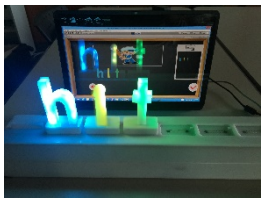
Example of an Alignment Chart, which is a table containing an alignment of research questions, variables/factors/constructs, data collection and data analysis methods. An alignment chart helps us be sure we are collecting the right data to answer our research questions.

Example from PhonoBlocks – tangible spelling system for children



Fan, M., Antle, A.N., Hoskyn, M. Neustaedter, C. and Cramer, E. 2017. Why tangibility matters: A design case study of at-risk children learning to read and spell. In *Proceedings of Conference on Human Factors in Computing Systems* (CHI '17), 1805-1816.

QUANTITATIVE -- Investigate spelling performance on a written spelling test administered before and after using PhonoBlocks system (for 6 weeks) with dynamic letter colour turned on (intervention) and off (control) on trained (learned) and new (transfer) words.

RQ	**IV**	**DV**	**Collection Method**	**Data Type**	**Analysis**
1.1 Does dynamic letter colour (on/off) impact children's spelling accuracy from pre to post test on trained words? 1.2 Does … on new words?	IV1: dynamic letter colour (on/off) IV2. Type of words (trained vs new words) IV3. Test points (pre and post test points)	Spelling accuracy 1.1 Trained words: DV1. Raw spelling accuracy at each test point DV2. % accuracy at each test point DV3. Pre to post gain/diff 1.2 New words DV1-3 Ditto	Written spelling test of 18 words said aurally 1.1 assess # correct out of 18 for trained words 1.2 ditto for new words	DV1: Interval (e.g. 17/18 correctly spelled words) DV2: Ratio % (e.g. 80%) DV3. Ratio % (e.g. 20% gain)	DV1 & DV2: Descriptives - mean/sdev. DV3: Ans RQ1.1 Inferential statistics – 1. For new words – 2x2 MIXED ANOVA (IV1: colour on/off & RM = IV3 pre-post) RQ 1.2 ditto for trained words Can also compare DV3 for IV2 (new vs trained words) w/ t-test

QUALITATIVE - Explore if there are different types of errors in spelling between intervention and control groups when children do the practice exercises using PhonoBlocks.

Note: Expectation: there are at least two types of spelling errors – 1) those directly related to rule; 2) those dealing w/ other aspects of spelling each word.

RQ	**Factor(s) of interest**[1]	**Construct(s) of interest**	**Data Collection Method**	**Data Type**	**Analysis**
2.1 What kinds of errors do children make using PB on trained words? 2.2 What … on new words	Compare using PB Colour + trained words Colour + new words No colour + trained words No colour + new words	Type of spelling error - Breaks rule - Other error	Video/Log of children doing practice exercises using PB Observational notes … of same System log of final words submitted using PB system	Descriptions spelling errors and corrections made Descriptions spelling errors and corrections made Descriptions spelling errors made on final words	Code error types → write up error type descriptions Compare error types between factors → write up patterns of error types and factors Could do frequency analysis (quant)[2] Could look at behaviors related to errors (qual) → describe PB hands-on/use behaviors related to error types

[1] In this case the factor of interest are directly related to the IVs above. But this need not be so. Could be factors related to UI/system, context, task or group characteristics etc. It is possible there is only one group and no factors.
[2] This would be a mixed methods analysis.