Rethinking Measures of Attitude Toward Technology in Technology Education

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INTRODUCTION

- **Tech education vital for fostering positive tech attitudes.**

Study goals:

1. **Collect existing tech attitude scales**
2. **Analyze cognitive, affective, behavioral, and environmental components**
3. **Describe measurement format and application**

BACKGROUND

PATT's Impact on Tech Education

- 'Pupils' Attitude Toward Technology' study in the early 1980s by Jan Raat and Marc de Vries.
- The beginning of technology attitude studies.
- PATT measures student's interest, roles, consequences, difficulties, curriculum, and career aspects.
- Influenced technology education, instruction, and curriculum design.

THEORETICAL FRAMEWORK-1

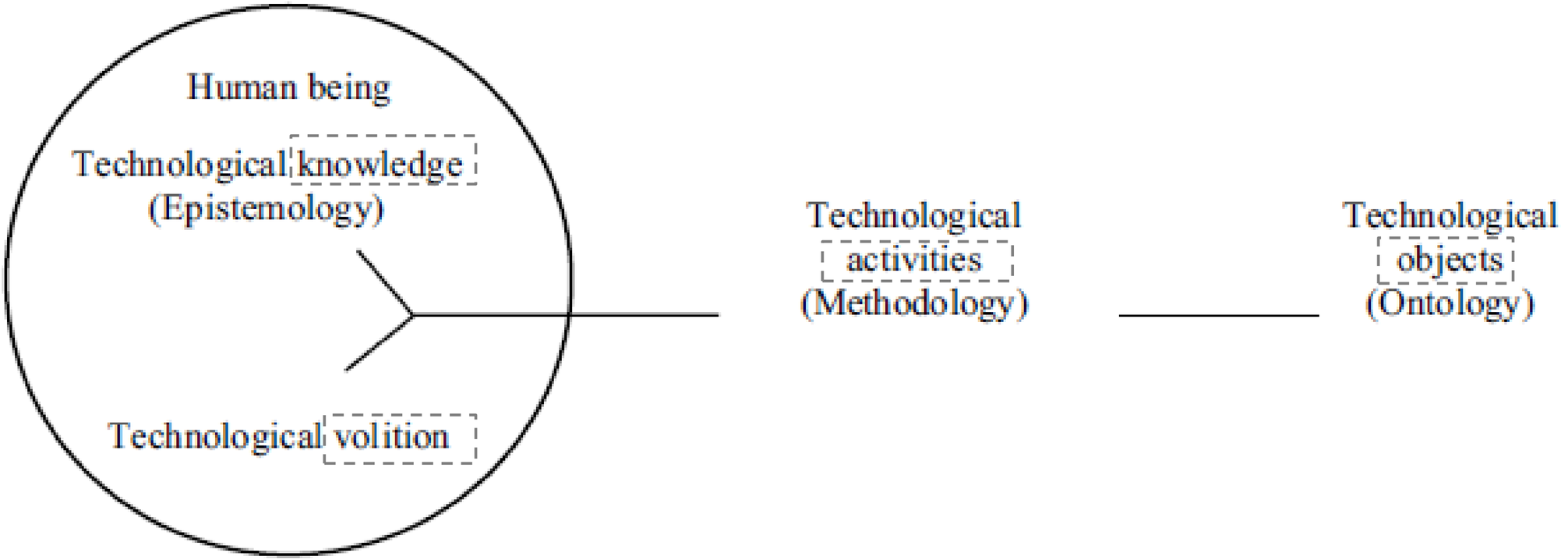


Figure 1. Model in which technology is manifested (Mitcham 1994:160)

THEORETICAL FRAMEWORK-2

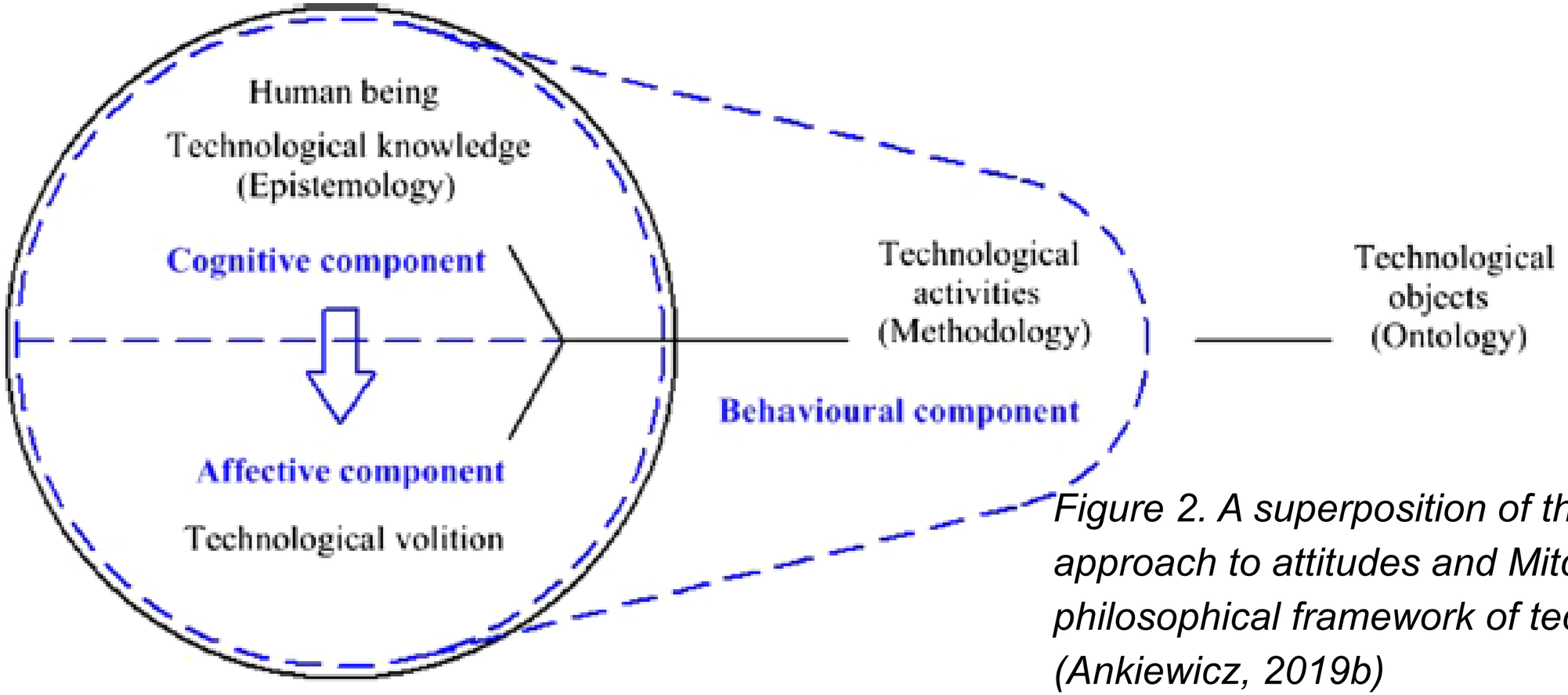


Figure 2. A superposition of the traditional approach to attitudes and Mitcham's philosophical framework of technology (Ankiewicz, 2019b)

THEORETICAL FRAMEWORK-3

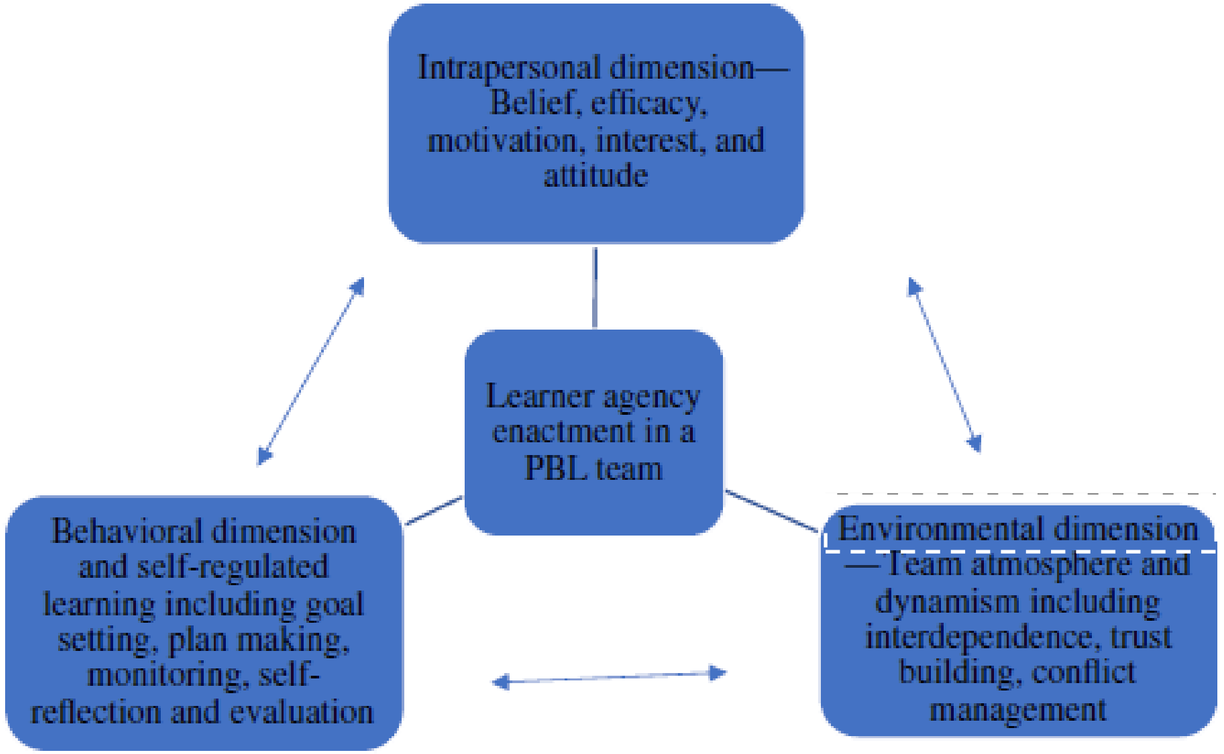


Figure 3. A model of learner agency in a problem- and project-based learning (PBL) team consisting of three interrelated dimensions (Bandura, 2008)

METHODOLOGY

QUALITATIVE METHOD

- Follows research procedures and guidelines (Gao et al., 2020).
- Conducts literature review and using relevant keywords.
- Gathers pertinent literature on the scales of interest.
- Develops a coding framework for content analysis based on theoretical frameworks (Mitcham, 1994; Bandura, 2008).

Journal Selection Process

PHASE 1

Horizontal Perspective:

Influenced by STEM trends.

PHASE 2

Vertical Perspective:

Recognized PATT in tech-related journals.

PHASE 3

Criteria for Inclusion

PHASE 1

Horizontal Perspective: The influence of technology, engineering, and STEM education trends

- Considered journals: IJTDE, JEE, IJSE.
- Keywords: 'attitude,' 'belief,' 'efficacy,' 'motivation,' 'interest,' and 'perception'
- PATT research mostly in IJTDE.
- other journals mainly discussed students' attitudes without using PATT measuring scales

PHASE 2

Vertical Perspective:
Recognized PATT in other tech-related journals.

- Based on the references from IJTDE
- Inferred TEAIJ and JTE.
- Chosen Journals: IJTDE, TEAIJ, JTE for content analysis.
- Searched with keywords; found 82, 20, and 7 potential articles.

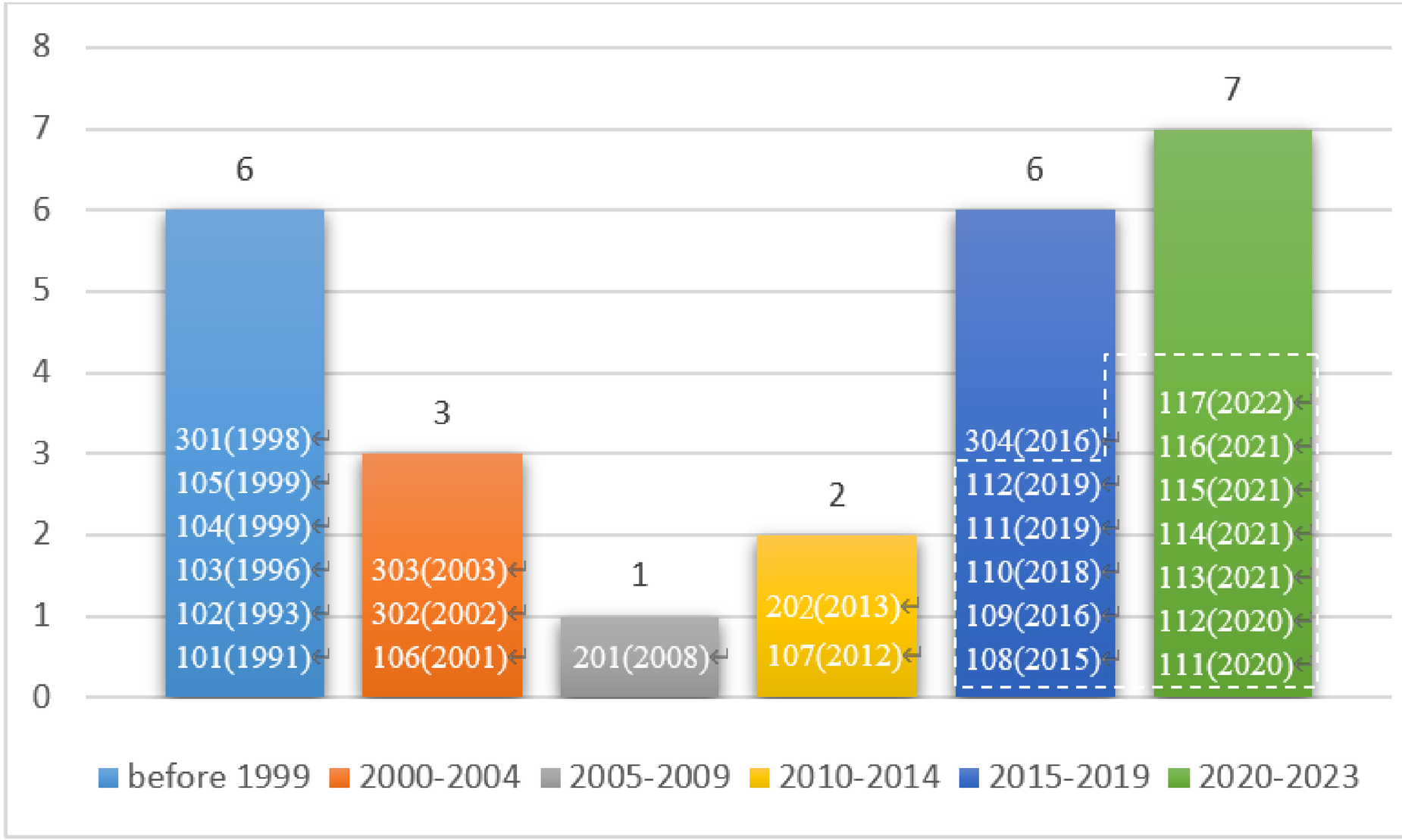
PHASE 3

Criteria for Inclusion

- This study concentrates on K-12 students and technology curriculum studies. Articles must
  - (a) students as the sample population,
  - (b) focus on K-12 settings,
  - (c) address technology curriculum.
- Final Selection: A total of 23 articles chosen for data analysis.

RESULT-1

Figure 4.
Distribution of articles on attitudes towards technology by year of publication



Code representation

IJTDE：101-117

TEAIJ：201-202

JTE：301-304

RESULT-2

Code representation

IJTDE：101-117

TEAIJ：201-202

JTE：301-304

Table 1.

Components of articles on attitudes toward technology

Components	Articles	Total
Cognitive	101, 103, 106, 112, 113, 201, 301, 302, 303	9
Affective	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 201, 202, 301, 302, 303, 304	23
Behavioural	101, 103, 105, 108, 109, 112, 116, 304	8
Environmental	105, 301, 302, 303	4

Home climate

RESULT-3

Code representation

IJTDE：101-117

TEAIJ：201-202

JTE：301-304

Table 2.

Format of measurement of technology attitude articles

Main formats	Articles	Total	
Questionnaire	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 201, 202, 301, 302, 303, 304	23	Likert scale
Interviews	103, 110	2	Structured

RESULT-4

Code representation

IJTDE：101-117

TEAIJ：201-202

JTE：301-304

Table 3.

Application of attitude towards technology scales

Means of application	Times of application	Articles	Total
Survey on students' attitude towards technology in technology curriculum	Once	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 112, 113, 116, 117, 201, 202, 302, 303, 304	19
Survey on changes in students' attitude towards technology before and after participating in technology curriculum	Twice (and more)	111, 114, 115, 301	4

Discussion and Suggestions

- Attitudes components: cognitive, affective, behavioral, and environmental aspects
- Measurement Tools: quantitative and qualitative methods
- Application: current attitudes and attitudes change in technology design activities

THANK YOU

Presentation by Syyi Tzeng

REFERENCES-THEORETICAL FRAMEWORK

REFERENCES 1

Mitcham, C. (1994). Thinking through Technology. Chicago: The University of Chicago Press.

REFERENCES 2

Ankiewicz, P. (2019b). Alignment of the traditional approach to perceptions and attitudes with Mitcham's philosophical framework of technology. Int J Technol Des Educ, 29, 329–340 https://doi.org/10.1007/s10798-018-9443-6

REFERENCES 3

Bandura, A. (2008). Toward an agentic theory of the self. In H. W. Marsh, R. G. Craven, & D. M. McInerney (Eds.), Self-processes, learning, and enabling human potential: Dynamic new approaches (pp. 15–49). Information Age Publishing.

THEORITICAL FRAMEWORK

OVERVIEW

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PROPONENTS

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SOLUTION

SOLUTION 1

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SOLUTION 2

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SOLUTION 3

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BACKGROUND-2

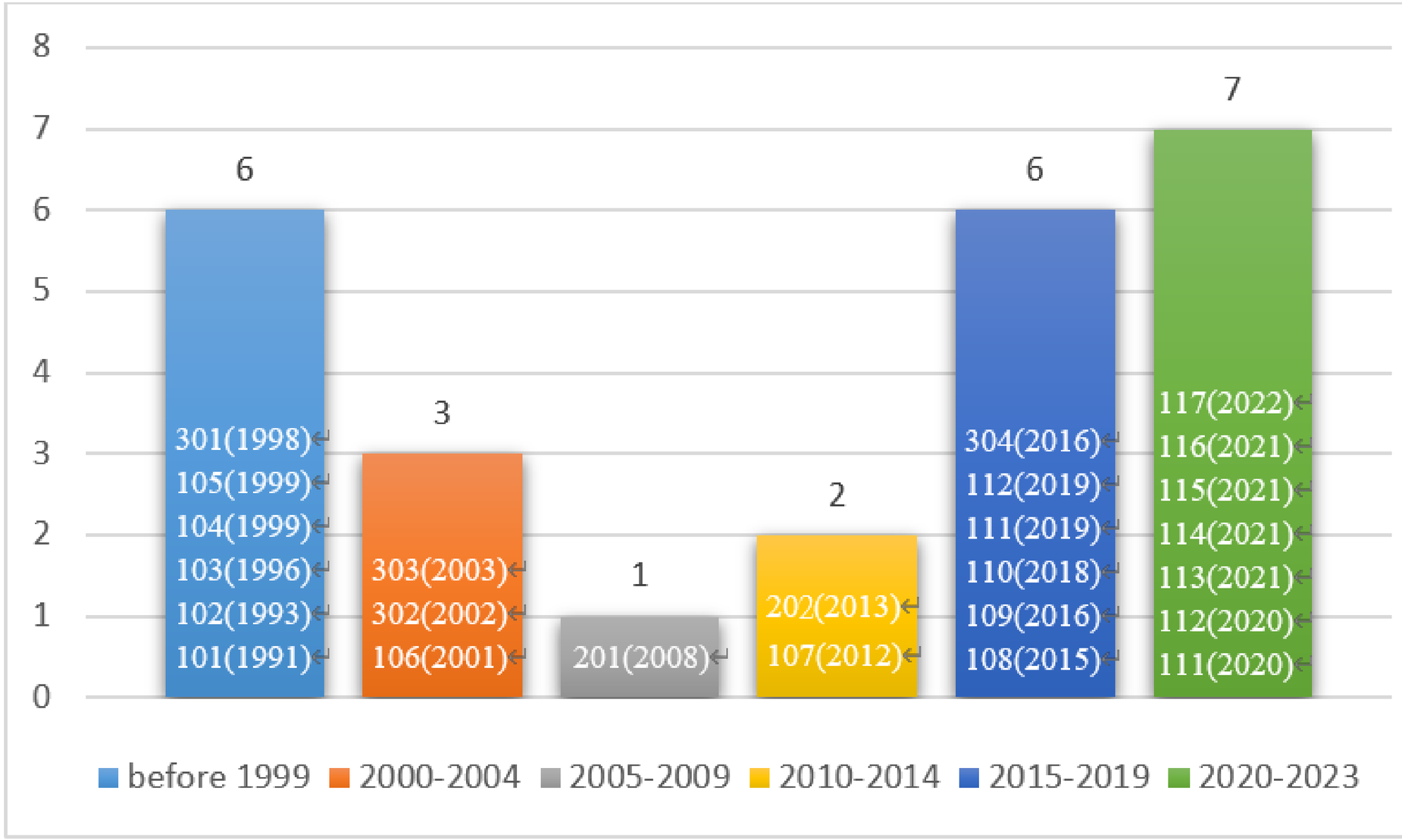
Expanding Tech Attitude Assessment

- PATT's limited focus: cognitive, affective, and behavioral components.
- according to Bandura's social cognitive theory, consider the impact of environmental component.
- Study goals: gather and analyze existing PATT attitude scales and evaluate how these attitude scales are measured and applied.

RESULT-1

Figure 4.

Distribution of articles on attitudes towards technology by year of publication



Code representation

IJTDE：101-117

TEAIJ：201-202

JTE：301-304

Discussion and Suggestions-4

Challenges with Current Scales:

- **Current technology attitude scales lack comprehensive coverage of cognitive, behavioral, and environmental attitudes.**
- **They also often overlook negative perceptions and miss insights into the design process.**
- **This limits their usefulness in improving teaching strategies and curriculum design.**

Discussion and Suggestions-5

Design Process Perspective:

- There's a need for more research on students' attitudes towards technology within the context of the design process.
- Students' feelings and experiences during K-12 technology education significantly influence their self-identity, interdisciplinary education, and career intentions, as per career development theories (Hammack et al., 2015; Mohd Shahali et al., 2017).