

EDUCATION FOR HEALTH SOCIETY: INDICATORS OF BURSTINESS IN RESEARCH

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Abstract

Background: Education for health society attracts more and more research efforts as it facilitates the quality of society's life. However, research on education for health society is of bursty nature. The phenomenon of burstiness is of particular research interest as it influences the flow of a number of processes including research and the quality of society's life in general. **Research question:** What are indicators of burstiness in research? **Approach:** Interdisciplinary research was applied to the study of the meaning of the key concepts of *burstiness*, *criteria*, *indicators* and *research*. Moreover, the analysis demonstrates how the key concepts are related to the idea of *education for health society* and shows how the steps of the process are related following a logical chain: theoretical framework → empirical study → conclusions. **Experiment:** Qualitative study was applied for empirical analysis. The empirical study was carried out in February 2016. **Conclusion:** The theoretical findings on the inter-relationship between *burstiness* and *gap processes* allow determining the indicators of burstiness of research. The empirical findings of the research allow drawing the conclusions on a high level of research burstiness. A newly formulated research question is presented. Further research directions are proposed.

KEY WORDS: Research, burstiness, criteria, indicators, interdisciplinary research.

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Introduction with aim of the research

Education for health society attracts more and more research efforts as it facilitates the quality of society's life. However, research on education for health society is of bursty nature. The phenomenon of burstiness is of particular research interest as it influences the flow of a number of processes including research process in particular and the quality of society's life in general. By phenomenon's burstiness, intervals of its high-activity alternating with long low-activity periods within a fat-tailed inter-event time distribution is meant (Karsai, Kaski, Barabási, & Kertész, 2012). The phenomenon of burstiness is revealed in a range of scientific fields as demonstrated in Table 1.

Table 1

Burstiness in different scientific fields

Scientific field	Phenomenon of burstiness
Telecommunications	Burstiness of bit-errors in data transmission
Economics	Burstiness of crises
Natural sciences	Burstiness of disasters, earthquakes, etc
Logistics	Burstiness of traffic
Social media	Burstiness of hot topic, keyword, event, etc
Business	Burstiness of workload
E-Business	Burstiness of buyers
Research	Burstiness of researchers (Ahrens, Zaščerinska, 2016)

Beginning in 1960 Gilbert (1960) presented the first model in telecommunications which emphasized that bit errors occurred in bundles (Wilhelm, 2014b) or, in other words, bursts. Since then, the issues of a general procedure to evaluate the performance or, in other words, research process in the present contribution, as well as a basic set of parameters (Elliott, 1963) or, in other words, indicators, are still relevant today (Wilhelm, 2014a).

In research, burstiness of the research process has been recently identified (Ahrens, Zaščerinska, 2016). The previous work in the field of burstiness of the research process focused on investigations of (Ahrens, Zaščerinska, 2016)

- the theoretical inter-relationship between *research and its burstiness* that allow determining that the flow of the research process is of bursty nature,
- the empirical analysis of research that allow drawing the conclusions on the researchers' burstiness in the research process.

Research question: What are indicators of burstiness in research on education for health society?

The aim of the research is to analyze scientific literature on process burstiness underpinning elaboration of indicators of burstiness in research.

Methods and methodologies

The meaning of the key concepts of *burstiness*, *criteria*, *indicators* and *research* is studied. Moreover, the analysis demonstrates how the key concepts are related to the idea of *education for health society* and shows a potential model for development, indicating how the steps of the process are related following a logical chain: conceptual framework → empirical study → conclusions.

The present contribution employs interdisciplinary research as interdisciplinary research assists in synthesizing, connecting and blending ideas, data and information, methods, tools, concepts, and/or theories from two or more disciplines in order “to make whole” (Repko, 2012).

The process of interdisciplinary research is organized as revealed in Figure 1 (Ahrens, Bassus, Zaščerinska, 2014):

- In Phase 1 of the interdisciplinary research, an issue is separately explored by two or more scientific disciplines.
- In Phase 2, the same issue is examined by the synergetic point of view of these two or more scientific disciplines.
- In Phase 3, results of the analysis are interpreted.

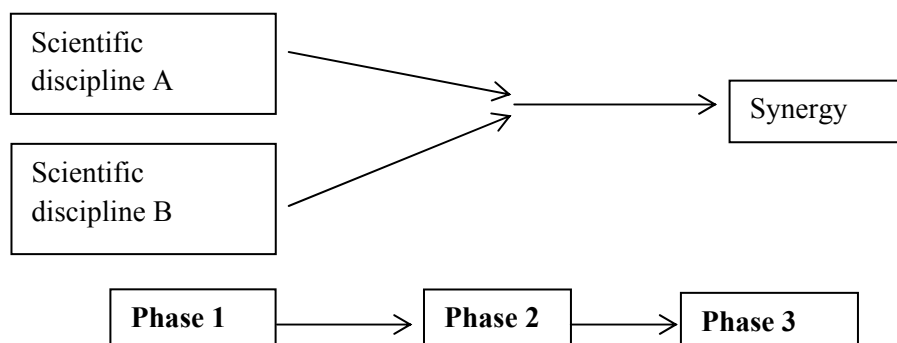


Figure 1. The interdisciplinary process by Repko (adopted from Repko, 2012)

For the search of indicators of burstiness in research, the synergy between research and telecommunications is promoted as the phenomenon of researchers in research process as well as bit-errors in data transmission appear to be of a similar nature, namely, the bursty nature. Such **methodologies** that consider the bursty nature of bit-errors in data transmission have been successfully implemented in telecommunications for optimizing data communication protocols and will be adopted in this work to the research burstiness. It should be noted that the present research is not limited to only two scientific disciplines, namely, education and telecommunication, but is based on a number of scientific disciplines such as business including e-business, social media, logistics, literature, etc.

The remaining part of this paper is organized as follows: the following section introduces burstiness in research and the search for indicators for evaluation of burstiness in research. The following section also presents the associated results of an empirical study. Finally, some concluding remarks are provided followed by a short outlook on interesting topics for further work.

Results of the research

Theoretical Framework

Research is an integral part of a single learning process (Zaščerinska, 2009, p. 24) as indicated in Figure 2.

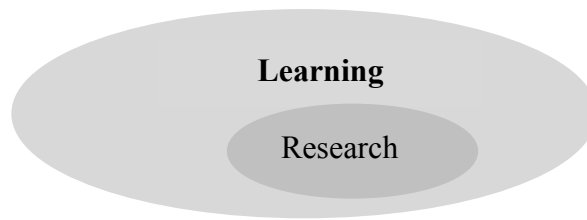


Figure 2. The inter-relationship between learning and research

Consequently, the terms *research* and *learning* are used synonymously in the present contribution. Learning is defined as a purposefully organized or spontaneous individual process of individual improvement of his/her individual experience (knowledge, skills and attitudes) based on cognition (Ahrens, Zaščerinska & Andreeva, 2013, p. 35) of social nature.

In the present work, research is built within the paradigm of researchers' binary behaviour. For identifying researchers' binary behaviour, such an everyday research situation is considered as potential researchers have to solve an issue formulated already in 1603 by William Shakespeare in his play *Hamlet* such as "To be, or not to be" (Shakespeare, 1825). Regarding a modern interpretation of potential researchers' contemporary problems, Shakespeare's words may sound as "to investigate, or not to investigate". It should be noted that "to investigate, or not to investigate" is considered as researchers' binary behavior depicted in Figure 3.

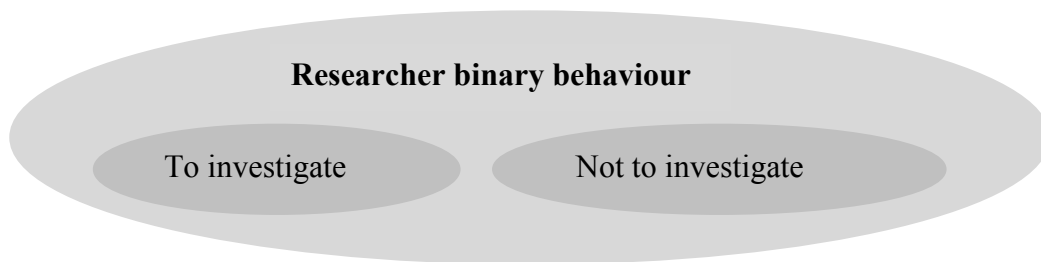


Figure 3. Elements of researchers' binary option

Researcher report on a carried out scientific investigation serves as an output of the research process. Figure 4 shows a typical scenario in which a researcher who presents a report on a carried out scientific investigation as the output of the research process is highlighted (represented by "x") within a sequence of people (represented by "-") who do the research without reporting. By people any researcher who does the research without reporting is understood in the present contribution.

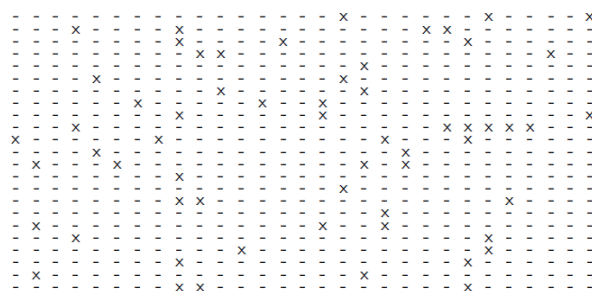


Figure 4. A researcher who presents a report on a carried out scientific investigation (represented by "x") within a sequence of people who do the research without reporting (represented by "-")

Research or, in other words, research process, which ends without a report on a carried out scientific investigation means a gap (Ahrens, Purvinis, Zaščerinska, Andreeva, 2015) in the present work. It should be noted that the terms "gap", "gap process" and "gap distribution function" are used synonymously in the present contribution. Gaps are rooted in the Hidden Markov Models (HMM). What has however interested communication protocol developers and coding theorists, are the probabilities of error structures in any finite time interval such as the block length or the cycle length of a transmission

procedure (Wilhelm, 2014b). These probabilities are typically difficult to present analytically (Wilhelm, 2014b). Many studies have found that the block error probability (p_b) dependent on the block length (n) in the initial part is linear when presented double-logarithmically (Wilhelm, 2014b). With this approach, Wilhelm (2014b) developed the gap *L-model* (Gap Model) and distance *A-model* with complete sets of formulae concerning the probabilities of error structures occurring in bursts, and in blocks. The gaps between two researchers are assumed to be statistically independent from each other (Ahrens, Purvinis, Zaščerinska, Andreeva, 2015). Figure 5 illustrates the research process between two researchers described by gap processes.

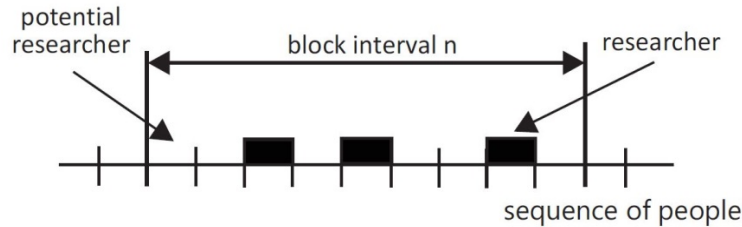


Figure 5. Researcher's gap for describing researchers' binary behavior

However, the researchers can be more independently distributed over e.g. a day or they can appear really concentrated as highlighted in Figure 6.

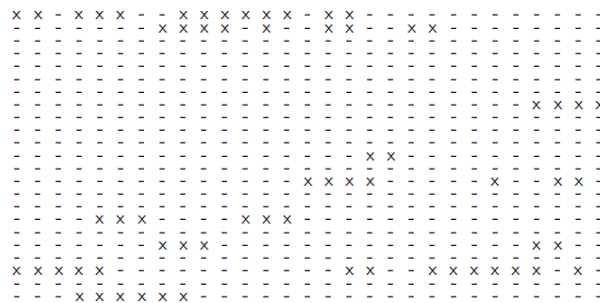


Figure 6. Researchers' burstiness (represented by "x") within a sequence of people who do the research without reporting (represented by "-")

In situations where binary decisions are made in research process, not only a report on a carried out scientific investigation as the output of the research process is of any research interest but also how concentrated reports are presented. That is why models which focus only on reports on a carried out scientific investigation with a given probability are not exact enough to describe research process. In general, the researchers' probability can serve as a clear indicator of how often people decide to do research. However, the researchers' probability does not deliver any information about how concentrated the research is.

In order to determine a criterion of the research process, the term *criteria* are defined. Criteria serve to structure, assess and evaluate (Špona, Čehlova, 2004). Criteria are identified by analysis of (Špona, Čehlova, 2004)

- definition of the research object,
- structure of the research object and
- factors (Špona, Čehlova, 2004).

For outlining a criterion, analysis of the bursty nature of researchers in research process is taken into consideration. As burstiness shapes the structure of the research process, burstiness is a criterion in research process.

In its turn, criterion is described by indicators. The term *indicator* is identified as the component to determine developmental dynamics of the object (Zaščerinska, 2013). It should be noted that in the present contribution, the terms *indicators* and *parameters* are used synonymously. By a parameter, definable, measurable, and constant or variable characteristic, dimension, property, or value, selected from a set of data (or population) to understanding a situation (or in solving a problem) is understood (Business Dictionary, 2015). In the present contribution, indicators of burstiness in research are determined via mathematical analysis such as following:

Analyzing the researchers' characteristic, we can define a block interval n (identified as the probability $p_B(n)$ where at least one researcher appears. The parameter n refers e.g. to the total number of people doing research in a given time e.g. a day. Choosing the parameter $n = 1$ the probability $p_B(n)$ equals the researchers' probability p_e .

Now we can assume that the probability $p_B(n)$ can be described as a function of the researchers' probability p_e and the block interval length n . Here the following approximation is used (Wilhelm, 1976; Ahrens, 2000)

$$p_B(n) = \begin{cases} p_e \cdot n^\alpha & 1 \leq n \leq n_0 \\ 1 & n > n_0 \end{cases} \quad (1)$$

Table 2 illustrates the levels of the probability p_e .

Table 2

Levels of probability p_e in a bursty research process

Criteria	Indicator	Levels				
		Level 1	Level 2	Level 3	Level 4	Level 5
		very low	low	average	high	very high
Burstiness	Probability p_e	0.00	0.11	0.41	0.60	0.80
		– 0.10	– 0.39	– 0.59	– 0.79	– 1.00

The value α denotes the linear dependence between $p_B(n)$ and n and is a measure for the researchers' concentration (also referred to the concentration of research process). The value of n_0 indicates the maximum block length to which the linear-dependence can be maintained (see Figure 7).

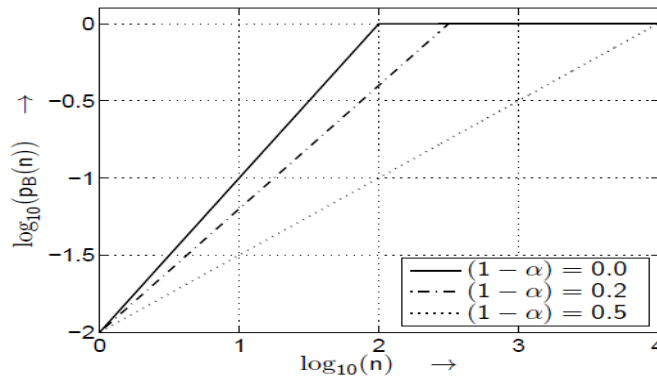


Figure 7. Relationship between the probability $p_B(n)$ and the block interval n for different parameters of the $(1 - \alpha)$ at a researcher's probability of $p_e = 10^{-2}$

The analysis of concentration parameter $(1 - \alpha)$ (referred to the concentration in research process) has shown that parameters in the range of 0.0 until 0.5 describe realistic scenarios. Thereby, a parameter $(1 - \alpha) = 0$ describes the situation where the potential researchers appear independently distributed from each other. Table 3 outlines the levels of the concentration $(1 - \alpha)$.

Table 3

Levels of concentration $(1 - \alpha)$ in a bursty research process

Criteria	Indicator	Levels				
		Level 1	Level 2	Level 3	Level 4	Level 5
		very low	low	average	high	very high
Burstiness	Concentration $(1 - \alpha)$	0.00	0.11	0.41	0.60	0.80
		– 0.10	– 0.39	– 0.59	– 0.79	– 1.00

With increasing parameter $(1 - a)$ the researchers appear more and more concentrated and the probability $p_B(n)$ decreased for a given n . With the assumption that the distances (gaps k) between neighboring researchers are statistically independent from each other, the researchers' characteristic, namely the occurrence of bursty researchers, is defined by the researchers' gap-distribution function $u(k) = P(X \geq k)$, which describes the probability of a gap larger than k . The setup

$$p_B(n) = \begin{cases} p_e \cdot \sum_{k=0}^{n-1} u(k) & 1 \leq n \leq n_0 \\ 1 & n > n_0 \end{cases} \quad (2)$$

is used to develop the researcher's gap distribution function $u(k)$ for the researchers' gaps step by step.

Comparing (1) and (2), one gets:

$$\sum_{k=0}^{n-1} u(k) = n^a \quad 1 \leq n \leq n_0 \quad (3)$$

and for the searched error-gap distribution $u(k)$ we yield:

$$\begin{array}{llll} n = 1 & : & u(0) & = \\ \\ n = 2 & : & u(0) + u(1) & = \\ \\ n = 3 & : & u(0) + u(1) + u(2) & = \\ \\ \dots & : & \dots & = \dots \\ n \leq n_0 & : & u(0) + u(1) + \dots + u(n-1) & = n^a \end{array}$$

The researchers-gap distribution function $u(k)$ can be defined as follows:

$$u(k) = \begin{cases} (k+1)^a - k^a & 0 \leq k \leq n_0 \\ 0 & k \geq n_0 \end{cases} \quad (4)$$

Re-writing of $u(k)$ leads to the researchers-gap density function $v(k) = P(X = k)$, which describes the probability of a gap X equal to k :

$$\begin{aligned} u(k) &= v(k) + v(k+1) + v(k+2) + \dots \\ u(k+1) &= v(k+1) + v(k+2) + \dots \end{aligned}$$

and by calculating the difference between $u(k)$ and $u(k+1)$ the researchers-gap density function $v(k) = P(X = k)$ can be obtained

$$v(k) = u(k) - u(k+1) . \quad (5)$$

Assuming that the researchers are independently distributed, i.e. $(1 - a) = 0$, and using equation (4) and (5) one gets the following result for the researchers-gap density function $v(k)$:

$$v(k) = \begin{cases} 1 & k = (n_0 - 1) \\ 0 & k \neq (n_0 - 1) \end{cases} . \quad (6)$$

With this result, the disadvantage of the model setup becomes evident. The model setup defined in (1) leads to a deterministic researchers-gap process. In situations, where the researchers appear concentrated, i.e. $(1 - a) > 0$, one can also find an enlarged value at $v(n_0 - 1)$. This error leads to engraving inaccuracies in the simulation process. The reason is the discontinuity at $n = n_0$ in equation (1). A modification of this model setup is necessary. The following solution can be assumed: The linear increases of can only be accepted for small parameters of α . The value of has to change steadily into the value for larger n. To the minimization of the model inaccuracy at $v(n_0 - 1)$ equation (4) has to be multiplied by the value $e^{-\beta \cdot k}$ [7]. For the researchers-gap distribution function $u(k)$ the following expression arises:

$$u(k) = ((k + 1)^a - k^a) e^{-\beta \cdot k} \quad 0 \leq k \leq \infty$$

with

$$\lim_{k \rightarrow \infty} e^{-\beta \cdot k} = 0 \quad \beta > 0$$

and

$$\beta \approx p_e^{\frac{1}{a}} .$$

Figure 8 illustrates the researchers-gap distribution function $u(k)$ for different parameters $(1 - a)$ assuming a researcher's probability of $p_e = 10^{-2}$.

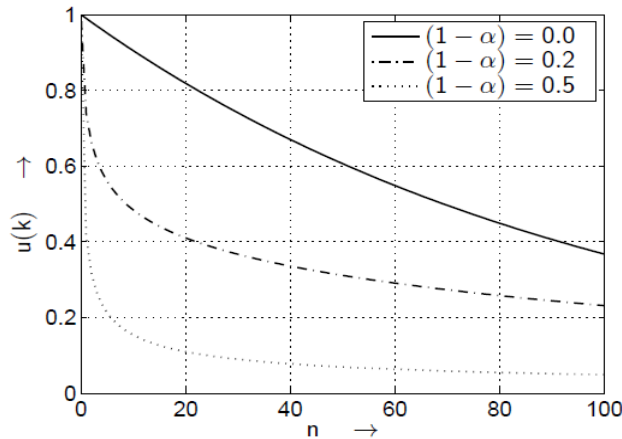


Figure 8. Researchers-gap distribution function $u(k)$ for different parameters of the $(1 - a)$ at a researcher's probability of $p_e = 10^{-2}$

The resultant researcher-gap density function $v(k)$ is depicted in Figure 9.

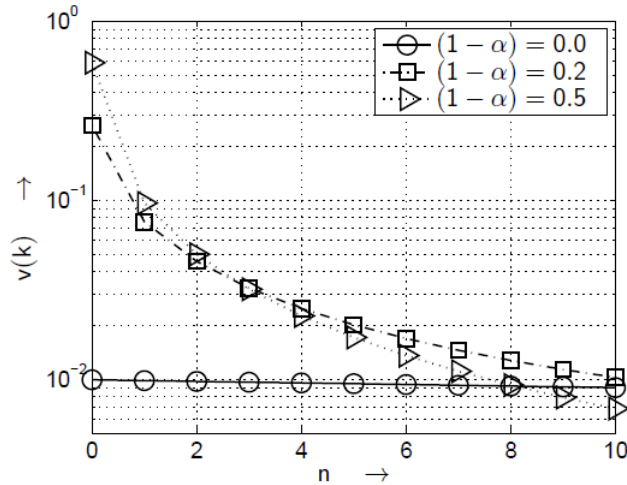


Figure 9. Researchers-gap density function $v(k)$ for different parameters of the $(1 - a)$ at a researcher's probability of $p_e = 10^{-2}$

Finally, the proposed system setup is highlighted in Figure 10.

Now, the researcher characteristic can be modelled by two parameters (the researcher's probability p_e and the researcher's concentration value $(1 - a)$).

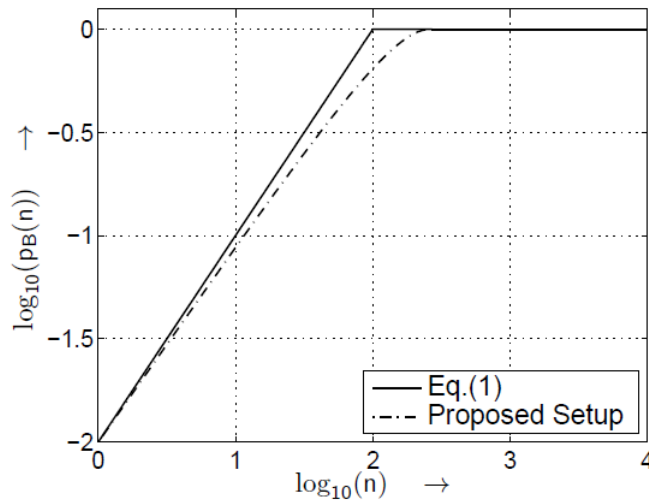


Figure 10. Approximated relationship between the probability $p_B(n)$ and the block interval n for different parameters of the $(1 - a)$

With the assumption that the distances between neighboring researchers are statistically independent from each other the model characteristic is described completely by the researcher's distribution function $u(k)$. For the creation of the gap processes a uniformly distributed random number Y is identical to the function $u(k)$ and the corresponding value of the researcher's gap is determined. For this, the following equation

$$Y = u(k) \tag{6}$$

has to be solved numerically.

Hence, the criterion of researchers' burstiness includes such indicators as probability and concentration (Ahrens, Purvinis, Zaščerinska, Andreeva, 2015) as summarized in Table 4.

Table 4

Criterion, indicators and levels of burstiness in research process

Criteria	Indicator	Levels				
		Level 1	Level 2	Level 3	Level 4	Level 5
		very low	low	average	high	very high
Burstiness	Probability p_e	0.00	0.11	0.41	0.60	0.80
	Concentration ($1 - a$)	0.10	0.39	0.59	0.79	1.00

For comparison purposes, Table 5 demonstrates the model of evaluation of burstiness of hot topic, keyword, event, etc in a sequence of batched georeferenced documents in social media developed by a group of Japanese researchers as geo-annotated user-generated data on social media sites is becoming one of the most influential sources of information (Kotozaki, Tamura, Kitakami, 2015). It should be noted that the term *model* is of great research interests. In pedagogy, by model a pattern is meant (Beļickis, Blūma, Koķe, Markus, Skujiņa, & Šalme, 2000). In mathematics, a model is an interpretation of a theory (Kühne, 2005). In engineering, business and computer sciences, a model describes a system (Banks, Carson, Nelson, Nicol, 2004). Interdisciplinary (pedagogy, mathematics, engineering, business and computer sciences) analysis of the term *model* leads to such a newly defined notion of the term *model* as a pattern of individual's or individuals' interpretation of a phenomenon (Ahrens, Purvinis, Zašcerinska, Andreeva, 2015). Models can be presented in a variety of forms such as verbal, graphic, computer, etc (Ahrens, Purvinis, Zašcerinska, Andreeva, 2015).

Table 5

Criterion and indicator of burstiness in social media

Criterion	Indicator
Burstiness of hot topic, keyword, etc in a sequence of batched georeferenced documents	Locality

This group of Japanese researchers built their model of evaluation of burstiness of hot topic, keyword, etc in a sequence of batched georeferenced documents on Kleinberg's burst detection algorithm (2002), which is based on a queuing theory for detecting bursty network traffic (Kotozaki, Tamura, Kitakami, 2015). It should be noted that Kleinberg's solution does not provide clear distinction between within-burst and out-of-burst records (Mai, Ajwani, Sala, 2015).

A comparative analysis of the model of evaluation of burstiness of hot topic, keyword, etc. in social media shown by the group of Japanese researchers (Kotozaki, Tamura, Kitakami, 2015) and the model for evaluation of researchers' burstiness in research process is reflected in Table 6.

Table 6

Comparison of models for evaluation of burstiness in social media and research

Model's element	Social media	Research process
Criteria	Burstiness of hot topic, keyword, etc in a sequence of batched georeferenced documents	Researchers' burstiness
Indicators	Locality	Researchers' probability
		Researchers' concentration
Feature	Sequence of batched georeferenced documents	Sequential independence of gaps between two researchers or sequentially independent gaps of length k between the individual researchers
Methodological background	Kleinberg's burst detection algorithm (2002), which is based on a queuing theory for detecting bursty network traffic and yields a nested representation of the set of bursts that imposes a hierarchical structure on the overall stream.	Gap distribution function within a sequence of the disturbed and interrupted transmission intervals

The comparative analysis of Table 6 reveals that Kleinberg’s burst detection algorithm, which is based on a queuing theory, is applicable to a sequence of phenomena while gap distribution function is featured by sequential independence of gaps between two researchers. The comparative analysis assists in drawing such a conclusion as research process is characterized by independence of gaps between two researchers. Consequently, the methodological background for evaluation of researchers’ burstiness in research process should take it into account while developing a model for evaluation of researchers’ burstiness in research process.

Empirical Study

The present part of the contribution demonstrates the design of the empirical study, results of the empirical study and findings of the study.

The design of the present empirical study comprises the purpose and question, materials and methodology of the present empirical study.

The empirical study was aimed at evaluating the burstiness in research process. The empirical study’s question was as follows: What is the level of burstiness in research on education for health society?

The present empirical study was carried out in February 2016. Analysis of statistical documents of a section on health education of an international scientific conference in a Baltic state in the period between 2012 and 2016 was implemented.

Interpretive research paradigm was used in the present empirical study. Interpretive research paradigm corresponds to the nature of humanistic pedagogy (Luka, 2008). The interpretive paradigm aims to understand other cultures, from the inside through the use of ethnographic methods such as informal interviewing, participant observation and establishment of ethically sound relationships (Taylor and Medina, 2013). Interpretive paradigm is characterized by the researcher’s practical interest in the research question (Cohen, Manion, Morrison, 2003). Researcher is the interpreter.

Qualitative study was applied for empirical analysis. Exploratory research was used in the empirical study (Mayring, 2007). The exploratory type of the comparative study aims to generate new hypotheses and questions (Phillips, 2006). The exploratory methodology proceeds from exploration in Phase 1 through analysis in Phase 2 to hypothesis development in Phase 3 (Bassus, Ahrens, Zaščerinska, 2015). Phase 1 *Exploration* is aimed at data collection; Phase 2 *Analysis* focuses on data processing, analysis and data interpretation; Phase 3 *Hypothesis Development* ensures analysis of results of the empirical study and elaboration of conclusions, hypotheses and research questions for further research (Bassus, Ahrens, Zaščerinska, 2015).

The qualitatively oriented empirical study allows the construction of only few cases (Mayring, 2004). The cases themselves are not of interest, only the conclusions and transfers we can draw from these documents (Flyvbjerg, 2006). Selecting the cases for the case study comprises use of information-oriented documents, as opposed to random documents (Flyvbjerg, 2006). This is because an average case is often not the richest in information. In addition, it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur (Flyvbjerg, 2006).

Analysis of statistical documents of a section on health education of an international scientific conference in a Baltic state in the period between 2012 and 2016 included the search for the number of submitted and accepted papers. The findings on the number of submitted and accepted papers a section on health education of an international scientific conference in a Baltic state in the period between 2012 and 2016 is presented in Table 7.

Table 7

Number of submitted and accepted papers within a section on health education of an international scientific conference in a Baltic state

Year	Submitted papers	Accepted papers
2012	11	9
2013	11	10
2014	18	13
2015	23	17
2016	20	15

Further on, Table 8 illustrates accepted papers (represented by “x”) within a number of submitted paper (represented by “-“) in the period between 2012 and 2016.

Table 8

Accepted papers (represented by “x”) within a number of submitted paper (represented by “-“) in the period between 2012 and 2016

Year	Sequence of submitted and accepted papers
2012	-xxx-xxxxxx
2013	xxxxx-xxxxx
2014	xxx-xxxxxx---xx-xx
2015	xxxxxxx---xxx-x-xxxxxx
2016	x-xxxxxx---xxxxxxx

Based on the results presented in Table 8, the indicators of burstiness, namely probability and concentration, were calculated. Table 9 summarizes the obtained results of both indicators, namely probability and concentration.

Table 9

Indicators’ mathematical results

Year	Submitted papers	Accepted papers	Probability p_e	Concentration $(1 - a)$
2012	11	9	0.81	0.70
2013	11	10	0.91	0.73
2014	18	13	0.72	0.61
2015	23	17	0.74	0.69
2016	20	15	0.75	0.73

Based on the results presented in Table 9, Table 10 indicated levels of burstiness in research process in the period between 2012 and 2016.

Table 10

Levels of burstiness in research process

Year	Probability	Probability level	Concentration $(1 - a)$	Concentration level	Level of burstiness
2012	0.81	very high	0.70	high	high
2013	0.91	very high	0.73	high	high
2014	0.72	high	0.61	high	high
2015	0.74	high	0.69	high	high
2016	0.75	high	0.73	high	high

Summarizing content analysis (Mayring, 2004) of the data reveals the burstiness in research process within a section on health education of an international scientific conference in a Baltic state within the period between 2012 and 2016 is high.

Discussion

The present research has limitations. The inter-connections between *burstiness*, *research on education for health society*, *criteria*, *indicators* and *gap processes* have been set. Another limitation is the empirical study based on one case only, namely a section on health education of an international scientific conference in a Baltic state within the period between 2012 and 2016. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research, namely the elaborated indicators and levels of probability and concentration for evaluation of burstiness based on gap processes, may be used as a basis of analysis of burstiness in other scientific disciplines. If the results of

other cases had been available for analysis, different results could have been attained. There is a possibility to continue the study.

Conclusions

The theoretical findings on the inter-relationship between *burstiness* and gap processes allow determining the indicators *probability and concentration* as well as the levels of burstiness.

The empirical findings in the present contribution allow drawing the conclusions on a high level of burstiness in research process within a section on health education of an international scientific conference in a Baltic state within the period between 2012 and 2016.

The following research question has been formulated: What is the inter-relationship between levels of burstiness and quality of research on education for health society?

Further research tends to facilitate the advancement of the theoretical framework on burstiness in a process. The search for relevant methods, tools and techniques for evaluation of burstiness in a process is proposed. Future research tends to focus on empirical studies to be carried out in other European countries. And a comparative research of different countries could be carried out, too.

References

1. Ahrens, A. (2000). "A new digital channel model suitable for the simulation and evaluation of channel error effects," in *Colloquium on Speech Coding Algorithms for Radio Channels*, London (UK), 17. April 2000, p. 2.1-2.15.
2. Ahrens, A., Bassus, O., Zaščerinska, J. (2014). *Interdisciplinary Research on Current Issues in Higher Education*. Verlag: Mensch & Buch.
3. Ahrens, A., Purvinis, O., Zaščerinska, J., Andreeva, N. (2015). Gap Processes for Modelling Binary Customer Behavior. Proceedings of the 8th International Conference on Engineering and Business Education 8-9 October 2015, pp. 8-13, Østfold University College, Fredrikstad, Norway. Published by University of Wismar, Germany.
4. Ahrens, A., Zaščerinska, J. & Andreeva, N. (2013). Engineering Students' Blended Learning in Higher Education. Proceedings of International Scientific Conference *Society, Integration, Education* of Rezekne Higher Education Institution Faculty of Education and Design Personality Socialization Research Institute in collaboration with Department of Civil Engineering and Architecture, University of Udine, Italy, May 24-25, 2013, Volume 1: Higher Education Institutions Pedagogy, School Pedagogy, Pre-School Pedagogy, Art Pedagogy, pp. 34-44. Rēzekne: Rēzeknes Augstskolas Izdevniecība 2013, Latvia, (ISSN 1691-5887). http://www.ru.lv/ckfinder/userfiles/RAweb/Saturs/zinatne/zinatniskie_instituti/personas_socializācijas_pētījumu_instituts/izdevumi/2013/I%20da%C4%BCa.pdf.
5. Ahrens, A., Zaščerinska, J. (2016). A Qualitative Study on the Burstiness of the Research Process. „*Empirisch pädagogische Forschung in inklusiven Zeiten - Professionalisierung, Konzeptualisierung, Systementwicklung*“, Universität Rostock, Germany. 19. bis 21. September 2016.
6. Banks, J., Carson, J., Nelson, B.L., Nicol, D. (2004). *Discrete-Event System Simulation*, 5/E. Prentice Hall Paper, 624 pp. Published 12/09/2004, ISBN-10: 0131446797. ISBN-13: 9780131446793. http://www.pearsonhighered.com/pearsonhigheredus/educator/product/products_detail.page?isbn=0131446797#sthash.YTCVcBIG.dpuf
7. Bassus, O., Ahrens, A., Zaščerinska, J. (2015). Analysis of Engineering Students' Needs in Interdisciplinary Education. Proceedings of the 8th International Conference on Engineering and Business Education 8-9 October 2015, Østfold University College, Fredrikstad, Norway, pp. 26-31. Published by University of Wismar, Germany. ISBN 978-3-924100-05-2.
8. Beļickis, I., Blūma, D., Koķe, T., Markus, D., Skujīņa, V. (vad.) & Šalme, A. (2000). *Pedagoģijas terminu skaidrojošā vārdnīca. Termini latviešu, angļu, vācu, krievu valodā*. Rīga, Latvia: "Zvaigzne ABC". (in Latvian). (2000).
9. Business Dictionary. Parameter. BusinessDictionary.com. 2015.
10. Cohen, L., Manion, L., Morrison, K., *Research Methods in Education*. Routledge/Falmer Taylor & Francis Group, London and New York:, UK and USA, (2003).
11. Elliott, E.O. (1963). Estimates of Error Rates for Codes on Burst-Noise Channels. The Bell System Technical Journal, (Volume:42, Issue: 5. pp. 1977 – 1997.
12. Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, 12(2), 219-245.
13. Gilbert, E.N. (1960). Capacity of a Burst-Noise Channel. B.S.T.J. 39, September 1060, pp. 1253-1265.
14. Karsai, M., Kaski, K., Barabási, A., & Kertész, J. (2012). Universal features of correlated bursty behavior. *Scientific Reports* 2, Article number:397 2012. doi:10.1038/srep00397.
15. Kleinberg, J. (2002). Bursty and Hierarchical Structure in Streams. Proceedings of the 8th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2002.
16. Kotozaki, K., Tamura, K., Kitakami, H. 2015. Identifying Local Burstiness in a Sequence of Batched Georeferenced Documents. *International Journal of Electronic Commerce Studies* Vol.6, No.2, pp.269-288, 2015 doi: 10.7903/ijecs.1347.
17. Kühne, T. (2005). What is a model? Dagstuhl Seminar Proceedings 04101, pp. 1-10. Publisher: Internationales Begegnungs- und Forschungszentrum für Informatik (IBFI), Schloss Dagstuhl, Germany. ISSN 1862-4405. <http://drops.dagstuhl.de/opus/volltexte/2005/23>. (2005).
18. Lūka, I. Development of Students' ESP Competence and Educator's Professional Activity in Tertiary Level Tourism Studies. In I. Žogla (Ed.), Association for Teacher Education in Europe Spring University Conference *Teacher of the 21st Century: Quality Education for Quality Teaching* University of Latvia (689-697). Riga, Latvia, (2008)
19. Mai, T., Ajwani, D., Sala, A. 2015. Profiling User Activities with Minimal Traffic Traces. In Philipp Cimiano, Flavius Frasincar, Geert-Jan Houben, Daniel Schwabe (Eds), Proceedings of 15th International Conference *Engineering the Web in the Big Data Era ICWE 2015*, Rotterdam, the Netherlands, June 23-26, 2015, pp. 116-133. Springer.
20. Mayring, P. (2007). On Generalization in Qualitatively Oriented Research. *Forum: Qualitative Social Research*, 8(3), Art. 26, 2007, pp. 1-8.
21. Mayring, P. (2004). Qualitative Content Analysis. In U. Flick, E. Von Kardoff and I. Steinke (Eds). *A Companion to Qualitative Research*, pp. 266-269. SAGE, UK, Glasgow.
22. Phillips, D. (2006). Comparative Education: method. *Research in Comparative and International Education*, Vol. 1, Number 4, 304-319.
23. Repko, A. (2012). *Interdisciplinary Research Process and Theory*. Second Edition. SAGE.

24. Shakespeare, William. (1825). *The Tragicall Historie of Hamlet Prince of Denmarke. As it hath beene diuerse times acted by his Highnesse seruants in the Cittie of London: as also in the two Vniuersities of Cambridge and Oxford, and else-where* [The "First Quarto"], pp. 35 ff. Nicholas Ling & J. Trundell (London), 1603. Reprinted as *The First Edition of the Tragedy of Hamlet: London, 1603*. The Shakespeare Press.
25. Špona A., Čehlova Z. (2004). *Pētniecība pedagoģijā (Research in Pedagogy)*. Rīga: Raka, (in Latvian), 2004.
26. Taylor, P.C., & Medina, M.N.D. (2013). Educational Research Paradigms: From Positivism to Multiparadigmatic. *The Journal of Meaning-Centered Education*. Vol. 1, Article 2.
27. Wilhelm, C. (2014b). Channel models for the analysis and synthesis of modern digital transmission media and processes. Distance model (A-model) and Gap model (L-model). www.channels-networks.net.
28. Wilhelm, C. (2014a). New models - symmetric binary channels with Memory. <http://www.channels-networks.net/english/>.
29. Wilhelm, H. (1976). *Datenübertragung (in German)*. Berlin: Militärverlag, 1976.
30. Zaščerinska, J. (2009). Designing Teaching/Learning Activities to Promote e-Learning. In: A. Ahrens & C. Lange (Ed.), *First Asian Conference on e-Business and Telecommunications*, pp. 22-35. Berlin: Mensch & Buch, Germany. ISBN: 978-3-86664-538-7.
31. Zaščerinska, J. (2013). *Development of Students' Communicative Competence within English for Academic Purposes Studies*. Verlag: Mensch & Buch. 202 pp. ISBN-13: 978-3-86387-359-2.

BILDUNG FÜR EINE GESUNDE GESELLSCHAFT: MODELLIERUNG GEBÜNDELT AUFTRETENDER FORSCHUNGSAKTIVITÄTEN

Z u s a m m e n f a s s u n g

Bildung für eine gesunde Gesellschaft zieht immer mehr Forschungsanstrengungen mit sich, welche sich nicht zuletzt in einer gestiegenen Lebensqualität zeigt. Die Forschung zeigt dabei eine burstartige Struktur, welche in diesem Beitrag analysiert wird. Dabei wird ein Modell eingeführt, welches das burstartige Auftreten von Forschungsaktivitäten beschreibt. Am Beispiel eines Konferenzmanagementsystems werden die Parameter des Modells geschätzt und ausgewertet.