

Supplement 1

Figure S1. Logic Model for iRAISE

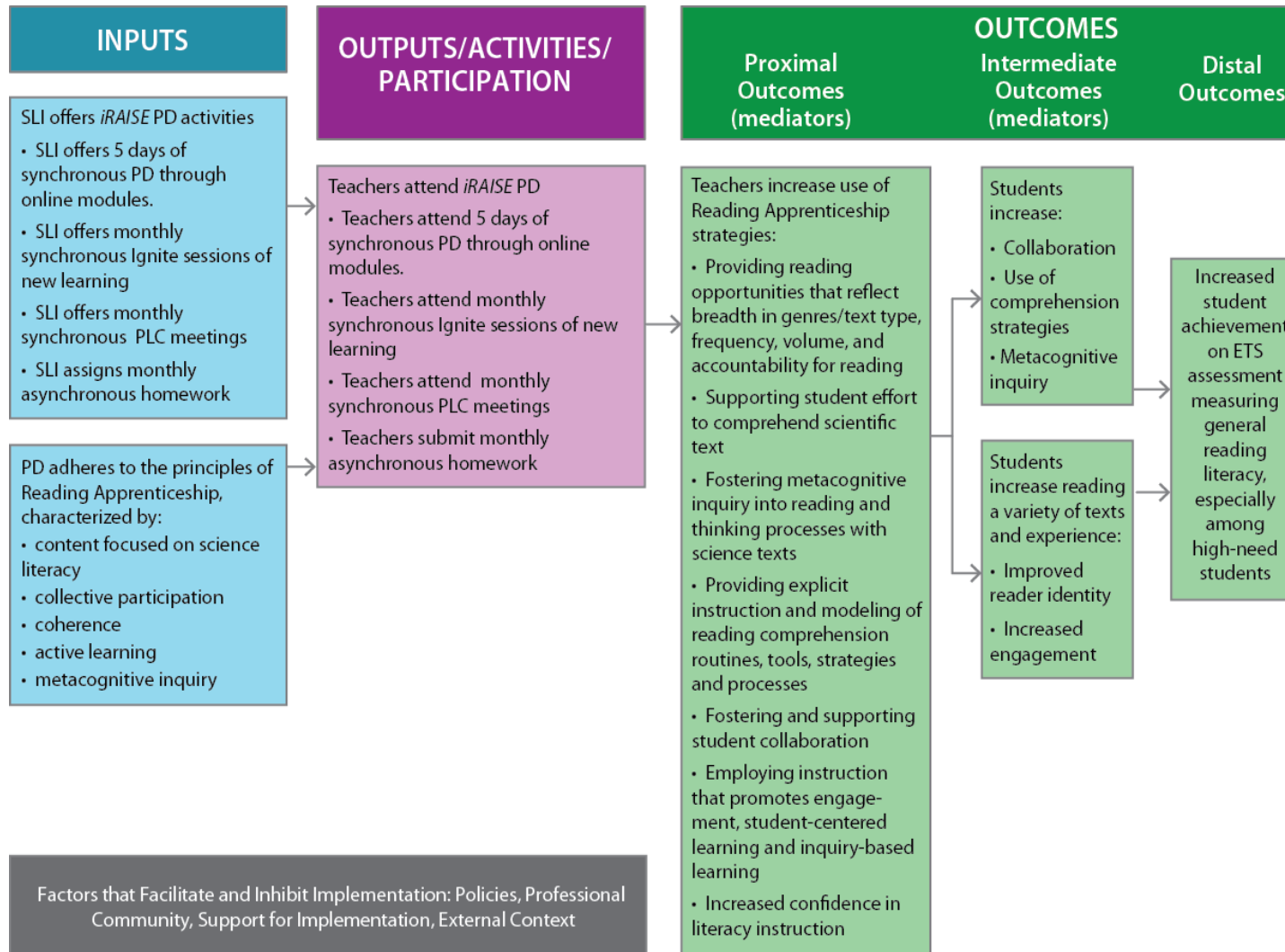


Table S1. Summary Table Comparing Models used to Obtain Predicted Implementation Values

Implementation Metric		R-squared, Adjusted R-Squared (Proportion of Variance in FOImp* explained by teacher-level baseline covariates)	Correlation between FOImp (i.e., measured) and FOImp* (i.e., predicted) in the treatment condition	Differential impact across levels of predicted implementation (differential impact is reported in scale score units)
COLUMN:				
CA	Model A	.817, .645, J=35	.903 ($p<.001$), J=35	-0.0164 (SE=.031), DF=1396, $t=-.54$ $p=.592$, J=68, J(T)=35, J(C)=33 n=1462,
	Model B	.922, .849 J=33	.918 ($p<.001$), J=33	0.009 (SE=.029), DF=1348, $t=.31$ $p=.758$, J=66, J(T)=33, J(C)=33, n=1414
	Theoretical Model	.416, -.071 J=34	.645 ($p<.001$), J=34	-0.009 (SE=.047), DF=1368, $t=-.20$ $p=.844$, J=67, J(T)=34, J(C)=33, n=1434
MA	Model A	.844, .687, J=34	.919 ($p<.0001$), J=34	0.024 (SE=.030), DF=1368, $t=.78$ $p=.435$, J=67, J(T)=34, J(C)=33 n=1434,
	Model B	.920, .842, J=34	.872 ($p<.0001$), J=34	0.015 (SE=.026), DF=1396, $t=0.58$ $p=.563$, J=68, J(T)=34, J(C)=34 n=1462,
	Theoretical Model	.384, -.129, J=34	.620 ($p<.0001$), J=34	0.032 (SE=.040), DF=1368, $t=.81$ $p=.420$, J=67, J(T)=34, J(C)=33 n=1434,
CAR	Model A	.891, .789, J=34	.919 ($p<.0001$), J=34	-0.024 (SE=.036), DF=1396, $t=-.65$ $p=.516$, J=68, J(T)=34, J(C)=34 n=1462,
	Model B	.950, .900 J=34	.872 ($p<.0001$), J=34	0.000 (SE=.034), DF=1368, $t=0.00$ $p=.996$, J=68, J(T)=34, J(C)=34 n=1434,
	Theoretical Model	.496, .076, J=34	.620 ($p<.0001$), J=34	-.022 (SE=.050), DF=1368, $t=-.45$ $p=.654$, J=67, J(T)=34, J(C)=33 n=1434,
MAR	Model A	.912, .556, J=34	.955 ($p<.0001$), J=34	0.016 (SE=.036), DF=1396, $t=.45$ $p=.656$, J=68, J(T)=34, J(C)=34 n=1462,
	Model B	.922, .848, J=34	.838 ($p<.0001$), J=34	0.017 (SE=.049), DF=1396, $t=.34$ $p=.733$, J=68, J(T)=34, J(C)=34 n=1462,
	Theoretical Model	.425, -.054, J=34	.652 ($p<.0001$), J=34	0.071 (SE=.057), DF=1396, $t=1.24$ $p=.214$, J=68, J(T)=34, J(C)=34 n=1434,
AVER AGE	Model A	.926, .828 J=29	.962 ($p<.001$), J=29	.040 (SE=.029) DF=1396, $t=1.37$ $p=.171$, J=68, J(T)=34, J(C)=34 n=1462, n(T)= 711 n(C)=751
	Model B	.909, .787, J=29	.988 ($p<.001$), J=28	.042 (SE=.03) DF=1348, $t=1.65$ $p=.098$ J=66, J(T)=33, J(C)=33 n=1414, n(T)= 691 n(C)=723

	Theoretical Model	.791, .549, J=29	.889 (p<.001), J=29	.047 (SE=.035) DF=1368, t=1.36 p=.174, J=67, J(T)=34, J(C)=33 n=1434, n(T)= 711 n(C)=723
HOLISTIC	Model A	.916, .805 J=29	.957 (p<.001), J=29	.026 (SE=.016) DF=1368, t=1.68 p=.094, J=67, J(T)=34, J(C)=33 n=1434, n(T)= 711 n(C)=723
	Model B	.976, .930 J=29	.967 (p<.001), J=29	.022 (SE=.014) DF=1396, t=1.58 p=.114, J=68, J(T)=34, J(C)=34 n=1462, n(T)= 711 n(C)=751
	Theoretical Model	.762, .486, J=29	.872 (p<.001), J=29	.028 (SE=.020) DF=1368, t=1.39 p=.164, J=67, J(T)=34, J(C)=33 n=1434, n(T)= 711 n(C)=723

Table S2. Summary of Facilitators' Ratings of Teachers' Levels of Implementation

	0 (some of these also included no evidence.)	1	2	3
Using core RA practices	Shows no evidence. Prioritizes competing initiatives. Experiences difficulty “meshing methods” using iRAISE and other approaches. Aims to make iRAISE “fit her style”.	Struggles with some elements of iRAISE. Is inconsistent in use of specific elements of iRAISE. Tries just some elements. Has difficult getting students to engage.	Tries some core routines. Shows consistent use of core routines. Shows intermittent and experiences challenges but demonstrates effort.	Tries many, including core, routines. Demonstrates multiple iRAISE practices through student work. Shows awareness of the learning culture.
Attention to student thinking	Shows no evidence. Is in a situation where only some students are engaging. Focuses on ‘compliance’ over engagement with text, thinking and learning. Focuses on “knowledge attainment”	Focuses on covering content (and related routines, such as teaching students to take detailed notes.) Is frustrated by students’ inability to engage in iRAISE strategies. Displays improvement with students’ engagement with text. Assumes students already know how to handle difficult text. Considers students to be stalled in depth of thinking. Understands the principles but does not apply them.	Uses evidence of students’ thinking to determine implementation success/ challenge. Is concerned that with use of new text students’ level of thinking is going down, but is persevering. Uses strategies that continue to evolve and to deepen student thinking. Experiences insight into the process: “today I got that talking to the text is truly the beginning of the conversation”. Has insight that by making thoughts visible a student can see misconceptions. Continues to focus on “right/wrong” of content answers. Focuses on students’ sense of security in participating in the classroom,	Puts student thinking at the center of teaching. Is responsive to student thinking. Student work evidences increased engagement with text over time. Shows student questioning, making connections in student work. increasing engagement with text over time, making inferences, summarizing text. Teacher is “learner-focused and her thoughts center on student engagement and thinking”. Expresses concern with student risk-taking in sharing thinking. Stresses the importance of student voice in the class. Recognizes stages students go through in acquiring skills through iRAISE.

			but consider it “a work in progress”.	
Persistence in problem-solving implementation	Struggles with “opportunities for reading, student engagement, and student discourse”. Focuses on the struggles of implementation. Expresses attitude that additional text functions only to make the subject matter more interesting. Focuses on perceived need to have students learn to take detailed notes. Says will get to iRAISE strategies after teaching them the basics. Is content to do iRAISE “once in a while”.	Is receptive to new ideas but shows limited implementation. Admits struggling as a reader herself, Admits lack of confidence in modeling for students. Persists with some elements of iRAISE but gives up on others after trying once. Feels students don’t have ability to engage with text on deep level. Does not try to deepen or expand implementation. Believes it is not his/her role to support students with reading in science. Shares that s/he struggled as a learner and is not sure how to support students. Wants more subject-specific examples.	Feels supported by the Professional Learning Community, but not by the school. Does not implement deeply or get at core practices. Expresses a lack of confidence in use of methods and using a tinkering approach. Is consistent with implementation, and is constantly strategizing. Consider strategies to support students with “new text”, such as modeling with new text. Grapples with overuse of underlining as a strategy by students. Notes time for implementing iRAISE is a challenge. Expresses confidence in making mistakes. States a need to have the opportunity to dialogue with someone in the district. Expresses difficulty finding activity to support text.	Resolves challenges by going back to drawing board. Exhibits confident and thoughtful implementation. Is resilient: tweaks and tries again. “Digs into core routines and layers practices...asks probing questions.” Uses student work samples to analyze evidence of student thinking. Wants to help other teachers with her approaches. Is persistent in core practices and grows during the year. Is flexible in implementing iRAISE based on students’ needs. Is persistent with implementation even if does not seem to be working. Admits sometimes not knowing “where to go” with student work and responses.
Use of text	Relies on notes in lecture form. Relies primarily on the textbook for student reading. Is aware of but does not use diverse text.	Uses her notes at text. Says s/he does not have time to find new texts. Tries pulling in additional texts. Relies mostly on the textbook. Exhibits limited use of rich/diverse text.	Tries to increase level of text complexity, but it is hard to find in Chemistry. Uses a range of texts. States challenge of finding more resources.	Uses multiple text types, and increases complexity with time (evident in samples). Grapples with challenges of using text. Describes implications for instruction and learning of using different text / resources.

	0	1	2	3	4	5
Overall	Focuses on covering content and struggles with social dimension of her class. Gave up in face of “students’ apathy”. Sees iRAISE as separate entity – students should be “working on it on their own”. Shows “minimal perseverance with framework.” Implements “at surface”. Considers it “hard to get new students on board”. Is cautious with thoughtful attention to the few students who are engaging (in an online learning environment); Sees student collaboration as “lacking depth of student thinking and speaking”. Expresses concerns with time and grading for completion. Admits “just doing bits for the experience”. Does not understand social dimension of RA framework. Responds to student work in a critical way.	Struggles with own reading. Expresses discomfort with certain strategies (metacognitive conversations.) Feels student don’t have abilities to do challenging work. Tried some strategies, but struggled with the “social dimension of class”. Has limited belief in students’ abilities. Focuses on covering content. Struggles with buying into iRAISE. Sees program as an “add on” and students should be “working on it on their own”. Discontinues use after a certain amount of time.	Maintains barriers to implementation. Lacks confidence to try new things on her own. Uses some core routines but practice falls flat in terms of deepening student thinking. Shows limited depth in personal and social processes utilizing metacognition, which would contribute to knowledge building. Exhibits less than frequent use of the program.	Looks forward to also using the program the following year. Exhibits exemplary persistence even when struggling with some aspects e.g., building the social/personal dimension in activity.	Supported students to read, think and talk like scientists, but caved in to pressures to cover content from colleagues. Understand iRAISE and relies on colleague for support.	Understands the framework deeply. Becomes program leader on staff. Connects core routines, and personal and social dimensions. Shows evidence of knowledge building that culminates in sense making, and is deeply aware of students’ processes: monitoring and documenting their thinking and sharing ideas and knowledge building. Adjusts program strategies based on students’ needs.