	10,429,300	33.8%	58.3%
Military	734,082	2.40%	
unemployed	1,831,000	6%	
Not in labor force	10,365,300	34%	

Data from the United States Census and Bureau of Labor Statistics indicates the likelihood of an individual aged 18 to 24 being in the labor force and actively earning is 58.3 percent. Figure 5 shows the breakdown of those earning (and not earning) by age and part-time/full-time status Figure 5 further breaks down the 18-24 cohort of earners by furthest level of education achieved.

Figure 5: Full-Time and Part-Time Earners by Educational Attainment[4]

	Total 18-24 Cohort	Non-completer	HS Graduate
All earners (thousands)	19,441	1,981	6,268
% Total	100%	10%	32%
% part-time	63%	81%	53%
% full-time	37%	19%	47%

Finally, Figure 6 shows the average annual earnings for full-time and part-time earners of each educational attainment level as reported in 2015.

Figure 6: Average Annual Earnings by Education Level[5]

[3] Calculated using U.S. Census 2016 data sets, the U.S. Bureau of Labor Statistics Current Population Survey, and U.S. Department of Department of Defense "Demographics Report"

[4] Annual Social and Economic Supplement, the U.S. Bureau of Labor Statistics Current Population Survey

	Total 18-24 Cohort	9th – 12th grade	HS Graduate
all earners	$18,019	$9,863	$18,255
part-time	$10,719	$6,056	$10,742
full-time	$30,316	$25,798	$26,694
PT : FT	35%	23%	40%

Using the data and probabilities from the previous figures, expected earnings by education level can be calculated, as shown in Figure 7.

Figure 7: Expected Value of Earnings by Education Level

Educational Attainment	P (Work)	Full-Time		Part-Time		Expected Earned Income	
		P (FT)	Earned income	P (PT)	Earned income	Per earner	Per person
HS Graduate	58%	47%	$26,694	53%	$10,742	$18,239	$10,579
Non-completer		19%	$25,798	81%	$6,056	$9,807	$5,688
Differential			$896		$4,686	$8,432	$4,891

Figures 8 and 9 show the calculation of expected income for a high school graduate and non-completer, respectively using the information from Figure 8.

Figure 8: Expected Earned Income per High School Graduate

$$P(Work) * [(P(FT_G) * FT\ Earned\ Income_G) + (P(PT_G) * PT\ Earned\ Income_G)]$$

$$0.58 * [(0.47 * 26{,}694) + (0.53 * 10{,}742)] = \$10{,}579$$

Figure 9: Expected Earned Income per Non-Completer

$$P(Work) * [(P(FT_{NC}) * FT\ Earned\ Income_{NC}) + (P(PT_{NC}) * PT\ Earned\ Income_{NC})]$$

$$0.58 * [(0.19 * 25{,}798) + (0.81 * 6{,}056)] = \$5{,}688$$

ECONOMIC IMPLICATIONS FOR FLORIDA

Applying the marginal effect of usage derived from regression analysis, Figure 10 demonstrates the estimated additional Florida graduates attributable to MyCareerShines participation for each observed cohort at the state level.

Figure 10: Graduation rate increases attributable to MyCareerShines Participation by Cohort

Cohort	MyCareerShines Participation Rate	Graduation Rate Increase
2015-16	2.1%	+ 0.104%
2016-17	9.8%	+ 0.492%
2017-18	14.1%	+ 0.703%
2018-19	20.0%	+ 0.998%

The Occupational Employment and Wage Estimates provided by the BLS show the annual mean wage of Florida across all occupations to be $44,050 in 2016, while the national annual mean wage was $49,630[5]. Applying this ratio (0.88) to discount the calculated earned income differential (EID) in Figure 7 results in an EID of $4,341 for Florida high school graduates. Figure 11 multiplies the earnings premium by the marginal increase in graduate earners from each cohort to calculate the annual compounded income boost for Florida graduates ages 18 to 24 each year that would've otherwise gone unearned.

Figure 11: Gains in Graduate Earnings Attributable to MyCareerShines Participation

Year	Additional Graduates	Marginal Earnings Increase	Compounded Earnings Increase
2016	129.4	$561,712	$561,712
2017	723.6	$3,141,837	$3,703,549
2018	1104.5	$4,794,528	$8,498,076
2019	1558.6	$6,765,734	$15,263,810

The complete economic benefit with respect to wages of gained graduates is captured by compounding their earnings each year, as those having graduated in years past continue to earn at a higher level than they otherwise would have. Figure 12 uses these earnings in the calculation of net present value to determine return on investment for the state of Florida, where the social discount rate 3.5 percent and annual costs are 2.6 million.

[5] May 2016 State Occupational Employment and Wage Estimates Florida. OES Statistics, BLS https://www.bls.gov/oes/2016/may/oes_fl.htm#00-0000

Figure 12: Net Present Value of Florida's Investment in MCS in terms of Student Earnings

Year	Aggregate Additional Earnings	Annual Cost
2015	--	- $2,600,000
2016	$561,712	- $2,600,000
2017	$3,703,549	- $2,600,000
2018	$8,498,076	- $2,600,000
2019	$15,263,810	- $2,600,000
	Net Present Value = $10,344,629	

Speaking exclusively in terms of gains from student earnings, the net present value of an investment in MyCareerShines equates to approximately $10.3 million. Intuitively this means the estimated statewide earnings increase attributable to system usage exceeded the total five-year system cost of $13 million by $10.3 million. While the economic benefits attributable to improved graduation rates in this calculation have been limited to earnings increases, it is important to consider additional indirect benefits that are realized as an indirect result. Research pertaining to the effects of boosting academic completion suggests that a 2.3 percent improvement state-wide graduation rates could generate $2.8 million in state and local tax revenue[6]. Additionally, studies indicated a significant reduction in Medicaid costs associated with reductions in the dropout rate, where the expected cost per graduate is reduced by as much as 50 percent[7]. Using the 2017 minimum per-enrollee national expenditure estimate[8], an increase of 3,500 graduates would have saved the state $8.7 million.

[6] Education and the Economy: Boosting the Nation's Economy by Improving High School Graduation Rates. Washington, DC: Alliance for Excellent Education.

[7] Muennig, P. (2013). Decreasing Medicaid and Health-Care Costs by Increasing Educational Attainment. Washington, DC: Alliance for Excellent Education.

[8] Per Capita Expenditure Estimates. https://www.medicaid.gov/state-overviews/scorecard/

CONCLUSION

Qualitative response-based examinations have frequently shown use of MCS to be helpful in many areas considered widely to be conducive to academic success.

Among these, students most frequently cited:

- Improvement with respect to self-awareness.
- Identifying educational opportunities.
- Increased motivation.
- Improved classroom performance.

The analysis conducted in this report is consistent with this feedback and indicates that increased academic performance in the form of higher graduation rates can be statistically linked to student engagement with MCS. These findings are confirmatory with respect to conclusions drawn in previous mixed-method studies conducted by Kuder researchers, where hope was found to be a significant predictor of student engagement[9].

Utilizing labor market data, census data, and secondary research, this report demonstrated how improvements in academic completion facilitated by use of MCS lead to economic gains in the form of greater earning potential and standard of living for students.

[9] Yoon, H.J., In, H., Niles, S.G., Amundson, N.E., Smith, B.A. & Mills, L. (2015). The effects of hope on student engagement, academic performance, and vocational identity. Canadian Journal of Career Development. 14, 34-45.

APPENDICES

A | Estimation Results for Fixed Effects Inter-class Regression Model

The regression output in Figure 1 indicates a positive and significant effect attributable to MCS Participation Rate (MyCareerShines_PR) variable with respect to the sampled Florida high school graduation rates. This effect is robust, as the P-value associated with the variable is approximately zero, and significant at the α = 0.001 level. The coefficient associated with MCS_PR variable is 0.048, indicating an estimated increase of approximately 0.05 percent in a school's graduation rate for every 1 percent increase in MyCareerShines participation. The effects of student achievement in English/language arts and mathematics as measured by standardized assessment are also highly robust with P-values of approximately zero and coefficients of 0.219 and 0.078 respectively. Intuitively, this suggests a strong link between student reading comprehension, language arts performance, mathematic performance, and a student's likelihood of graduation. In this model, performance pertaining to science and social studies assessment was not found to be predictive with respect to variance in graduation rates. The F tests for this model produced a value of approximately 0, implying with high confidence that all included coefficients are statistically different from zero

B | Estimation Results for Random Effects Generalized Least Squares (GLS) Regression Model

The regression output in Figure 2 indicates a positive and significant effect attributable to MCS Participation Rate (MyCareerShines_PR) variable with respect to the sampled Florida high school graduation rates. This effect is robust, as the P-value associated with the variable is approximately zero, and significant at the α = 0.001 level. The coefficient associated with MCS_PR variable is 0.044, indicating an estimated increase of 0.044 percent in a school's graduation rate for every 1 percent increase in MyCareerShines participation. The effects of student achievement in English/language arts and mathematics as measured by standardized assessment are also highly robust with P-values of approximately zero and coefficients of 0.190 and 0.071 respectively. Intuitively, this suggests a strong link between student reading comprehension, language arts performance, mathematic performance, and a student's likelihood of graduation. In this model, performance pertaining to science and social studies assessment was found to be significant at the α = 0.01 and α = 0.05 levels, respectively. The F tests for this model produced a value of approximately 0, implying with high confidence that all included coefficients are statistically different from zero

C | Estimation Results for Hausman Test of Endogenous Regressors

In Figure 3, the Hausman test is conducted to determine whether the regressors or explanatory variables are systematically correlated with the error terms. The null hypothesis when comparing fixed and random effects models is that the regressors and do not correlate with the variables included in model, and that variation across observations (schools in this case) is random. In this case the P-value is approximately zero, rejecting the null hypothesis and confirming the need to control for unobservable differences across schools that affect the predictor variables. Therefore, the appropriate model is Fixed Effects.

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