harp.

Hope and resilience in climate change education

Addendum: Research Designs

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Research Designs

- Design-based research: e.g. lesson studies
- Quantitative research: e.g. survey studies
- Qualitative research: e.g. interview studies
- Mixed-methods: e.g. sequential or parallel

Perspectives

- Teacher
- Student
- Other …

Design-based research: lesson studies

Research Questions

- Starting from practitioner query
- Why and How

Pros

- For and with practitioners
- Can dive deeper into phenomenon of interest (e.g. through thick description)
- Easier to describe the particular context
- Closer contact with participants/phenomenon of interest
- Immediate feedback from participants possible (e.g. during interview or through member check)

Cons

- Not generalisable, due to smaller sample size
- More expensive (labour-intensive)
- Reliability and validity more difficult to guarantee (researcher bias)

Design-based research: lesson studies

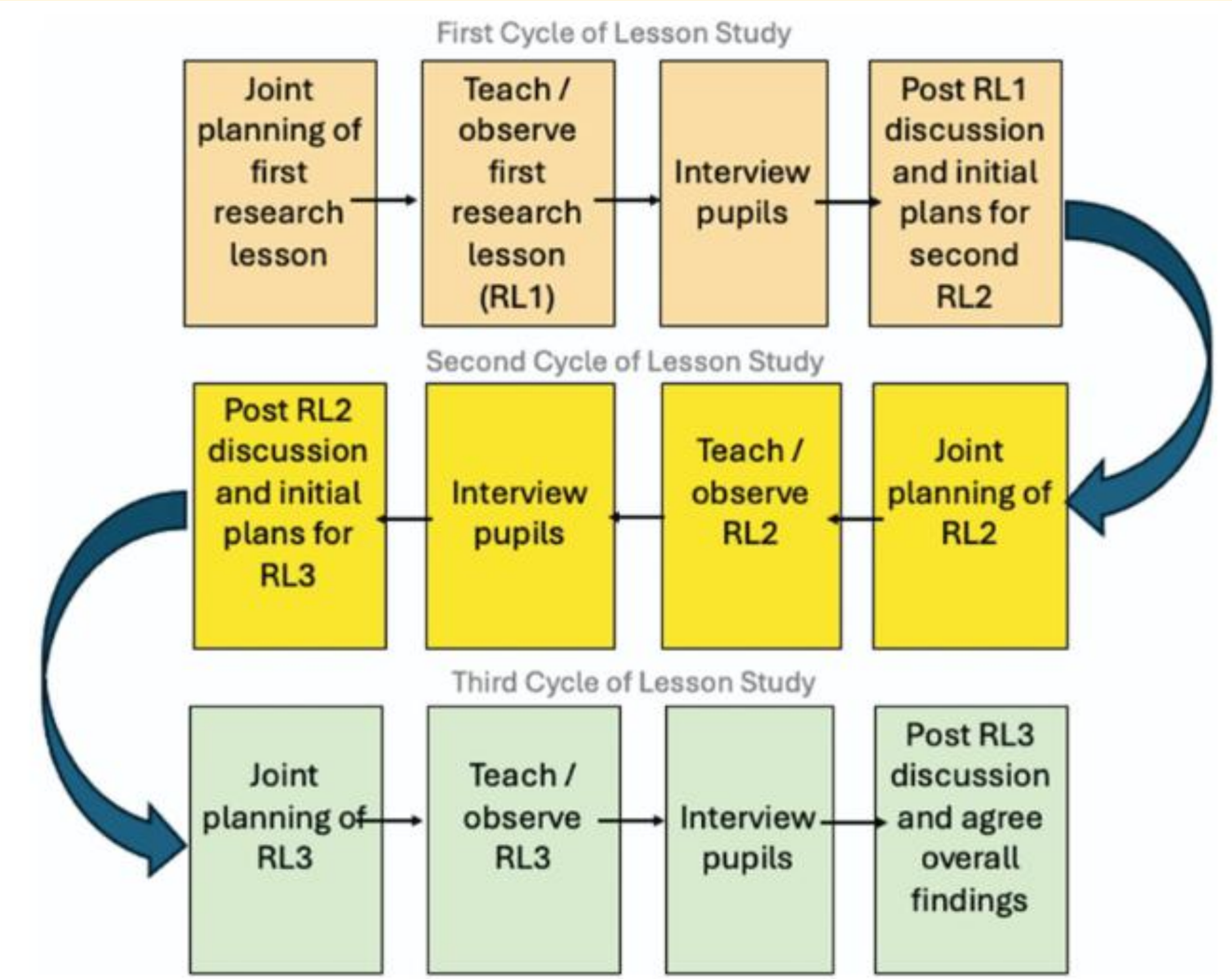

Figure 1. The Research Lesson Study model (adapted from Dudley 2019, 6).

Quantitative research: Survey studies

Research Questions

- Opinions
- (Self-)Perceptions, Self-Reporting
- Associations (correlations; linear models)
- Trends (longitudinal studies)
- What (descriptive statistics) and tentative How (CFA modelling; SEM)

Pros

- Generalisable results (if significant → findings in sample also true for entire population)
- Easy and cheaper to administer (e.g. online; by other than researcher)
- Can help build theory (modelling)
- Well-established and more easily verifiable reliability and validity measures

Cons

- Importance of sample size
- Importance of clear, unambiguous, and appropriate (non-academic) language
- Difficult to tap into causal effects (regardless of statistical techniques such as SEM-analyses)

Cohen, Manion, & Morrison. (2011);
DeVellis (2017).

Quantitative research: Survey studies

1° use validated survey instruments

2° adapt existing validated instruments: see examples in literature

Li & Monroe (2018); Ojala (2012); Olsson et al (2020); Wullenkord & Ojala (2023);

3° develop a new instrument → mixed-methods

Four procedural steps in survey development

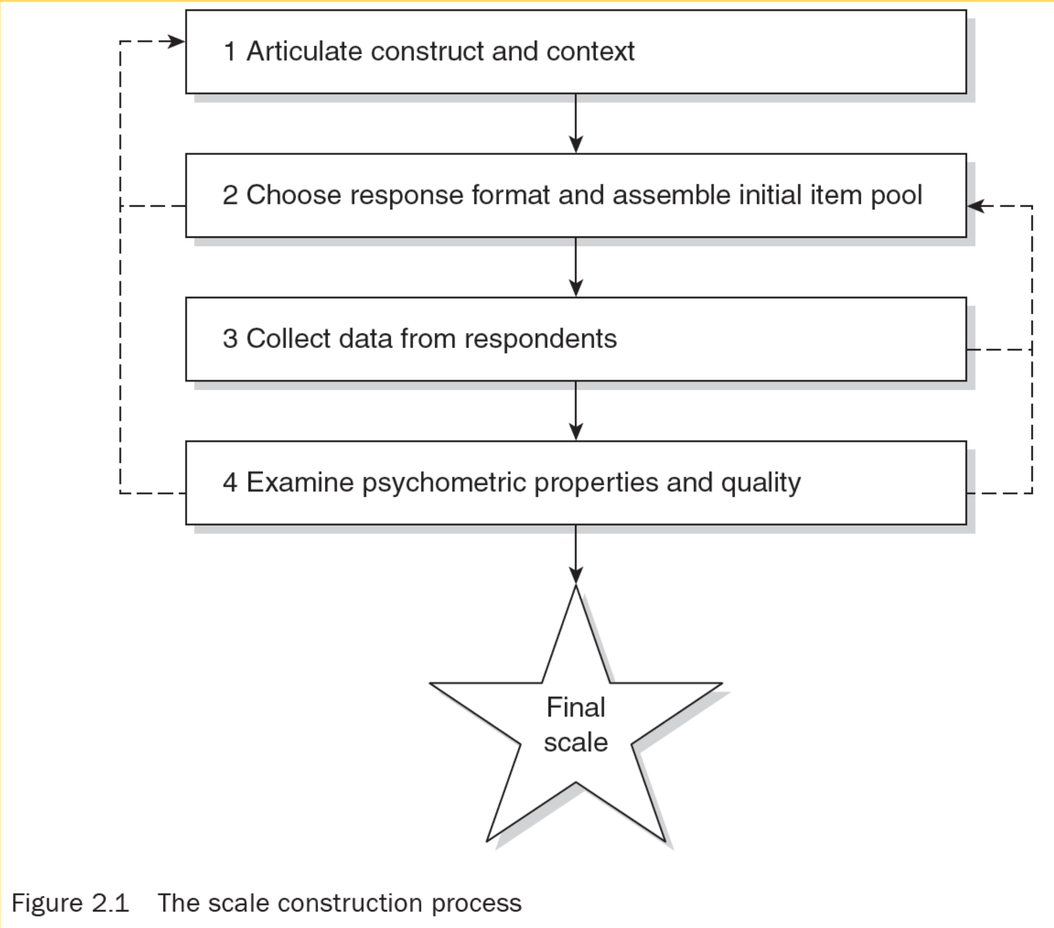

Figure 2.1 The scale construction process

Furr, R. M. (2011), p. 6

Furr, R. M. 2011. *Scale Construction and Psychometrics for Social and Personality Psychology.* London, New Oakes, New Delhi, Singapore: Sage Publications.

Mixed-methods (MM) research:

Different possible designs: two examples

Teddlie, C., & Tashakkori, A. (2009), p. 129

- Parallel mixed designs refer to MM projects where the phases of the study (QUAN, QUAL) […] address related aspects of the same basic research question(s).

- Sequential mixed designs refer to MM projects where the […] research questions and procedures for one strand depend on the previous strand.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. London: Sage.

Mixed-methods research:

Different possible designs: a typology

Table 7.4 Creswell and Plano Clark's (2007) Typology of MM Designs and Variants

Design Type	*Variants*	*Notation*
Triangulation	Convergence Data transformation Validating QUAN data Multilevel	QUAN + QUAL
Embedded	Embedded experimental Embedded correlational	QUAN (qual) or QUAL (quan)
Explanatory	Follow-up explanations Participant selection	QUAN → qual
Exploratory	Instrument development Taxonomy development	QUAL → quan

Teddlie, C., & Tashakkori, A. (2009), p. 145.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. London: Sage.

Mixed-methods research:

Different possible designs: two examples

- Exploratory Sequential: e.g. QUAL → quan

  1° literature review

  2° exploratory qualitative study (e.g. focus groups, interviews, intervention,…)

  3° quantitative study (e.g. instrument development)

  QUAN → qual

  4° further qualitative research into underlying processes (e.g. drivers and barriers)

- Explanatory Parallel (also ‘concurrent’, ‘simultaneous’): e.g. QUAN + QUAL

  e.g. a triangulation method

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. London: Sage.

Scale		Number of items (110 à 86)		Subscale
About self (57 items)	1. Action competence	**13**	4	Knowledge of climate action possibilities
			5	Willingness to act for the climate
			4	Capacity expectations
	2. Pro-climate Behaviour	**6**		
	3. Emotions	**29** (15: challenging)	3	Anger
			3	Anxiety
			3	Powerlessness
			3	Guilt
			3	Contempt/denial/apathy
		(14: comfortable)	3	Enthusiasm
			2	Constructive Hope: collective
			2	Constructive Hope: positive reappraisal
		Constructive Hope (6)	2	Constructive Hope: trust-self
			5	Joy in taking climate action
	4. Coping strategies	**9**	3	Emotion-focused
			3	Problem-focused
			3	Meaning-focused
About teachers' approaches (25)	5. Participatory	**3**		
	6. Pluralistic (perspectives)	**4**		
	7. Action-oriented	**12**	3	Community-based (Real-world problem-based)
			3	Commitment-supporting
			3	Learning by doing: action-taking
			3	Learning by doing: from mistakes
	8. Emotion regulation	**6**		
Demographic information (4)		**4**		School, age, gender (m/f/other/I prefer not to tell, home languages).
		(1)		Optional: email if volunteering for further participation in focus group

Three teaching approaches
Four (?)

- Fact-based: aims to provide information
  - Knowledge transfer
- Normative: aims to provide socialisation
  - Teaching ‘correct’ behaviour
- Pluralistic: aims to provide opportunities for personal development (action competence)
  - Holistic knowledge
  - Participative and multi-perspective
  - Action-oriented (learning by doing in the real world; community-engaged learning)

+ Emotion-sensitive teaching

Coping strategies and pro-environmental behaviour

Exploring macro and micro worries, coping, and relations to climate engagement, pessimism, and well-being

Table 2
Spearman correlations and descriptive statistics of study variables in Study 2.

Variable	1	2	3	4	5	6	7	8	α [95% CI]	*M (SD)*	Skewness (Kurtosis)	Scale range
1. Macro climate worry	—	[.52, .66]	[-.19, .06]	[.28, .45]	[.00, .20]	[.51, .64]	[.05, .26]	[.44, .60]	.90 [.88, .91]	4.58 (1.36)	−0.94 (0.12)[a]	1–6
2. Micro climate worry	.53**	—	[-.18, .03]	[.32, .49]	[.14, .33]	[.32, .48]	[-.04, .17]	[.29, .46]	.81[a] [.77, .87]	3.58 (1.42)	−0.04 (−0.64)	1–6
3. Climate optimism	−.09†	−.06	—	[-.40, −.15]	[-.13, .08]	[.02, .25]	[.52, .65]	[-.08, .15]	.84 [.81, .86]	3.20 (1.01)	0.26 (0.27)	1–6
4. Climate pessimism	.31**	.38**	−.30**	—	[.11, .30]	[.13, .32]	[-.21, −.02]	[.12, .33]	.78 [.74, .81]	3.35 (1.16)	0.00 (−0.42)	1–6
5. Distancing	.05	.21**	−.02	.20**	—	[-.05, .15]	[-.01, .22]	[-.08, .15]	.77 [.73, .80]	2.20 (0.84)	0.34 (−0.61)	1–5
6. Problem-focused coping	.54**	.39**	.15**	.22**	.04	—	[.08, .30]	[.68, .77]	.80 [.77, .83]	2.85 (1.00)	0.07 (−0.69)	1–5
7. Meaning-focused coping	.07	.02	.58**	−.15**	.06	.15**	—	[-.04, .20]	.70 [.60, .74]	3.14 (0.66)	−0.49 (0.94)	1–5
8. Pro-environmental behavior	.51**	.35**	.07	.21**	.03	.75**	.08	—	.87 [.86, [a]89]	2.96 (0.80)	−0.26 (−0.08)	1–5

Note. Above the diagonal are 95% confidence intervals.
†$p < .10$, **$p < .01$.
[a] Spearman correlation.

Wullenkord & Ojala (2023)

Emotion-sensitive Climate Change Education and coping strategies

HARP Correlation study: emotion-sensitive CCE ~ coping strategies from a student perspective

Table 2 Overview of emotion-sensitive climate change education (6 items) and coping strategies (3 x 3 items) as perceived and reported by students per country, with descriptive statistics means and standard deviations (sd)

Scale and item code	Item	means AT CZ NL	*sd* AT CZ NL
Emotion-sensitive CCE		**4.32** **4.07** **4.23**	**1.29** **1.38** **1.35**
Q24_EmoSensitive_77	77. At our school, we learn to support each other.	4.86 4.75 5.00	1.54 1.74 1.45
Q24_EmoSensitive_78	78. At our school, we learn to respect each other's emotions regarding climate change.	4.30 4.07 4.42	1.57 1.71 1.70
Q24_EmoSensitive_79	79. At our school, we learn to respect **our own boundaries** when it comes to taking climate action.	4.35 4.01 4.08	1.52 1.63 1.62
Q24_EmoSensitive_80	80. At our school, we learn to respect **each other's boundaries** when it comes to taking climate action.	4.35 4.16 4.06	1.51 1.63 1.65
Q24_EmoSensitive_81	81. At our school, we learn to deal with feelings of discomfort regarding climate change.	3.96 3.63 3.78	1.51 1.62 1.67
Q24_EmoSensitive_82	82. At our school, there is attention for comfortable emotions such as hope regarding climate action.	4.09 3.81 4.02	1.54 1.61 1.65
Emotion-Focused coping		**4.10** **3.89** **4.48**	**1.47** **1.50** **1.44**
Q14_Emotion-focused_49	49. I don't want to think about climate change.	3.62 3.86 4.02	1.64 1.67 1.65
Q14_Emotion-focused_50	50. I just want to enjoy life without thinking too much about the future.	4.32 3.85 4.77	1.72 1.86 1.72
Q14_Emotion-focused_51	51. I want to be happy now instead of worrying about the future.	4.37 3.95 4.67	1.72 1.79 1.69
Meaning-Focused coping		**3.78** **3.86** **3.79**	**1.22** **1.11** **1.31**
Q16_Meaning-focused_55	55. I trust politicians will do what is necessary for the climate.	3.07 2.70 3.13	1.56 1.37 1.53
Q16_Meaning-focused_56	56. I have confidence that scientists will find solutions for climate change.	4.37 4.71 4.25	1.41 1.41 1.55
Q16_Meaning-focused_57	57. I believe that technology will solve the climate change problem.	3.90 4.17 3.99	1.55 1.55 1.67
Problem-Focused coping		**3.19** **3.51** **2.92**	**1.47** **1.52** **1.48**
Q15_Problem-focused_52	52. I talk with my family about what we can do about climate change.	3.28 3.40 3.23	1.73 1.76 1.83
Q15_Problem-focused_53	53. I talk with my friends about what we can do about climate change.	3.13 3.61 2.83	1.68 1.76 1.61
Q15_Problem-focused_54	54. I talk with my fellow students about what we can do about climate change.	3.16 3.51 2.71	1.63 1.76 1.53

Note: AT = Austria, CZ = Czechia, NL = the Netherlands; 7-point Likert answer options with 4 = neutral centre

- : negative effect +: positive effect	**Cohen's rules of thumb**
0.50-1.00	Large
0.30-0. 49	Medium
0.10-0.29	Small
-0.10<…<0.10	No effect

Table 3 Pearson's correlation of emotion-sensitive CCCE and coping strategies with their p-values

	AT CZ NL	Emotion-sensitive CCE	Problem-Focused coping	Emotion-Focused coping
Problem-Focused coping		0.305*** 0.347*** 0.186***		
Emotion-Focused coping		- 0.142** - 0.126* - 0.125*	- 0.319*** - 0.319*** - 0.445***	
Meaning-Focused coping		0.209*** 0.142** 0.127*	0.140** 0.147** 0.032 ns	0.150*** - 0.087 ns - 0.020 ns

Note: AT = Austria, CZ = Czechia, NL = the Netherlands;
*ns = non-significant * p < 0.05 ** p < 0.01 *** p < 0.001*

Sass et al. (submitted abstract)