

CASE 4: CLC Analysis of New Programs



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Project Mandate

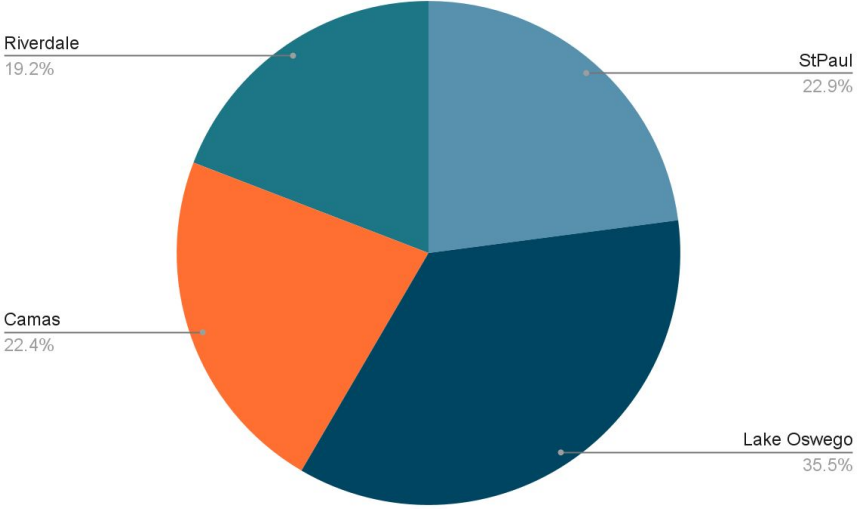
- Analyzing potential benefits of switching to one of three new educational curricula for the SkillsAdvantage program.
- Conducting survey questions on existing customers' attitude and preference of program delivery: on-line vs. center-based

Data Product

student_id	district	educational_level	date	program	score_reading	score_writing	score_math	score_mathCalc
934981	Lake Oswego	A	9/24/22	intake	685	53	419	458
934981	Lake Oswego	A	11/6/22	skills	722	56	456	491
956445	Camas	B	9/24/22	intake	614	28	217	508
956445	Camas	B	11/13/22	skills	622	29	238	546
928862	Camas	B	9/24/22	intake	472	53	466	745

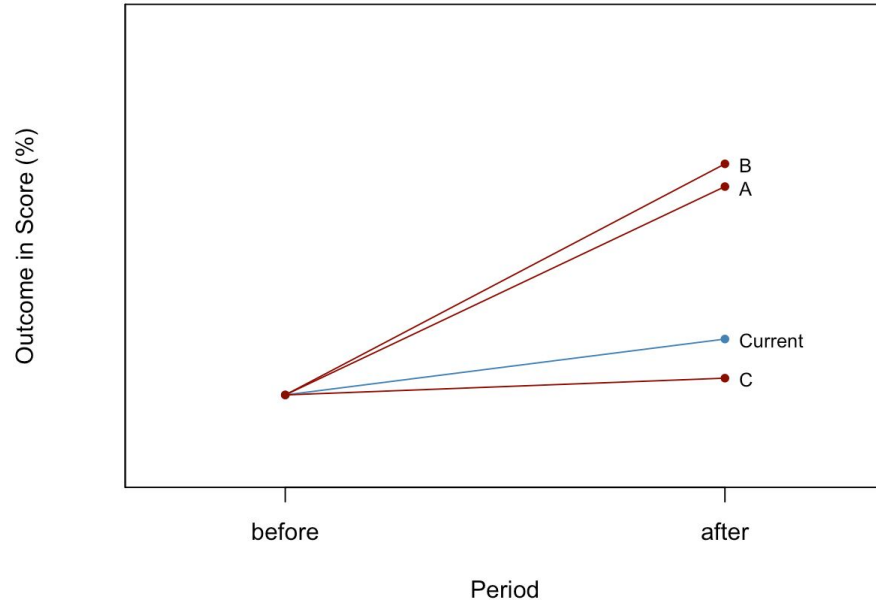
- Intake: Students' initial scores when they first enrolled at CLC
- Skills: Scores after taking CLC SkillsAdvantage course

Student Distribution across Districts



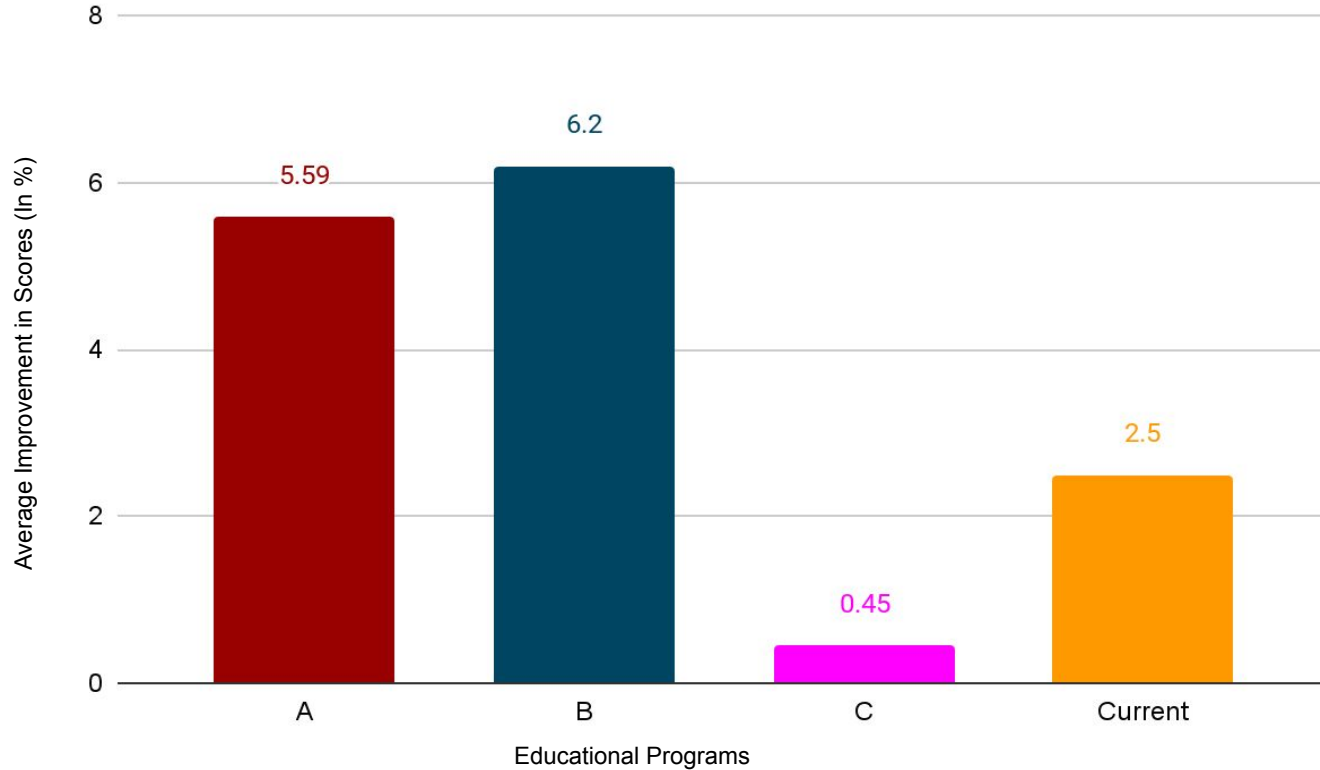
District	Number of Students	Program Assigned
St. Paul	786	Current
Lake Oswego	1217	A
Camas	769	B
Riverdale	657	C

Quasi-Experimental Design to Compare Difference

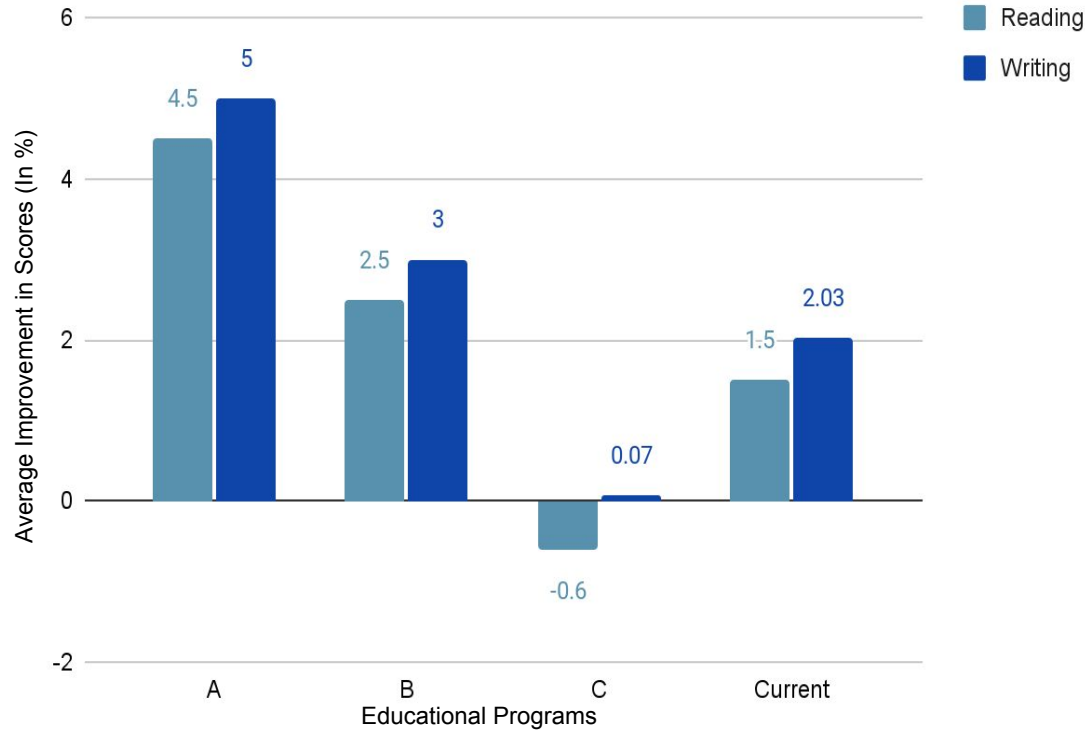


- Compared with current programme, **Program B** got most significant improvement.
- **Program C** got worst improvement, even worse than current programme.

Overall Program Improvement

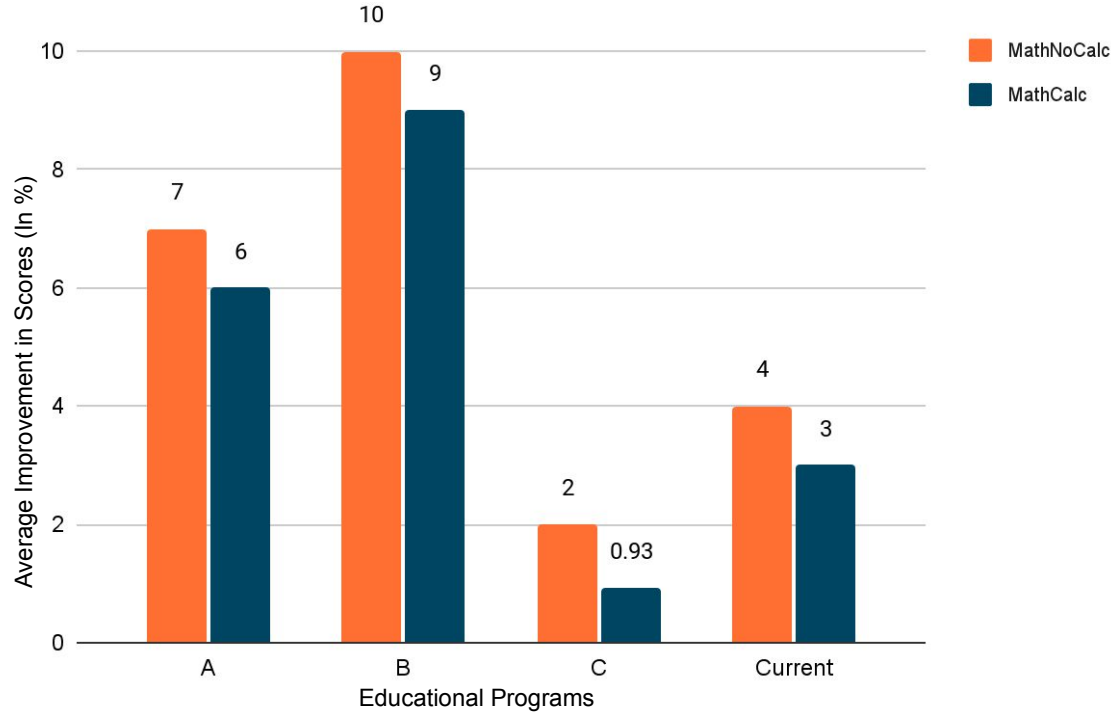


Program A shines in improving Reading and writing Scores!



- Compared to current programme, On Average, Program A **improved Reading and Writing scores by 3%**
- Program C **decreased average improvement** scores in both reading and writing.

Program B improved Math Scores!



- Compared to current programme, On Average, Program B improved both Math scores by 5 %
- Program A improved both the Math scores by almost 3%
- Program C decreased both the Math Scores compared to Current Math scores.

Survey Questions — Demographic

1. Which program and course are you taking?

Program ■ Tutoring ■ Skills ■ Refresh

Course ■ Online ■ Center-based

2. How many hours per week do you spend outside of class for this program?

■ 0-2 hour ■ 2-4 hour ■ 4-6 hour ■ 6 or more hours

3. How long does it take from your home to school if you are taking off-line class?

■ less than 15 min ■ 15~30 min ■ 30~60 min ■ more than 60 min

4. What device are you using if you are taking online class?

■ Mobile ■ desktop ■ Laptop

5. What's your educational level(grade)?

(Enter grade number between 7 ~ 12)

Survey Questions – Attitude

1. How do you evaluate our program (1 for very poor, 5 for very excellent):

Class material ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

Class schedule ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

Instructor's delivery ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

Instructor's responsibility ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

Interaction with instructor ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

2. How do you evaluate the difficulty level of the program?

■ Really Hard ■ Hard ■ Neutral ■ Easy ■ Really easy

3. Do you think the difficulty level of homework/exam compare with the class content?

■ Much Harder ■ Harder ■ Same Level ■ Easier ■ Much Easier

4. This program met your expectation

■ Strongly Disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly Agree

Conclusion

Findings

- **Camas District** has the most improvement.
- **Program B** got most significant improvement of **overall score**.
- **Program A** increases average improvement of scores most in **reading and writing**.
- **Program B** is most effective in improving the scores in **Math**.

Recommendation

- Choose **Program B** to replace the current SkillsAdvantage program.

Concerns

- Time bias
- Student talent difference
- Test score reflection
- The quality of instructors
- Other competitors in the districts

Q&A

Appendix - I

Reading and writing scores regression using Quasi Experiment-

```
Call:
lm(formula = score_reading ~ factor(program) * factor(educational_program),
    data = data)

Residuals:
    Min       1Q   Median       3Q      Max
-327.11 -64.37   4.61   67.65  209.73

Coefficients:
              (Intercept)              599.389              3.284 182.513 <2e-16 ***
factor(program)skills              6.489              4.702   1.380   0.1676
factor(educational_program)A      -1.782              4.186  -0.426   0.6703
factor(educational_program)B      -9.116              4.610  -1.977   0.0480 *
factor(educational_program)C       6.807              4.922   1.383   0.1667
factor(program)skills:factor(educational_program)A 13.250              6.013   2.204   0.0276 *
factor(program)skills:factor(educational_program)B  3.345              6.644   0.503   0.6147
factor(program)skills:factor(educational_program)C -9.319              7.001  -1.331   0.1832
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 94.33 on 7082 degrees of freedom
Multiple R-squared:  0.007199, Adjusted R-squared:  0.006218
F-statistic: 7.336 on 7 and 7082 DF, p-value: 8.442e-09
```

```
Call:
lm(formula = score_writing ~ factor(program) * factor(educational_program),
    data = data)

Residuals:
    Min       1Q   Median       3Q      Max
-52.277 -9.920  -0.277  10.080  49.343

Coefficients:
              (Intercept)              49.8133              0.5287  94.226 <2e-16 ***
factor(program)skills              1.1065              0.7569   1.462   0.144
factor(educational_program)A       0.8435              0.6739   1.252   0.211
factor(educational_program)B      -0.4851              0.7421  -0.654   0.513
factor(educational_program)C       0.6806              0.7923   0.859   0.390
factor(program)skills:factor(educational_program)A 1.5136              0.9680   1.564   0.118
factor(program)skills:factor(educational_program)B  0.6680              1.0695   0.625   0.532
factor(program)skills:factor(educational_program)C -1.1814              1.1269  -1.048   0.295
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 15.18 on 7082 degrees of freedom
Multiple R-squared:  0.006281, Adjusted R-squared:  0.005299
F-statistic: 6.395 on 7 and 7082 DF, p-value: 1.608e-07
```

Appendix - II

Math scores regression using Quasi Experiment-

```
Call:
lm(formula = score_mathNoCalc ~ factor(program) * factor(educational_program),
    data = data)

Residuals:
    Min       1Q   Median       3Q      Max
-432.31 -114.92  -16.92   134.73   311.70

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      488.145     5.151   94.764 < 2e-16 ***
factor(program)skills      14.961     7.375    2.029  0.04252 *
factor(educational_program)A    -3.567     6.566   -0.543  0.58703
factor(educational_program)B   -19.025     7.231   -2.631  0.00853 **
factor(educational_program)C    -7.843     7.720   -1.016  0.30969
factor(program)skills:factor(educational_program)A  13.734     9.432    1.456  0.14539
factor(program)skills:factor(educational_program)B  27.843    10.421    2.672  0.00756 **
factor(program)skills:factor(educational_program)C  -7.950    10.980   -0.724  0.46906
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 148 on 7082 degrees of freedom
Multiple R-squared:  0.0101,    Adjusted R-squared:  0.009122
F-statistic: 10.32 on 7 and 7082 DF,  p-value: 6.047e-13
```

```
Call:
lm(formula = score_mathCalc ~ factor(program) * factor(educational_program),
    data = data)

Residuals:
    Min       1Q   Median       3Q      Max
-554.14  -83.53   16.56  100.10  253.94

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      562.8788     4.6664 120.625 < 2e-16 ***
factor(program)skills      8.1403     6.6806    1.219  0.22307
factor(educational_program)A   -9.9280     5.9485   -1.669  0.09516 .
factor(educational_program)B  -16.8153     6.5505   -2.567  0.01028 *
factor(educational_program)C   -0.4362     6.9937   -0.062  0.95027
factor(program)skills:factor(educational_program)A  15.0905     8.5440    1.766  0.07740 .
factor(program)skills:factor(educational_program)B  25.3540     9.4406    2.686  0.00726 **
factor(program)skills:factor(educational_program)C  -4.4437     9.9470   -0.447  0.65508
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 134 on 7082 degrees of freedom
Multiple R-squared:  0.0066,    Adjusted R-squared:  0.005618
F-statistic: 6.721 on 7 and 7082 DF,  p-value: 5.812e-08
```