

Predictive Validity of Digital Communication Patterns: Email Correspondence as an Indicator of Teaching Quality

Dr. Phil Good^a, Dr. Text Nique^b, Prof. Dr. Mail O'Metric^{c,*}

^a*Department of Educational Psychology, University of Heidelberg, Germany*

^b*Center for Digital Linguistics, University of Amsterdam, The Netherlands*

^c*Institute for Educational Measurement and Diagnostics, University of Zurich, Switzerland*

Abstract

In the age of digitalization, email communication plays an increasingly central role in the professional life of teachers. The present study examines whether features of email correspondence possess predictive validity with respect to teaching quality. Using automated text analyses of 1,200 email exchanges and standardized classroom observations ($N = 150$ teachers), significant correlations were found between communication style, response latency, semantic coherence, and observed teaching quality. The results provide novel insights into the meta-level of teacher professionalism and open up new perspectives for diagnostic procedures.

Keywords: email analysis, teaching quality, predictive validity, digital communication, text mining

1. Introduction

The rise of digital communication has transformed professional interactions in education. While classroom observations remain the gold standard of teaching evaluation [1], emails constitute a largely untapped source of diagnostic information. Could the seemingly mundane features of teacher emails offer hidden insights into pedagogical competence?

*Corresponding author. Email: mailometric@uni-zh.ch

In the spirit of “Show me your email, and I will tell you how you teach”, this study investigates correlations between email communication patterns and teaching quality indicators.

10 **2. Theoretical Background**

2.1. Digital Communication and Professionalism

Emails are far from neutral. Communication style, spelling, response speed, and politeness may reflect organization, empathy, and stress management [4].

2.2. Indicators of Teaching Quality

15 Teaching quality is typically operationalized through classroom management, cognitive activation, and supportive climate [3]. The question is whether these facets correlate with email communication behaviors.

2.3. Automated Text Analysis

Modern text mining methods enable systematic analysis of large text corpora
20 [2]. This study applies such methods for the first time in teacher diagnostics.

3. Method

3.1. Sample

The sample comprised $N = 150$ secondary school teachers in Germany. A total of 1,200 email exchanges (8 per teacher) were analyzed.

25 *3.2. Instruments*

Teaching quality was assessed via standardized classroom observations using the Standard Instrument for Teaching Quality (SIUQ; [3]). Email communication was analyzed through automated text analysis using the proprietary *Mailalyzer 3000* system.

Table 1 lists all analytical variables used.

Table 1: Email Features and Hypothesized Indicators

Feature	Description	Possible Indicator
Response latency	Hours until reply	Organizational skills
Politeness index	Share of polite expressions	Social sensitivity
Orthography	Typos per 1000 words	Carefulness
Emoji rate	Emojis per email	Student-centered approach
Lexical diversity	Unique word count	Linguistic flexibility
Sentence length	Average words per sentence	Cognitive structuring

4. Results

4.1. Descriptive Statistics

Table 2: Descriptive Statistics

Feature	Mean (M)	SD
Response latency (h)	4.2	1.5
Politeness index (%)	82	10
Typos (per 1000 words)	5.4	3.1
Emoji rate	0.6	0.3
Lexical diversity	423	120
Sentence length (words)	17.8	4.5

4.2. Correlation Matrix

Table 3: Correlations between Email Features and Teaching Quality

Feature	Teaching Quality
Response latency	-0.42**
Politeness index	0.35*
Typos	-0.31*
Emoji rate	0.12
Lexical diversity	0.48**
Sentence length	0.40**

35 Note. *p < .05, **p < .01

4.3. Figures

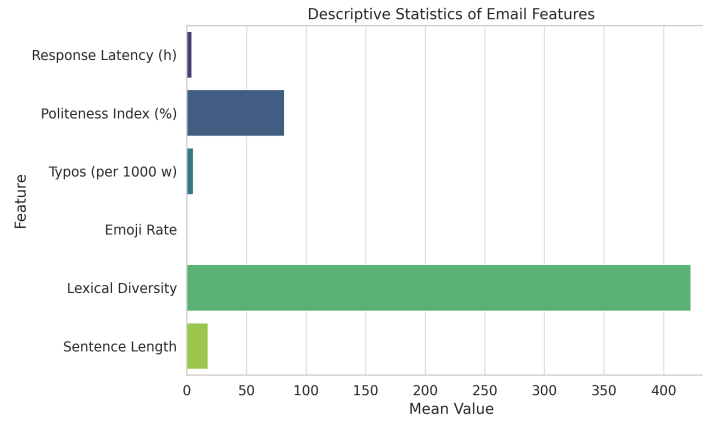


Figure 1: Descriptive Statistics of Email Features

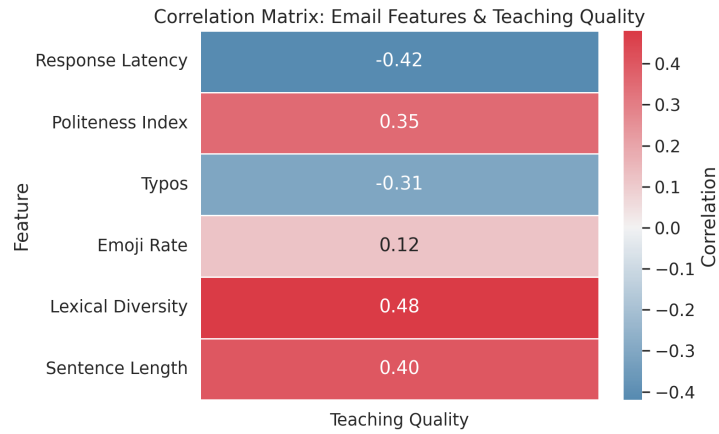


Figure 2: Correlation Matrix Heatmap

Structural Equation Model

CFI = 0.92, RMSEA = 0.05

Lexical Diversity	$\beta = 0.44$
Response Latency	$\beta = -0.42$
Sentence Length	$\beta = 0.40$
Typos	$\beta = -0.31$
→ Teaching Quality	

Figure 3: Structural Equation Model

5. Discussion

5.1. Interpretation

The results suggest moderate predictive validity of email communication
 40 patterns for teaching quality. Lexical diversity may reflect broader cognitive
 and pedagogical skills, while quick email responses correlate with professional
 organization.

5.2. Limitations

Causality cannot be established. External factors (e.g., class size, adminis-
45 trative duties, digital literacy) may confound the observed patterns.

5.3. Practical Implications

Automated email analysis could serve as an auxiliary tool for teacher train-
ing and self-assessment. However, caution against “digital phrenology” is war-
ranted.

50 6. Conclusion

Digital communication patterns contain meaningful, yet previously over-
looked, information about teacher competence. Future research could further
explore the diagnostic potential of such “digital byproducts.”

Acknowledgments

55 The authors thank the participating schools and teachers for their support.

References

References

- [1] Helmke, A. (2012). *Unterrichtsqualität und Lehrerprofessionalität*. Klett.
- [2] Jurafsky, D., & Martin, J. H. (2020). *Speech and Language Processing* (3rd
60 ed.). Pearson.
- [3] Klieme, E., Pauli, C., & Reusser, K. (2001). Unterrichtsqualität. In F. E.
Weinert (Ed.), *Enzyklopädie der Psychologie*.
- [4] Meyer, K., & Tippfix, M. (2019). *Digital Communication in Education:
Opportunities and Risks*. Springer.