Research & Creativity Week
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New Mexico State University

Elements of Professional Development for SAMR Technology Integration in the Early Elementary Grades

Dissertation
by
Cassie Y. Froemming, PhD

Committee Members

- Dr. Lauren Cifuentes, Chair
- Dr. Lynette Bagwell
- Dr. Luis Huerta
- Dr. Barbara Chamberlin

Cassie Froemming

- Educator 25+ Years
- Former Elementary Teacher
- Teacher Educator
- University Supervisor
- Literacy & Co-Teaching Specialist
- Seesaw Ambassador
- Researcher

Outline

- Introduction
- Literature Review
- Methods
- Findings
- Limitations
- Discussion
- Conclusion

Background Information

Technology is beneficial for children when it is

developmentally appropriate

and

purposeful.

Guernsey & Levine, 2015

Change the World!

Introduction

Problem

K-3
Technology Professional Development

- Access & Use
- Learning Demands
- Want Technology PD
- Model Not Fully Developed

Introduction

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Purpose

Elements of Professional Development

- Adoption
- Purposeful Integration

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Elements of Professional Development

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Significance

Practice & Theory

- Social-Constructivism
- Developmentally Appropriate Practice
- Diffusion of Innovations
- Technology Integration
- Professional Development

Literature Review

Pedagogy

Scaffolded
(Madson & Edmunds, 2007; Duffy & Jona

Learner-Centered & Personalized
(Wolfe, 2013; Duffy & Jonassen, 2013; Cator, 2014; Johnson, 2016; Demonte, 2017; Darling-Hammond, 2009)

In-House Tech Coaching
(Delaney, 2011; Blair,2012; Duffy & Jon
Flanigan, 2013; Ehsanipour & Zaccerel
Quintero, 2019)

SAMR to Tool Use
(Flanigan, 2013; Hamilton, 2016; Terada 2020)

Developmentally Appropriate Practice
(Ertmer & Ottenbreit-Leftwich, 2010; Guernsey & Levine, 2015; NAEYC & Fred Rogers, 2012; Darling-Hammond, 2017)

Reflection
(Madson & Edmunds, 2007; Wolfe, 2013; McGrath, 2020)

Cifuentes

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(Cifuentes, 2011; Delaney, 2011)

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Face-to-Face Peer Support Within Professional Learning Communities (PLCs)
(Cifuentes, 2011)

Online

Peer Support Within Online Learning Communities & Personal Learning Networks (PLNs)
(McLoughlin, 2008; Green & Cifuentes, 2011; Delaney, 2011)`

Online 1-1 Support from Knowledgeable Expert
(Office of Technology, 2017: Luckhardt, 2018)

Online Courses & On-Demand Resources
(Office of Technology, 2017: Seesaw Learning, Inc. 2020)

Digital Badging & Micro-Learning Credentials
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Literature Review

Pedagogy	Face-to-Face	Online

Volunteers

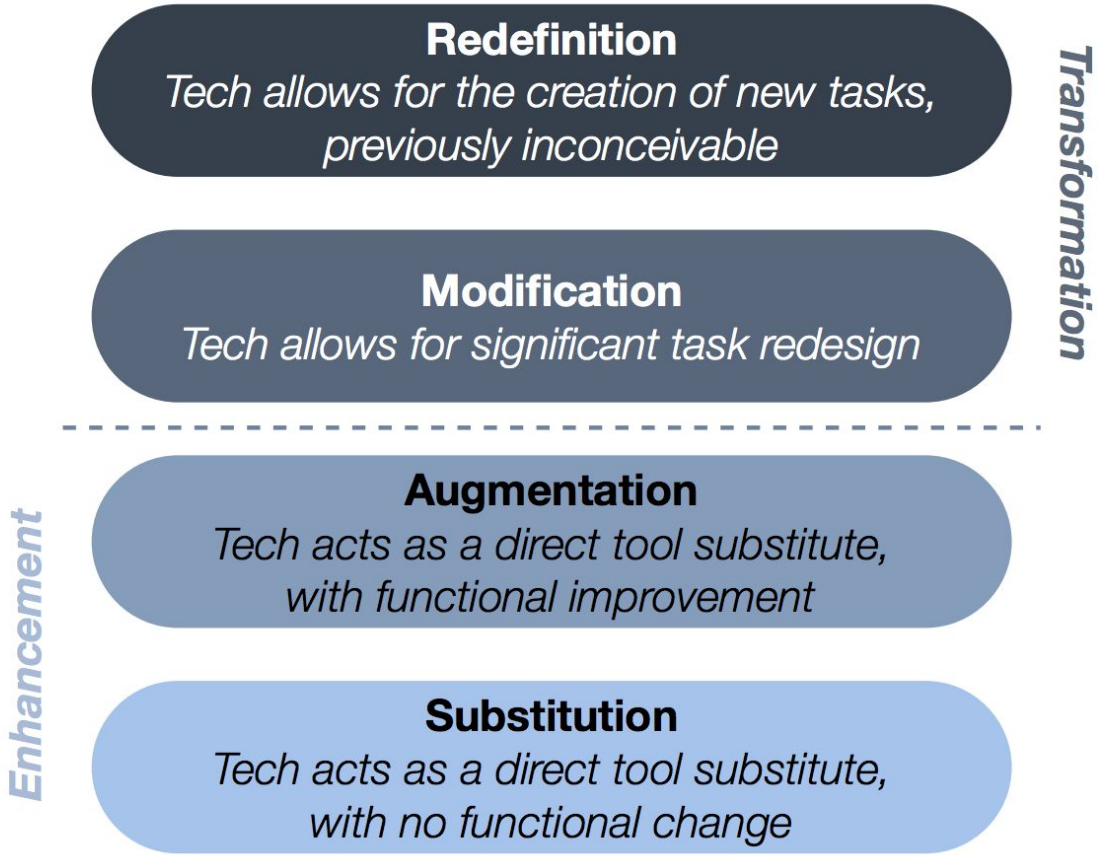
(Taylor, 2017)

?

16 Elements Under Exploration

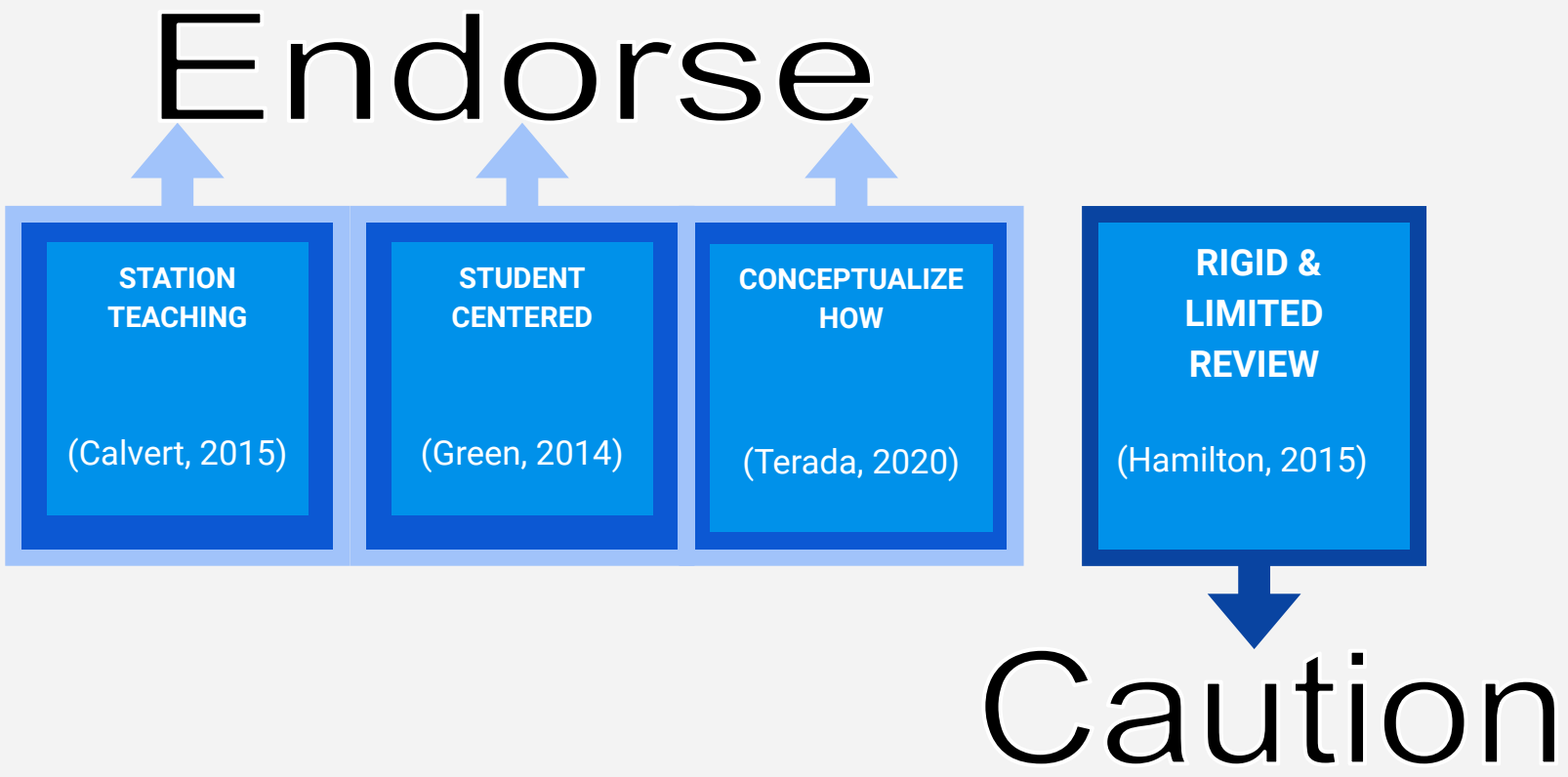
Pedagogy	Face-to-Face	Online
1. Personalization	*8. 1-1 Face-to-Face Support Workshops*	*10. 1-1 Online Peer Support*
2. Scaffolding	*9. Face-to-Face Peer Support Within Professional Learning Communities (PLCs)*	*11. Personal Learning Networks (PLNs)*
3. Learner-Centeredness		*12. Online 1-1 Support from Knowledgeable Expert*
4. In-House Tech Coach		*13. Online Course- Workshop*
5. SAMR to Tool Use		*14. Online Course- Future*
6. Developmentally Appropriate Practice		15. On-Demand Resources
7. Reflection		16. Digital Badges & Micro-Learning

SAMR MODEL

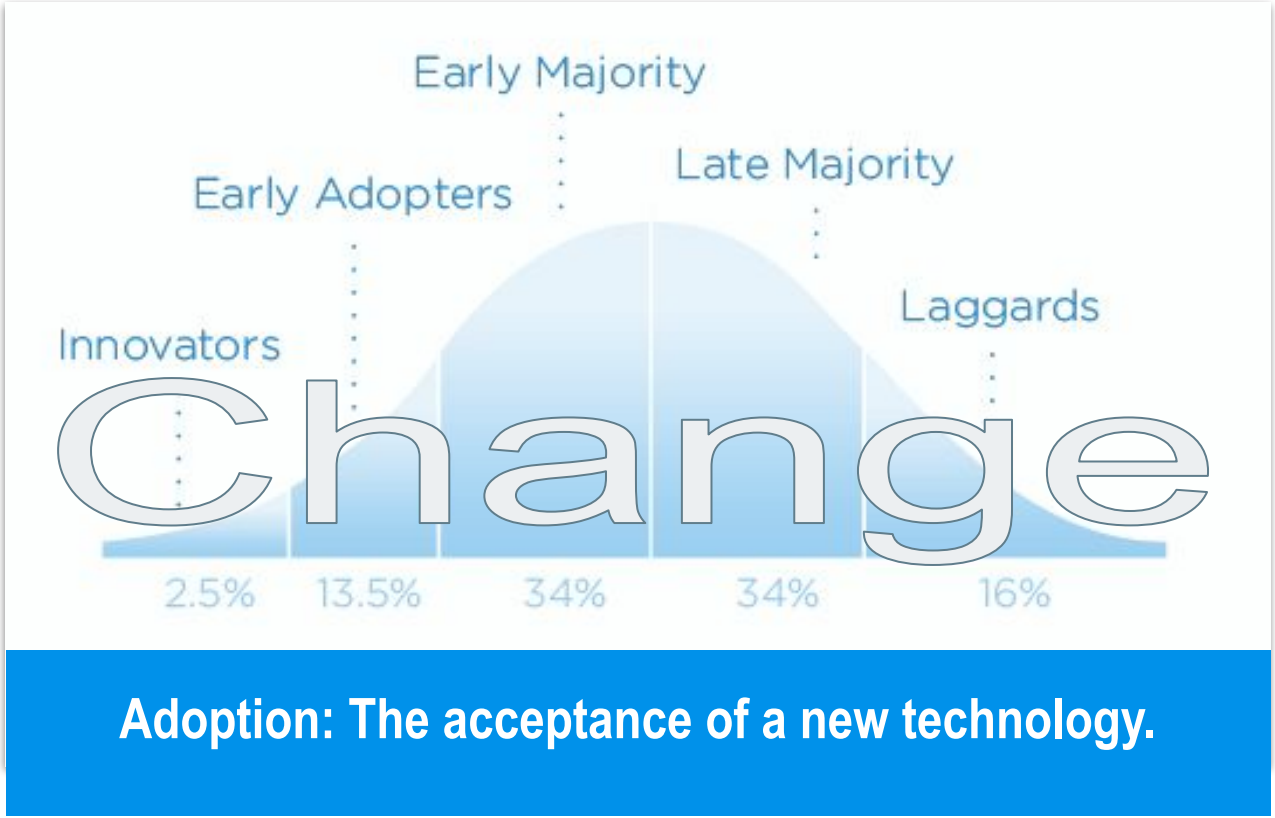


SAMR Model Graphic Source: http://hippasus.com/blog/archives/270

SAMR Model Gap



Diffusion of Innovation Theory



Adoption: The acceptance of a new technology.

Roger's *Diffusion of Innovations* by Pnautilus licensed under, CC 2.5

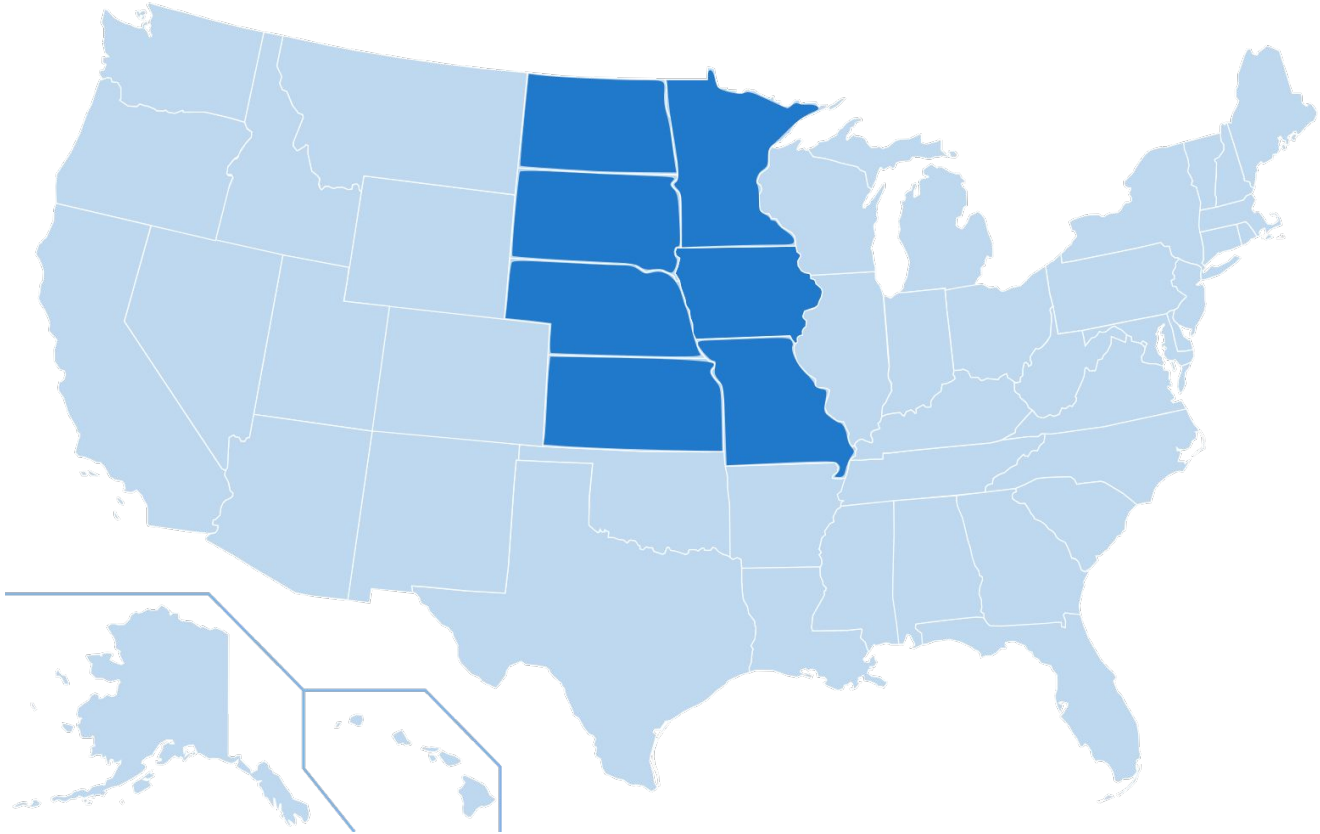
Research Question

What elements of a
SAMR focused professional development experience
facilitate K-3 teachers' change in
adoption and **purposeful integration of technology**
into their classroom teaching practices?

Methods

- Naturalistic Inquiry
- Social Constructivist Paradigm
- Educational Design Research
  - *Review Literature*
  - *Design* Intervention
  - *Evaluation for Effectiveness*
- Qualitative Methods
- Participatory Approach

Research Context



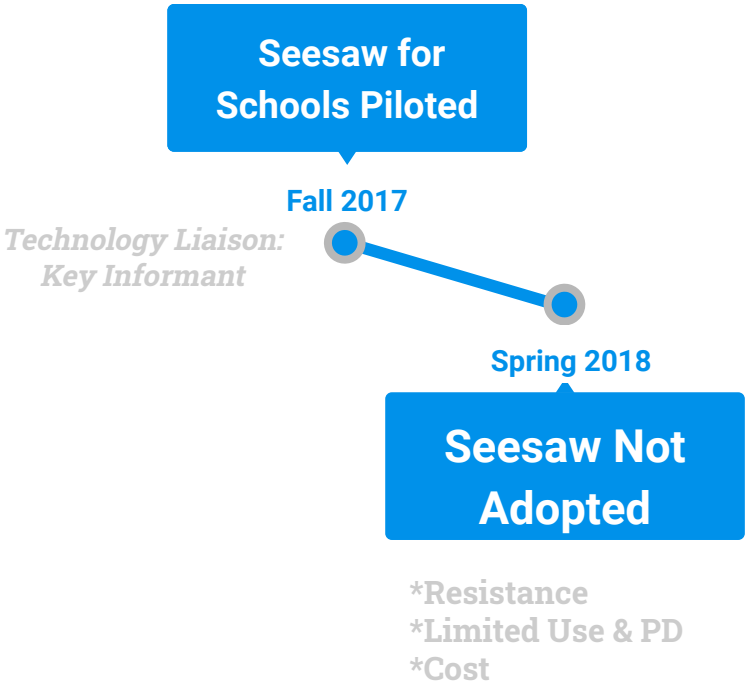
Research Context

Seesaw for Schools Piloted

Fall 2017

Technology Liaison: Key Informant

Research Context



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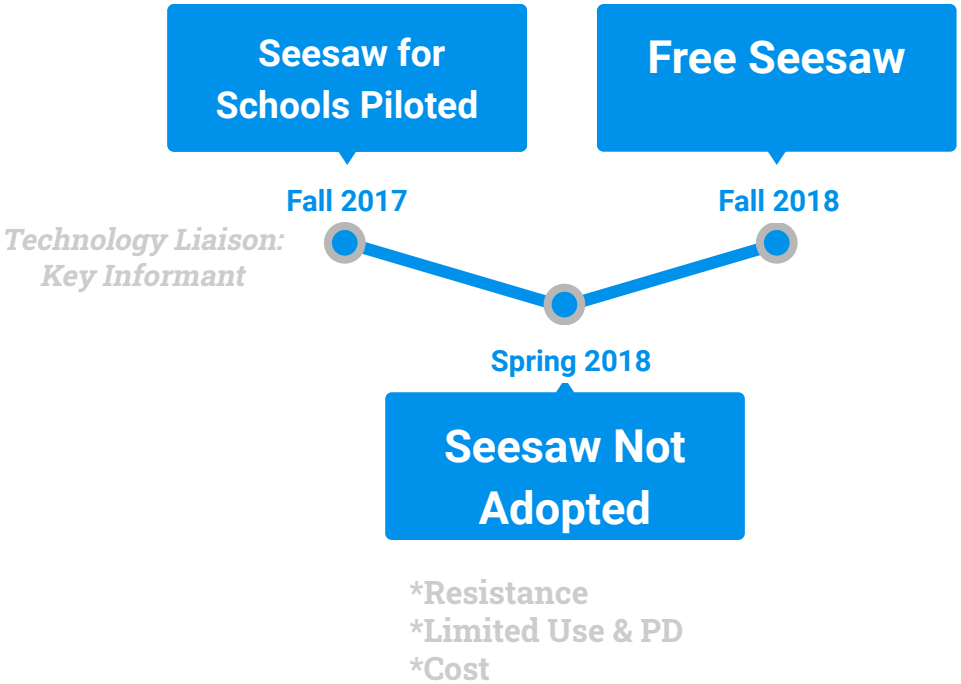

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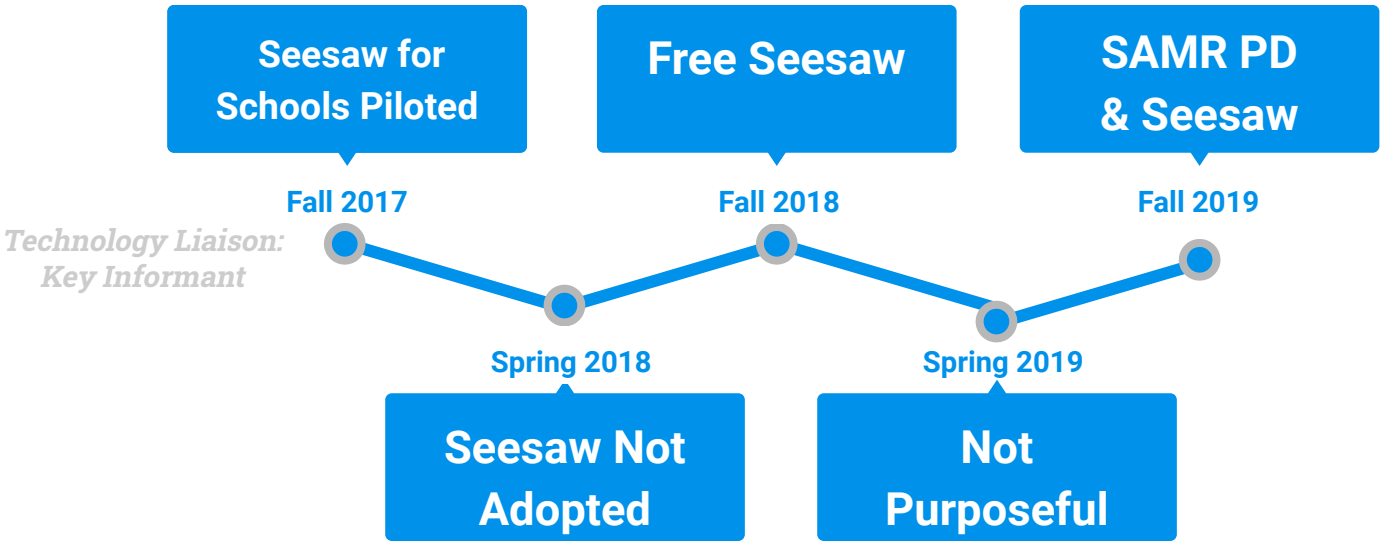

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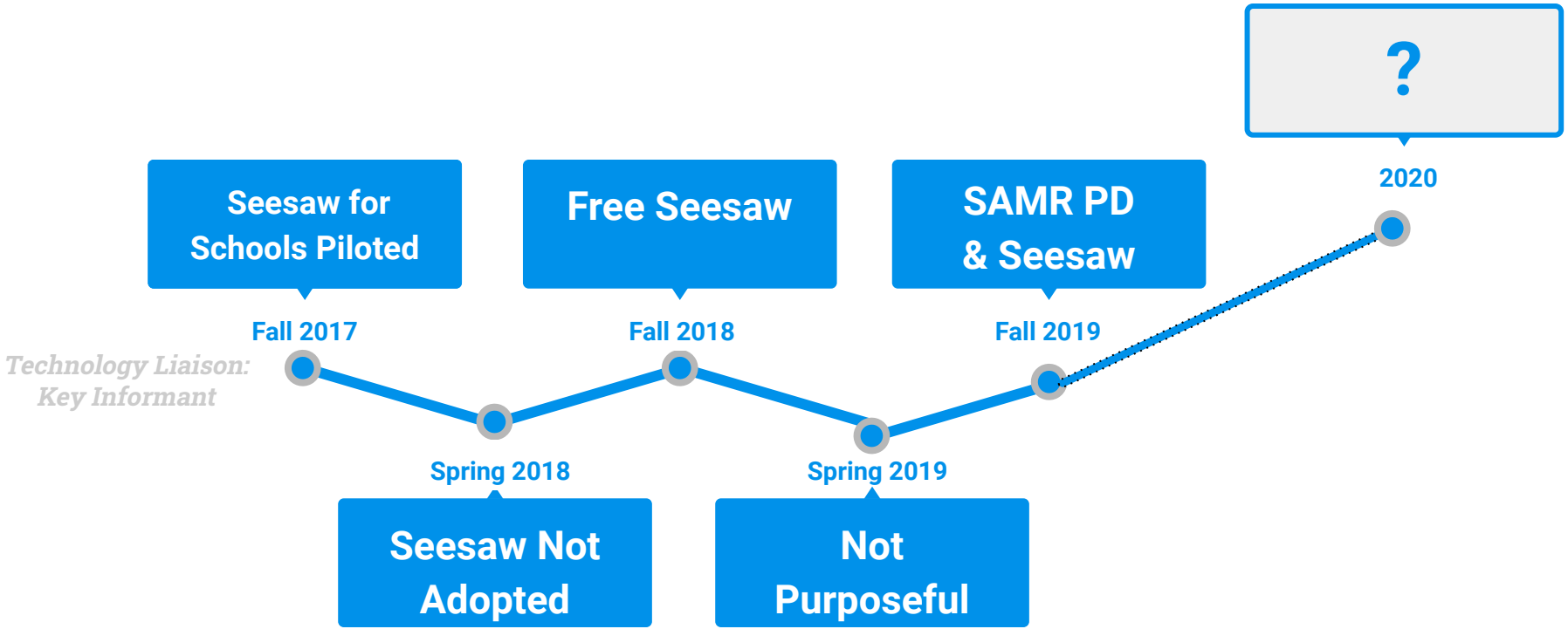
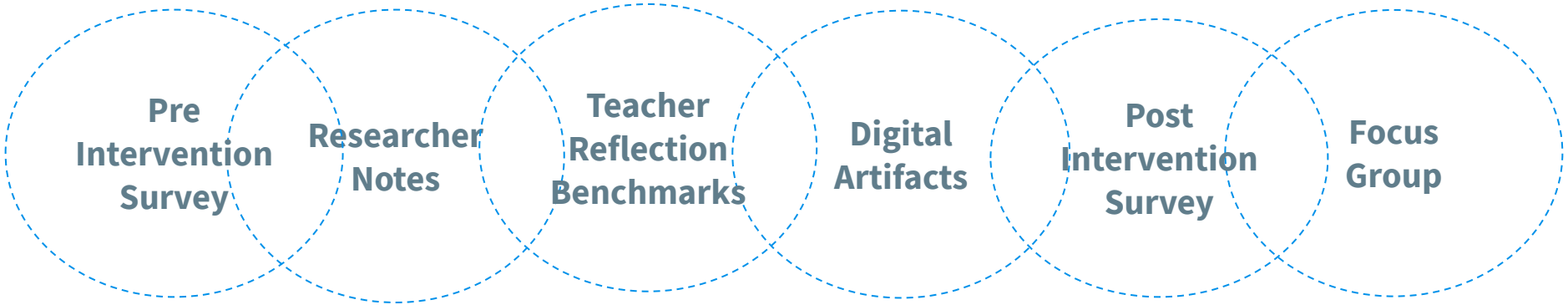


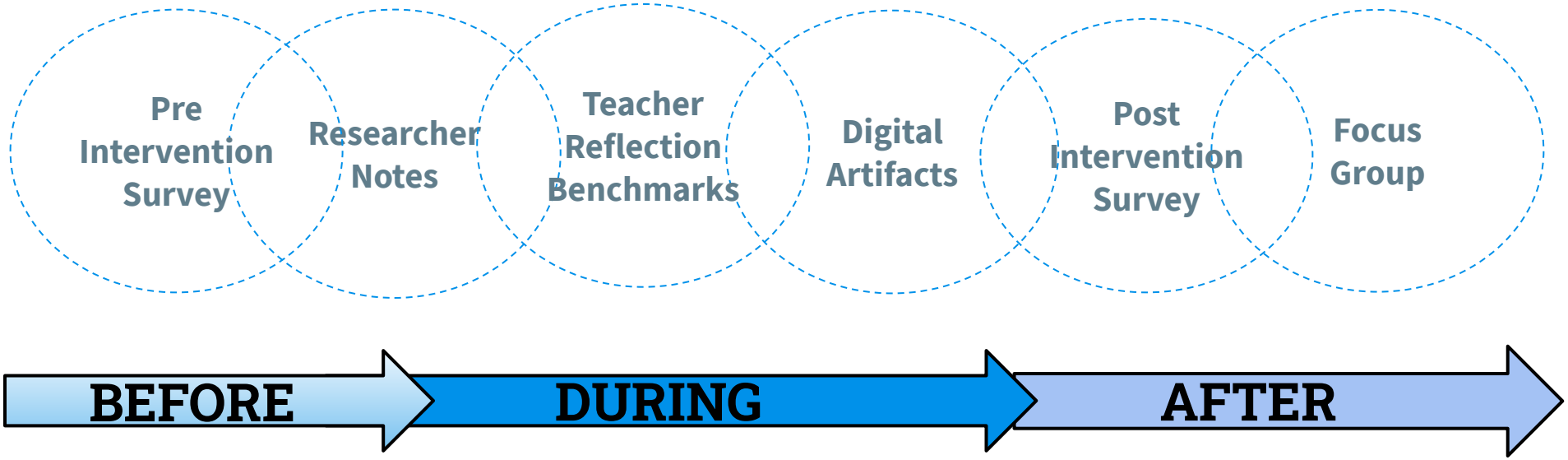
PD Participant Information

Name	Age	Gender	Ethnicity	Grade	# Yrs	Tenure
Tia	42	F	White	K	9	2019
Jory	27	M	White	1	5	2017
Celeste	46	F	White	2	23	2000
Jayla	45	F	White	3	9	2015
Kain	30	M	White	3	7	2017

Data Sources



Data Collection



Intervention:
The “K-3 Tech PD” Experience

Workshop

- One Day
- 6 Hours
- Face-to-Face
- SAMR
- Seesaw

+ Follow-Up

- 6 Wk Implementation
- Seesaw Demo Classroom - PLN
- SAMR & Seesaw Authentic Classroom

Procedures

BEFORE PD

- *Informed Consent*
- **Pre-Intervention Survey**

Procedures

BEFORE PD

- *Informed Consent*
- **Pre-Intervention Survey**

DURING PD

Workshop:

- **Digital Artifacts**

Implementation Period:

- **Digital Artifacts**
- **Teacher Reflection Benchmarks/ Self-Reported Competencies**

Procedures

BEFORE PD

- *Informed Consent*
- **Pre-Intervention Survey**

DURING PD

Workshop:

- **Digital Artifacts**

Implementation Period:

- **Digital Artifacts**
- **Teacher Reflection**
- **Benchmarks/ Self-Reported Competencies**

AFTER PD

- **Post-Intervention Survey**
- **Focus Group**

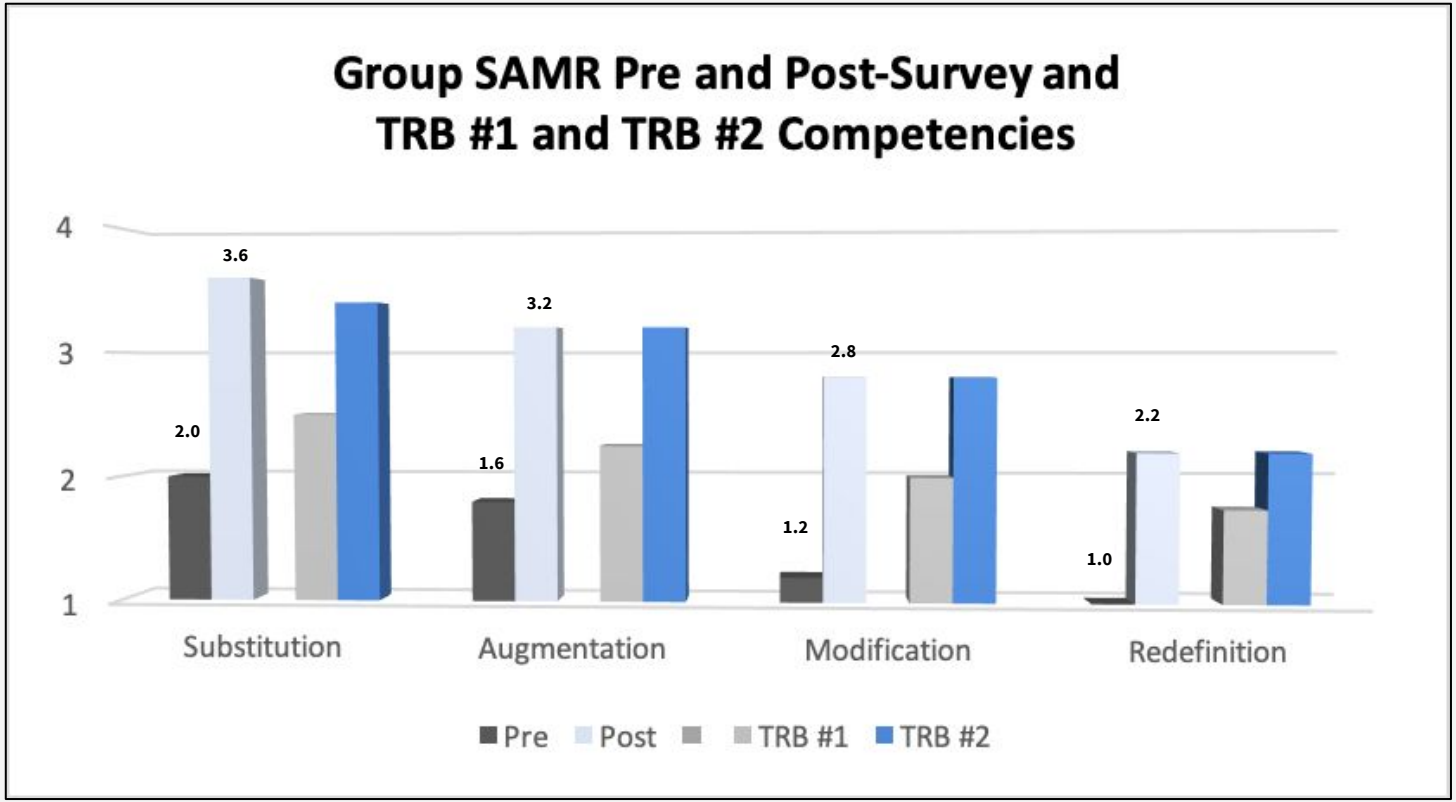
Data Analysis

Clean Read Categories Focused Coding Individual Holistic Member Checking

Findings

Teacher	Pre-Intervention Characteristics	Adoption	Integration	Overcame Challenges	Elements
Celeste	-Laggard -Fear & Frustration	X	X	X	X
Ayla	-Late Adopter or Laggard -Content with current tech -Seeking more support	X	X	X	X
Kain	-Innovator -Growth Mindset -Team Oriented	X	X	X	X
Tia	-Early Adopter -Growth Mindset	X	X	X	X
Jory	-Early Adopter -Independent	X	X	X	X

Evidence of Purposeful Integration

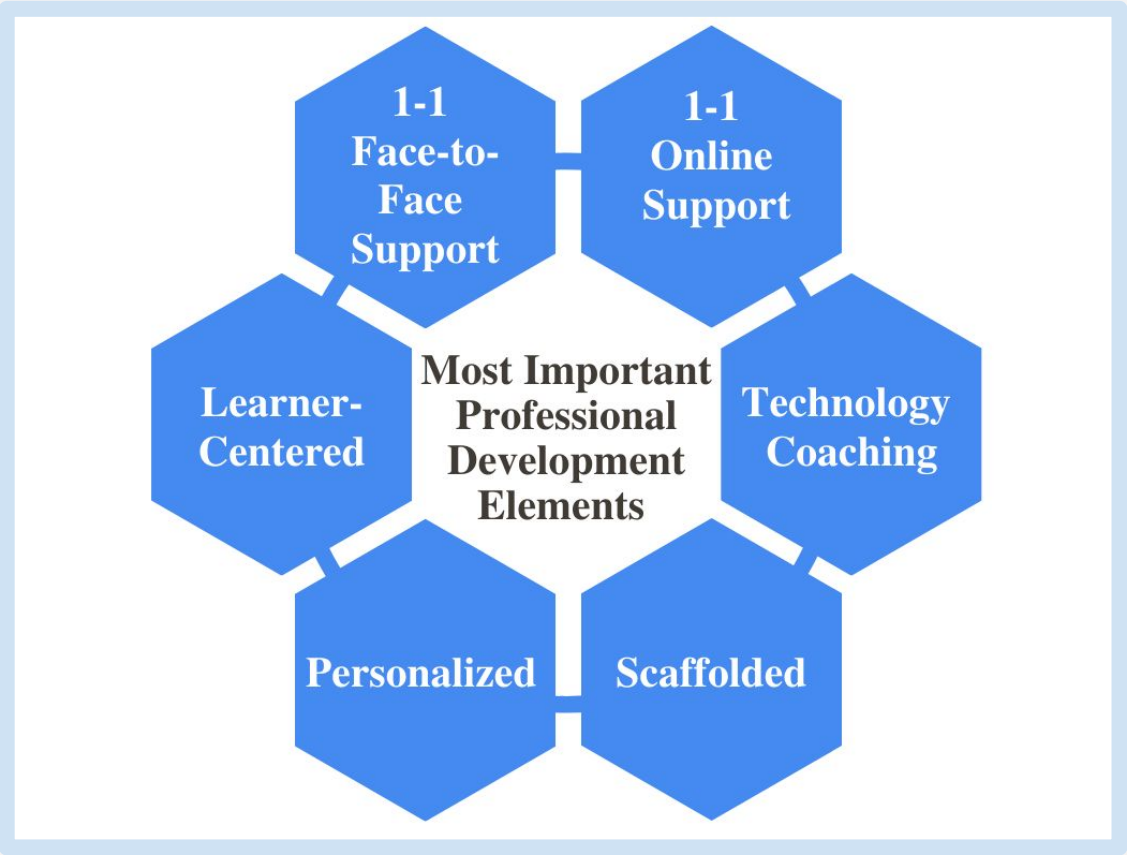


1 - *Beginning* 2 - *Developing* 3 - *Proficient* 4 - *Advanced*

16 PD Elements That Worked

- Personalization
- Scaffolding
- Learner-Centeredness
- An in-house tech coach
- Applying SAMR to tool use
- A focus on Developmentally Appropropriate Practice
- Opportunities for reflection
- One-to-one face-to-face support
- Face-to-face peer support
- One-to-One online support
- An online PLN
- Online course-workshop
- Online course-future
- Access to on-demand resources
- Micro-learning* *Excludes digital badges*

Most Important PD Elements



Emergent Findings

Beyond the 16 Elements Identified in the Literature

- Pacing
- Empathy
- Best Practices
- Learn with Students
- Student Engagement
- Modeling
- Stations
- Team Oriented
- Learning in Smaller Chunks
- Engagement
- Trust (Gwen)
- Feedback
- Time for Exploration
- Benchmarks
- Practical Application

Noteworthy Finding

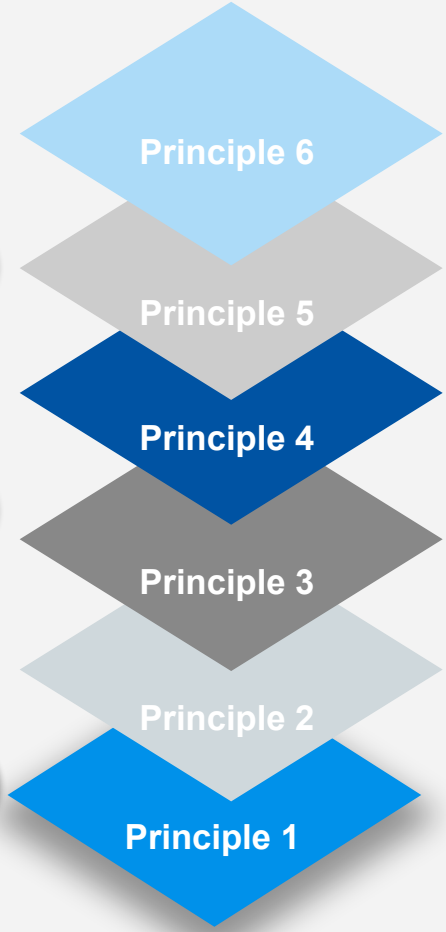
Practical Application

Learning is promoted when new knowledge is demonstrated.
(Merrill, 2013).

Limitations

Seesaw K-3	Hierarchy	Schedule	Needs	Digital
Experience	Tech Liaison	Closures	Methods	Transparency
Tech Liaison	Tenure	Digital Tools	Covid-19	No Transcription
Rapport & Balance (Creswell, 2018)	**Participatory** (Jacobs, 2016)	**Flexible Design** (Creswell, 2018)	**Decision Making** (Creswell, 2018)	**Unobtrusive** (Creswell, 2018)

Guiding Principles for "K-3 Tech PD"



6 Combine Elements to Maximize & Sustain Learning

5 Include Volunteers Facilitate Change

4 Provide Technology Coaching & Personalization

3 Help Conceptualize with SAMR

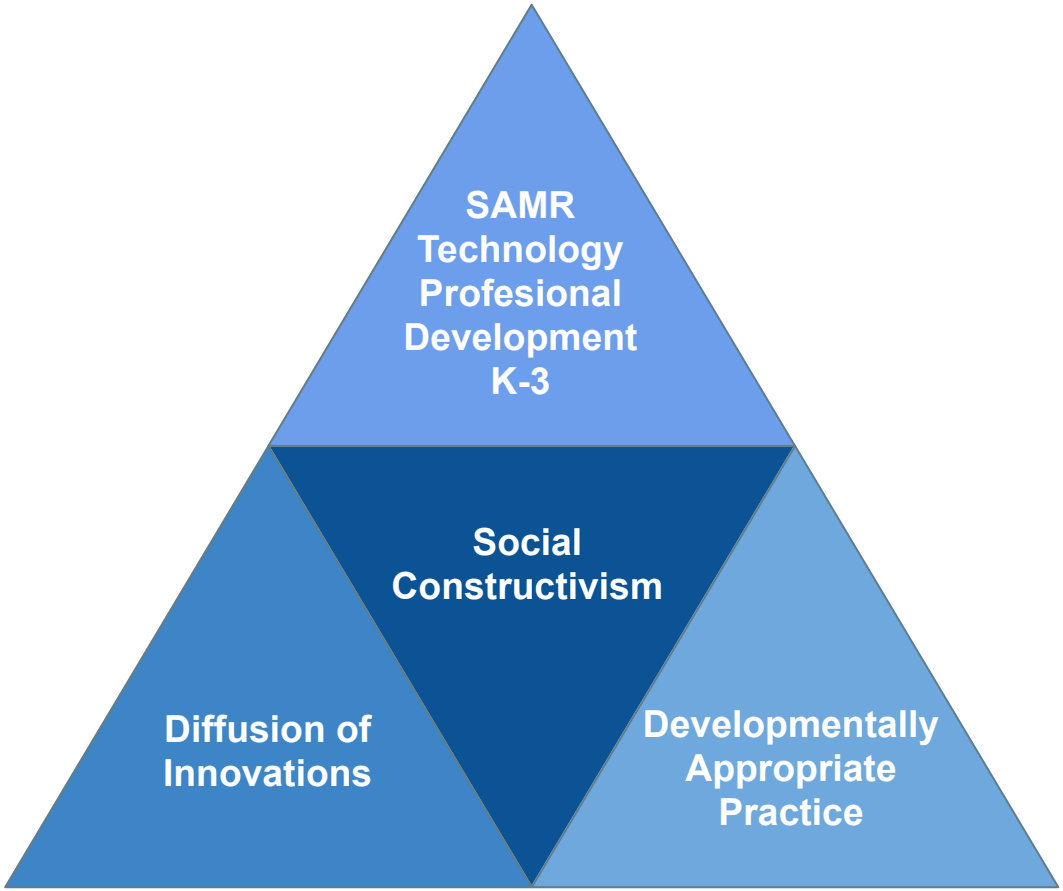
2 Offer Constructivist Learning Opportunities

1 Minimize Negative Teacher Perceptions

Recommendations for Future Research

1. Technology integration models.
2. Extension of learning with SAMR.
3. Perceptions of SAMR and curriculum alignment.
4. Online teaching methods, platforms, & tools.
5. Digital divide and Seesaw potential.

Conclusion


SAMR
Technology
Profesional
Development
K-3
Social
Constructivism
Diffusion of
Innovations
Developmentally
Appropriate
Practice

SAMR

One Heart.

One Voice.

MODEL

Questions & Answers

For a K-3 Tech PD Teaser, click here!
For highlights of the professional development experience, click here !

Email for further information or questions:

Cassie Froemming

cassief@nmsu.edu

Thank you for taking time to learn about this important, timely & relevant study!

References

REFERENCES

Blair, N. (2012). Technology integration for the new 21st century learner. *Principal, (January/February)*, 8-13. https://www.naesp.org/sites/default/files/Blair_JF12.pdf

Bradshaw, A. (2017). Critical pedagogy and educational technology. In *Culture, learning and technology: Research and practice* (pp. 8-27). New York, NY: Routledge.

Christensen, R., & Knezek, G. (2008). Self-report measures and findings for information technology attitudes and competencies. *International Handbook of Information Technology in Primary and Secondary Education*, 349-365. https://doi.org/10.1007/978-0-387-73315-9_21

Cifuentes, L., Maxwell, G., & Bulu, S. (2011). Technology integration through professional learning community. *Journal of Educational Computing Research*, *44*(1), 59-82. doi:10.2190/EC.44.1.d

Cifuentes, L., & Vilbert, L. (May, 2014). Digital Literacy and Critical Thinking. In J. M. Spector (Ed*.), Encyclopedia of Educational Technology*. San Francisco: Sage.

ClassDojo, Inc. (2020). ClassDojo (Version 7.5.0) [Mobile application software]. App store. https://itunes.apple.com/

Collins C. (2020, April 23). *Teaching through coronavirus: What educators need right now*. Teaching Tolerance. https://www.tolerance.org/magazine/teaching-through-coronavirus-what-educators-need-right-now

Common Sense Media. (2017). How tech is changing childhood: And what we're doing about it. https://www.commonsense.org/our-impact/

Common Sense Media. (2020, March 17). *Common sense launches online COVID-19 resource hub for families and educators.* https://www.commonsensemedia.org/about-us/news/press-releases/common-sense-launches-online-covid-19-resource-hub-for-families-and

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oakes, CA: SAGE Publications, Inc.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks, CA: SAGE Publications.

Delaney, M. (2011). *Training teachers to integrate technology: How stronger professional development can boost ed-tech success*. https://edtechmagazine.com/k12/article/2011/11/training-teachers-integrate-technology

Duffy, T. M., & Jonassen, D. H. (2013). *Constructivism and the technology of instruction: A conversation*. London, England: Routledge.

Ehsanipour, T., & Zaccarelli/Center to Support Excellence in Teaching, F. G. (2017, July). Exploring coaching for powerful technology use in education. https://digitalpromise.org/wp-content/uploads/2017/07/Dynamic-Learning-Project-Paper-Final.pdf

Ellingson, L. L. (2009). *Engaging Crystallization in qualitative research: An introduction*. Thousand Oaks, CA: SAGE.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255-284. doi:10.1080/15391523.2010.10782551

Facebook, Inc. (2019). Facebook (Version 231) [Mobile application software]. App store. https://itunes.apple.com/

References (Continued)

Flanigan/Education Week, R. L. (2016, June 6). Ed-tech coaches becoming steadier fixture in classrooms. https://www.edweek.org/ew/articles/2016/06/09/ed-tech-coaches-becoming-steadier-fixture-in-classrooms.html

Flores, C. J., & Luschen, K. V. (2014). *Crafting critical stories: Toward pedagogies and methodologies of collaboration, inclusion and voice*.

Fred Rogers Center. (2014). *Checklist for identifying exemplary uses of technology and interactive media for early learning: The Pennsylvania digital media literacy project.*Fred Rogers Center for Early Learning & Children's Media. https://www.fredrogerscenter.org/initiatives/digital-media-learning/resources/

Fröbel, F. (1985). *Friedrich Froebel's pedagogics of the kindergarten: Or, his ideas concerning the play and playthings of the child.* Trans. Josephine Jarvis. New York: D. Appleton.

Gamrat, C., & Zimmerman, H. T. (2014). An online badging system supporting educators' stem learning: Open badges in higher education. https://sites.google.com/site/openbadgesinhighereducation/library/an-online-badging-system-supporting-educators-stem-learning

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, *38*(4), 915-945. doi:10.3102/00028312038004915

Google, LLC. (2020) Google Classroom. [Mobile application software]. https://itunes.apple.com/

Green, L. S. (2014). Through the looking glass: Examining technology integration in school librarianship. *Knowledge Quest*, *43*(1), 36-67.

Green, M., & Cifuentes, L. (2011). The effects of follow-up and peer interaction on quality of performance and completion of online professional development. *Journal of Interactive Learning Research*, *22*(1), 85-109.

Guba, E. G., & Lincoln, Y. S. (1989). *Fourth Generation Evaluation*. Thousand Oaks, CA: SAGE.

Guernsey, L., & Levine, M. H. (2015). *Tap, click, read: Growing readers in a world of screens*. San Francisco, CA: Jossey-Bass.

Hamilton, B. (2007). *It's elementary!: Integrating technology in the primary grades*. Washington, DC: International Society in for Technology in Education.

Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The substitution augmentation modification redefinition (SAMR) model: a critical review and suggestions for its use. *TechTrends*, *60*(5), 433-441. https://doi.org/10.1007/s11528-016-0091-y

Harris, M. (2017, August 18). *Coaches and champions – The essentials of educational technology support*. The International EdTech Blog with Matt Harris Ed.D.

Herr, K., & Anderson, G. L. (2015). *The action research dissertation: A guide for students and faculty* (2nd ed.). Los Angeles, CA: Sage.

Hug, T., & Friesen, N. (2007). Outline of a microlearning agenda. *Elearning Papers.*Thompson Rivers University.

Jacobs, S. D. (2016). The use of participatory action research within education-benefits to stakeholders. *World Journal of Education*, *6*(3), 48-55. doi:10.5430/wje.v6n3p48

Jiban, C. (2020). *Literacy for all: How to build confident, lifelong readers*. NWEA.

Johns, K., Troncale, J., Trucks, C., Calhoun, C., & Alvidrez, M. (2017). Cool tools for school: Twenty-first century tools for student engagement. *Delta Kappa Gamma Bulletin*, *84*(1), 53-58. /

References (Continued)

Johnson, A. M., Jocavina, M. E., Russell, D. E., & Soto, C. M. (2016). Challenges and solutions when using technologies in the classroom. In S.A. Crossley & D.S. McNamara (Eds.) *Adoptive educational technologies in the classroom.* New York. Published with acknowledgement of federal support.

Kolb, L. (2017). *Learning first, technology second: The educator's guide to designing authentic lessons*. Portland, OR: International Society for Tech in Education.

Kontovourki, S., Garoufallou, E., Ivarsson, L., Klein, M., Korkeamaki, R., Koutsomiha, D., … Virkus, S. (2017). Digital literacy in the early years: Practices in formal settings, teacher education, and the role of informal learning spaces - a review of the literature. http://digilitey.eu/wp-content/uploads/2017/01/WG2-LR-March-2017-v2.pdf

Kulowiec, G. (2013, November 14). Unleashing Creativity: Greg Kulowiec App Smashing - from Beth Holland. https://edtechteacher.org/unleashing-creativity-greg-kulowiec-app-smashing-from-beth-holland/

Kulowiec The History 2.0 Classroom. http://kulowiectech.blogspot.com/2013/02/app-smashing-part-i.html, G. (2013, February 18). App smashing part I: The history 2.0 classroom. http://kulowiectech.blogspot.com/2013/02/app-smashing-part-i.html

LaMorte/Boston University School of Public HealthBoston University School of Public Health, W. W. (2018, August 29). *Behavioral change models: Diffusion of innovation theory*. Retrieved May 20, 2019, from http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories4.html

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Thousand Oaks, CA: Sage Publications.

Lindsay, J. (2016). The global educator: Leveraging technology for collaborative learning & teaching. Eugene, OR: International Society for Technology Education.

Luckhardt, E. (2018, July 11). An open letter to "sit and get" PD. https://michiganvirtual.org/blog/its-time-to-practice-what-we-preach-revolutionizing-professional-learning-pedagogy/

Malterud, K. (2001). Qualitative research: standards, challenges, and guidelines. The Lancet, 358, 483-488.

Marzano, R. J. (2003). *What works in schools: Translating research into action*. Alexandria, VA: ASCD.

Matzen, N. J., & Edmunds, J. A. (2007). Technology as a catalyst for change: The role of professional development. *Journal of Research on Technology in Education*, *39*(4), 417-430. doi:10.1080/15391523.2007.10782490

McKenney, S., & Reeves, T. C. (2019). *Conducting educational design research* (2nd ed.). New York, NY: Routledge.

McLaughlin, C., & Lee, M. J. (2008). The three P's of Pedagogy for the networked society: Personalization, participation and productivity. *International Journal of Teaching and Learning in Higher Education*, *20*(1), 10-27. http://www.isetl.org/ijtlhe/pdf/IJTLHE395.pdf

Meacham, J. (2015, July 18). Parent communication app review. http://jessicameacham.com/parent-communication-app-review/

Merrill, M. D. (2013a). Constructivism and instructional design. In *Constructivism and the technology of instruction: A conversation* (pp. 99-114). New York, NY: Routledge.

Merrill, M. D. (2013b). First principles of instruction. Pfeiffer.

Morrow, L. M., & Gambrell, L. B. (2018). *Best practices in literacy instruction* (6th ed.). New York, NY: Guilford Publications.

National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media. (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/topics/PS_technology_WEB.pdf

Office of Educational Technology. (2016). Future ready learning: Reimagining the role of technology in education. 2016 National education technology plan. https://tech.ed.gov/files/2015/12/NETP16.pdf

References (Continued)

Office of Educational Technology. (2016). Future ready learning: Reimagining the role of technology in education. 2016 National education technology plan. https://tech.ed.gov/files/2015/12/NETP16.pdf

Office of Educational Technology. (2017). Reimagining the role of technology in education: 2017 National Education Technology Plan Update. https://tech.ed.gov/files/2017/01/NETP17.pdf

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon*, *9*(5), 1-6. doi:10.1108/10748120110424816

PricewaterhouseCoopers. (2018). Technology in US schools: Are we preparing our kids for the jobs of tomorrow?. https://www.pwc.com/us/en/about-us/corporate-responsibility/library/preparing-students-for-technology-jobs.html

Puentedura, R. (2015, October 29). SAMR: A brief introduction. http://hippasus.com/blog/archives/227

Puentedura, R. R. (2014, November 28). SAMR in the classroom: Developing sustainable practice. http://www.hippasus.com/rrpweblog/archives/2014/11/28/SAMRInTheClassroom_DevelopingSustainablePractice.pdf

Quintero, D. (2019, January 25). *Instructional coaching holds promise as a method to improve teachers' impact*. Brookings. https://www.brookings.edu/blog/brown-center-chalkboard/2019/01/25/instructional-coaching-holds-promise-as-a-method-to-improve-teachers-impact/

Richardson, W., & Mancabelli, R. (2011). *Personal learning networks: Using the power of connections to transform education*. Solution Tree Press.

Rogers, E. M. (1962). *Diffusion of innovations* (1st ed.). New York, NY: New York Free Press.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: New York Free Press.

Seesaw Learning, Inc. (2020b). Seesaw: Student driven portfolios. http://web.seesaw.me

SlidesCarnival. (2020, May 7). *Blue connections. Free PowerPoint template & Google slides theme*. Slides Carnival. https://www.slidescarnival.com/cordelia-free-presentation-template/216

Terada, Y. (2020, June 23). *COVID-19's impact on students' academic and mental well-being*. Edutopia. https://www.edutopia.org/article/covid-19s-impact-students-academic-and-mental-well-being

Tufford, L., & Newman, P. (2010). Bracketing in qualitative research. *Qualitative Social Work*, *0*(0), 1-17. DOI: 10.1177/1473325010368316\

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wolfe, R. E., Steinberg, A., & Hoffman, N. (2013). *Anytime, anywhere: Student-centered learning for schools and teachers*. Cambridge, MA: Harvard Education Press.

Zielezinski, M. B., & Darling-Hammond, L. (2016). *Promising practices: A literature review of technology use by underserved students*. Stanford Center for Opportunity Policy in Education. https://edpolicy.stanford.edu/sites/default/files/publications/scope-report-promising-practices-v1.pdf

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