

Paper Summary

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Title: Enhancing Student Digital Skills: Adopting an Ecosystemic School Analytics Approach

Authors: Stylianos Sergis, Demetrios G. Sampson, Michail Giannakos

DOI: 10.1109/ICALT.2017.87

Year: 2017

Publication Type: Conference

Discipline/Domain: Educational Technology / Learning Analytics

Subdomain/Topic: School Analytics, Digital Skills, Educational Decision-Making

Eligibility: Eligible

Overall Relevance Score: 85

Operationalization Score: 80

Contains Definition of Actionability: Yes (implicit and explicit in decision-making framing)

Contains Systematic Features/Dimensions: Yes

Contains Explainability: Yes

Contains Interpretability: Partial

Contains Framework/Model: Yes

Operationalization Present: Yes

Primary Methodology: Quantitative (fsQCA), Conceptual-empirical

Study Context: K-12 schools, cross-European dataset

Geographic/Institutional Context: Europe (2995 schools; EU Commission study)

Target Users/Stakeholders: School leaders, policymakers, educators

Primary Contribution Type: Methodological and empirical model for deriving actionable school improvement

CL: Yes

CR: Yes

FE: Partial

TI: No

EX: Yes

GA: Yes

Reason if Not Eligible: n/a

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Enhancing Student Digital Skills: Adopting an Ecosystemic School Analytics Approach

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****Discipline/Domain:****

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****Subdomain/Topic:****

School Analytics, Digital Skills, Educational Decision-Making

****Contextual Background:****

Focuses on enabling K-12 school leaders to use *School Analytics*—a layered, ecosystemic data framework

****Geographic/Institutional Context:****

European cross-national dataset from an EU Commission survey.

****Target Users/Stakeholders:****

School leaders, educational policymakers, teacher professional development coordinators.

****Primary Methodology:****

Quantitative (fsQCA), supported by conceptual framework building.

****Primary Contribution Type:****

Development and validation of a School Analytics ecosystemic factor model + demonstration of fsQCA for

General Summary of the Paper

The paper introduces a School Analytics approach integrating an ecosystemic factor model with fuzzy-set

Eligibility

Eligible for inclusion: ****Yes****

How Actionability is Understood

Actionability is conceptualized as *the translation of school ecosystem data into targeted, evidence-based

> “[...] translate these analyses to specific remedying actions for targeted improvement” (p. 1)

> “[...] inform leaders on the specific school areas to improve to meet their goal” (p. 2)

What Makes Something Actionable

- Derived from **holistic, multi-layered data** spanning micro, meso, and macro school levels.
- **Configurable causality**: recognition that multiple different factor combinations can lead to the same outcome.
- **Alignment with desired goals** (here: improving digital skills).
- Clear identification of **specific factor configurations** present/absent that produce the target outcome.
- Context-sensitive applicability—school-specific diagnosis.

How Actionability is Achieved / Operationalized

- **Framework/Approach Name(s)**: School Analytics Ecosystemic Factor Model + fsQCA-based decision-making.
 - **Methods/Levers**: Collect data across school layers; calibrate factors into fuzzy sets; run fsQCA to identify configurations.
 - **Operational Steps / Workflow**:
 1. Define factor model (macro, meso, micro).
 2. Collect and validate data (survey-based, Likert-scale).
 3. Calibrate into fuzzy sets.
 4. Run fsQCA to extract configurations linked to high digital skills.
 5. Interpret results for leadership decision-making.
 - **Data & Measures**: 4-point Likert survey items; principal attitudes, teacher practices, equipment, culture.
 - **Implementation Context**: EU schools, ICT integration and digital skills development.
- > “[...] outline which configurations of the factors... can explain high levels of students’ digital skills, and t
- > “[...] eight distinct configurations... lead to high students’ digital skills” (p. 4)

Dimensions and Attributes of Actionability (Authors’ Perspective)

- **CL (Clarity)**: Yes – model clearly identifies factor relationships and configurations.
 - > “[...] outline... specific school areas to improve” (p. 2)
- **CR (Contextual Relevance)**: Yes – configurations are context-specific to school ecosystem profiles.
- **FE (Feasibility)**: Partial – feasibility is implied through practical applicability of identified configurations.
- **TI (Timeliness)**: No explicit reference.
- **EX (Explainability)**: Yes – causal configurations and underlying factors are transparent.
- **GA (Goal Alignment)**: Yes – directly tied to improving student digital skills.

****Other Dimensions Named by Authors:**** Coverage and consistency metrics to assess robustness.

Theoretical or Conceptual Foundations

- School Analytics conceptual framework (Sergis & Sampson, 2016).
- Extensive Digital Competence (EDC) model.
- ICT Competence Profiling framework.
- Configurational theory via fsQCA (Ragin, 2000, 2008).

Indicators or Metrics for Actionability

- fsQCA coverage (analogous to R^2).
- fsQCA consistency (adequacy of causal configuration).
- Reliability & validity measures (Cronbach's alpha, AVE).

Barriers and Enablers to Actionability

- ****Barriers:**** Lack of integrated data systems; absence of certain enabling factors (e.g., ICT equipment,
- ****Enablers:**** Strong leadership attitudes; positive teacher attitudes; supportive culture; sufficient ICT inf

Relation to Existing Literature

Positions itself as moving beyond descriptive ICT adoption studies to ****prescriptive, configuration-based**

Summary

This paper offers a robust, empirically validated method for converting multi-level school data into actionable

Scores

- ****Overall Relevance Score:**** 85 – Strong implicit definition of actionability tied to targeted decision-making
- ****Operationalization Score:**** 80 – Provides a detailed process and tool (fsQCA) to derive actionable insights

Supporting Quotes from the Paper

- “[...] translate these analyses to specific remedying actions for targeted improvement” (p. 1)
- “[...] outline which configurations... can explain high levels of students’ digital skills” (p. 2)
- “The fsQCA analysis revealed 8 distinct configurations... which can lead to high students’ digital skills” (p. 2)
- “[...] inform leaders on the specific school areas to improve to meet their goal” (p. 2)

Actionability References to Other Papers

- Sergis & Sampson (2016) – School Analytics framework.
- Aesaert et al. (2015) – EDC model.
- Ragin (2000, 2008) – fsQCA methodology.
- Pappas et al. (2016, 2015) – fsQCA applications in other domains.