

LINKING EXTERNAL TIME WITH INTERNAL TIME FOR REVAMPING EDUCATION REFORM

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***Abstract.** Time is a non-renewable resource. This feature highlights the research significance for the whole sector of education in all countries. The research aim is to analyse scientific literature on time in education underpinning the links between external and internal time. The research is exploratory. It includes theoretical explorations and theoretical modelling of links between external and internal time. The research allows concluding that time can be segmented into external and internal time. The external time and internal time are linked. External time has significantly fastened due to the knowledge growth that led to technology development. In turn, internal time remains steady. The difference between the frequency of change related the external and internal time creates dissonance between the external and internal time for*

individuals in general, and learners particularly. Dissonance between the external and internal time leads to lower learning achievement as well as impacts individuals' health in a negative way. For diminishing the consequences of dissonance between the external and internal time, online studies as well as distance study programmes have been widely leveraged. The new research question is put forward: What educational methods promote the balance between learners' external and internal time? Education reform has to become regular.

Keywords: *development of the system of the external and internal perspectives, education reform, external time, frequency of knowledge change, internal time, time qualitative measurement, time quantitative measurement.*

Introduction

Latvia is currently working on an education reform (Kinca, 2024). Due to demographic situation in the country, Latvia regularly re-structures the school network. School network re-structuring includes the time problem that schoolchildren in Form 1-6 from remote areas might experience. The reform documents propose that schoolchildren in Forms 1-6 should not spent more than 40 minutes on bus organised by local government to bring schoolchildren from home to school (Zinovjeva, 2023). The time importance for education reform is characterised by the time key feature: time is a non-renewable resource. Time feature, as being a non-renewable resource, highlights the significance of this research for the whole sector of education.

Solving this practical problem related to schoolchildren time to be spent on the way to reach their school, Latvia's government is trying to solve, demonstrates the existence of the importance of time for schoolchildren (internal time) as well as local society (external time).

The aim of this research is to analyse scientific literature on time in education underpinning the links between internal time and external time.

The present work represents exploratory research. It includes theoretical explorations as well as theoretical modelling of links between internal and external time. Theoretical interconnections between internal and external time are to be analysed and interpreted. A new research question is to be formulated. Implications for education reform are to be presented.

Research Methodology

The present study was exploratory in nature. This type of research is chosen as links between internal and external time are underexplored (Ahrens, & Zašcerinska, 2021). The lacuna in research on links between internal and external time requires exploratory efforts in this work. Exploratory research is empowered by researchers' openness to launch the study (Ahrens, Zascerinska, Bhati, Zascerinskis, & Aleksejeva, 2021). Exploratory research also means that research can be performed with high flexibility for building a structure in the analyzed research field (Ahrens, Foerster, Zašcerinska, & Wasser, 2020). Exploratory research may result in the creation of a new theory, formulation of hypotheses, or proposal of new research questions (Phillips, 2006). The newly introduced theories, hypotheses, or research questions, which were elaborated within exploratory research, can be tested for generality in subsequent research work and/or studies (Mayring, 2007).

The present exploratory research was enabled by the research questions:

1. Are there links between internal and external time?
2. What are links between internal and external time?

The methodological background of the present research is reflected in Table 1.

Table 1 Methodological background of the present research

Principle	Short description	Reference
Interconnectedness	Everything is connected, nothing is excluded, and everything is related	OECD, 2019
Interdependency	One phenomenon impacts the other existing or emerging phenomena	
In flux	Everything in the universe is fluid and in motion	

Source: OECD, 2019.

The principles of the methodological background of the present research lay the ground for the methodology known as “the development of the system of the external and internal perspectives” created by Zašcerinska (2011, 2013) as shown in Figure 1.

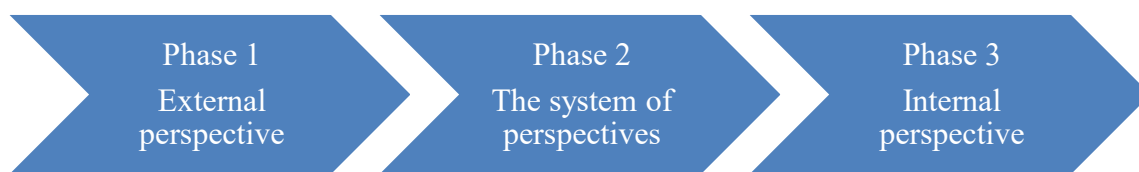


Figure 1 **Research methodology** (by authors)

Principles of the methodological background of the present research lay the pavement for the methodological foundation of the development of the system of the external and internal perspectives.

The methodological foundation of the development of the system of the external and internal perspectives is formed by the System-Constructivist Theory (Zaščerinska, 2011). The System-Constructivist Theory is also known as the New or Social Constructivism Pedagogical Theory (Zaščerinska, Andreeva, Zaščerinskis, & Aļeksejeva, 2016). Table 2 highlights the pillars of the System-Constructivist Theory.

Table 2 **Pillars of the System-Constructivist Theory**

Theory	Short description	Reference
System Theory	Any activity is a system	Parsons, 1976
Social system theory	Communication is a system	Luhmann, 1988
Symbolic interaction theory	Meaning of symbols in communication depends on the context and may change over time	Mead, 1973
Theory of Subjectivism	Prevalence of individual feelings in search for truth	Groeben, 1986

Source: Zaščerinska, Andreeva, Zaščerinskis, & Aļeksejeva, 2016.

The System-Constructivist Theory implies the dialectical principle of the unity of opposites (Zaščerinska, Andreeva, Zaščerinskis, & Aļeksejeva, 2016). The dialectical principle of the unity of the opposites encompasses the relationship between external (social, social interaction, teaching, etc) and internal (individual, cognitive activity, learning, etc.) perspectives as the synthesis of external and internal perspectives (Bassus & Zaščerinska, 2012). Perspective means a set of certain embodied fundamental assumptions (Barry, 2002), that are based on experience, to serve the observation of the reality. Table 3 describes components of the external and internal perspectives.

Table 3 Description of components of the external and internal perspectives

Components of the external perspective	Components of the internal perspective
conscious	unconscious
instruction / teaching	learning / acquisition
foreign language	mother tongue
professional language	
systematic	non-systematic
from abstract to concrete	from concrete to abstract
thought generalization	object generalization

Source: by authors.

The system-constructivist approach was introduced to learning by Reich (2005). The system-constructivist approach emphasizes that human being's point of view is of subjective nature (Maslo, 2007). It means that everyone has his/her own system of the external and internal perspectives. This system of the external and internal perspectives is a complex open system (Rudzinska, 2008). Complex open systems are characterized by components that can leave and join the system, (Siebert, 2022). Experience is the linchpin in the knowledge construction process (Maslo, 2007) within the development of the system of the external and internal perspectives. Therefore, the subjective aspect of human being's point of view, based on the researchers' experience, is applicable to the present research and its results, too.

Implementation of theoretical methods includes (Ahrens, & Zašcerinska, 2021)

- analysis of scientific literature,
- theoretical modelling,
- systematisation,
- synthesis,
- comparison, and
- generalisation.

The content collected via literature analysis is analysed and interpreted. Content interpretation is visualised by the creation of the theoretical model.

Research Results

Education belongs to social sciences (Ahrens & Zascerinska, 2021). Education is beneficial for society development. Function of education is to transfer the collected knowledge - including knowledge about methods for information search - to the new generation.

Time is a qualitative and quantitative measure of duration of different objects, e.g. physical, cultural, social and other objects as illustrated in Figure 2.

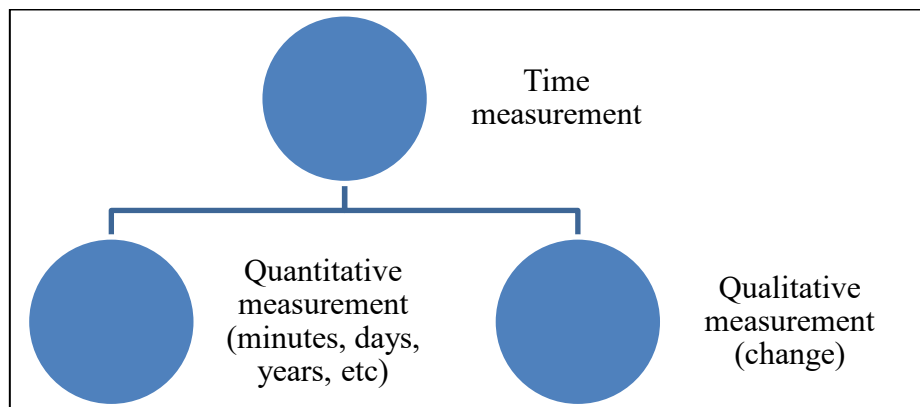


Figure 2 **Structural elements of time measurement** (by authors)

Quantitative measurement is expressed in terms of the passage of minutes, days, years, etc.

Qualitative measurement is described by a change. The change can be visually identified. For example, learner is more confident when giving a presentation in a class.

Thereby, time is an educational category.

The rate at which knowledge is becoming available is doubling every 12 months (Pandey, 2020). It is predicted to increase even faster in the upcoming years (Pandey, 2020). It should be noted that the Knowledge Doubling Curve - as depicted in Figure 3 adapted from Mitchell (2023) - was first mentioned by Buckminster Fuller in 1982 in his book “Critical Path” (Pandey, 2020). He had noticed that until 1900, human knowledge approximately doubled every century linearly (Pandey, 2020). By 1945, it was doubling every 25 years, and by 1982, it was doubling every 12-13 months (Pandey, 2020). According to an estimate by IBM, human knowledge will be doubling every 12 hours in the year 2020

(Pandey, 2020). Therefore, the role of time in education for knowledge transfer has significantly increased.

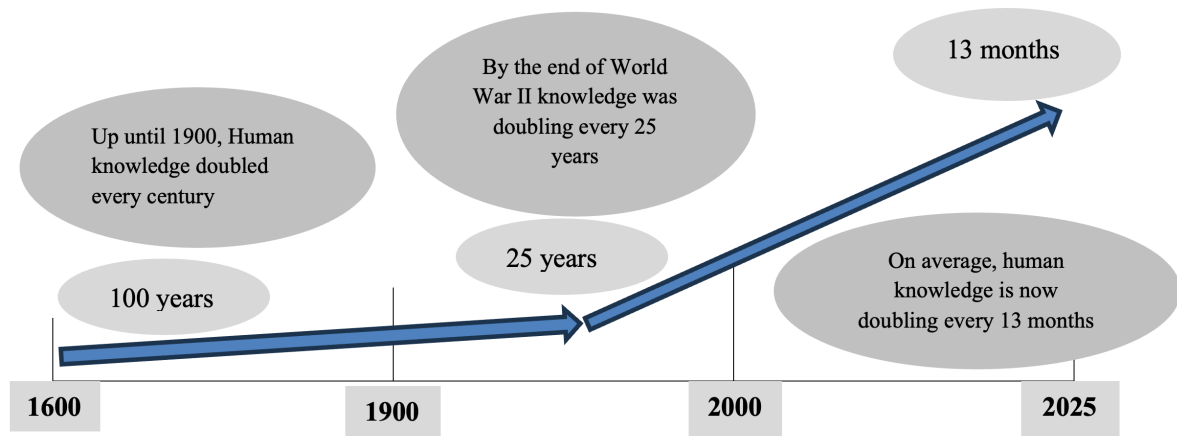


Figure 3 **Knowledge growth trend** (by authors)

Figure 4 shows the frequency of knowledge change based on the analysis of Figure 3. As Figure 4 illustrates, the frequency of knowledge change has significantly increased.

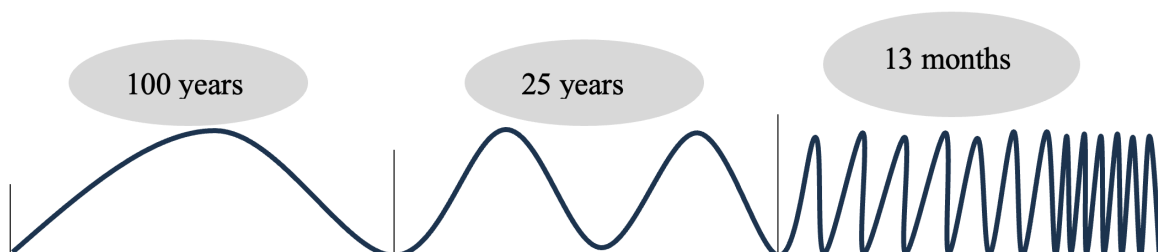


Figure 4 **Frequency of knowledge change** (by authors)

Application of the methodology of the development of the system of external and internal perspectives to the analysis of knowledge doubling in society in different historical ages allows introducing the term “external time”. By external time, time organised by society and social life is meant. For example, the external time includes education institutions’ working time, bus timetable, etc. In education, the target group is learners. Referring to individual learners, the term “internal time” is proposed. Our terms coincide with the terminology “external time” and “internal time” developed by Daan, & Merrow (2002). Table 4

demonstrates structural elements of time in accordance with the methodology of the development of the system of external and internal perspectives.

Table 4 Structural elements of time

Perspective	Structural element of time	Associated terms
External perspective	External time	Social time
Internal perspective	Internal Time	Internal clock Inner clock Circadian rhythm Biological time

Source: by authors.

Analysis of the definitions of the internal clock, inner clock, circadian rhythm, and biological time allows stating that in research these four terms are used synonymously. Table 5 characterises the internal time on the basis of quantitative time measurement.

Table 5. Internal time characterisation(by authors)

Feature of internal time	Short description	Reference
Circadian rhythm	The cycle of 24-hour day	Senthilnathan, & Sathiyasegar, 2019
Internal clock & Inner clock	Individual body time cycle in the frame of 24-hour day, e.g. morningness - eveningness by Folkard, & Hunt, (2000).	Authors' interpretation
Biological time	Generation change in about 25 years	Fenner, 2005; Wang, Al-Saffar, Rogers, & Hahn, 2023

Source: by authors.

Analysis of Table 5 leads to the statement that internal time does not change.

Comparison of external time and internal time is presented in Figure 5. The line representing internal time symbolise all the three – circadian rhythm, inner clock, and biological time.

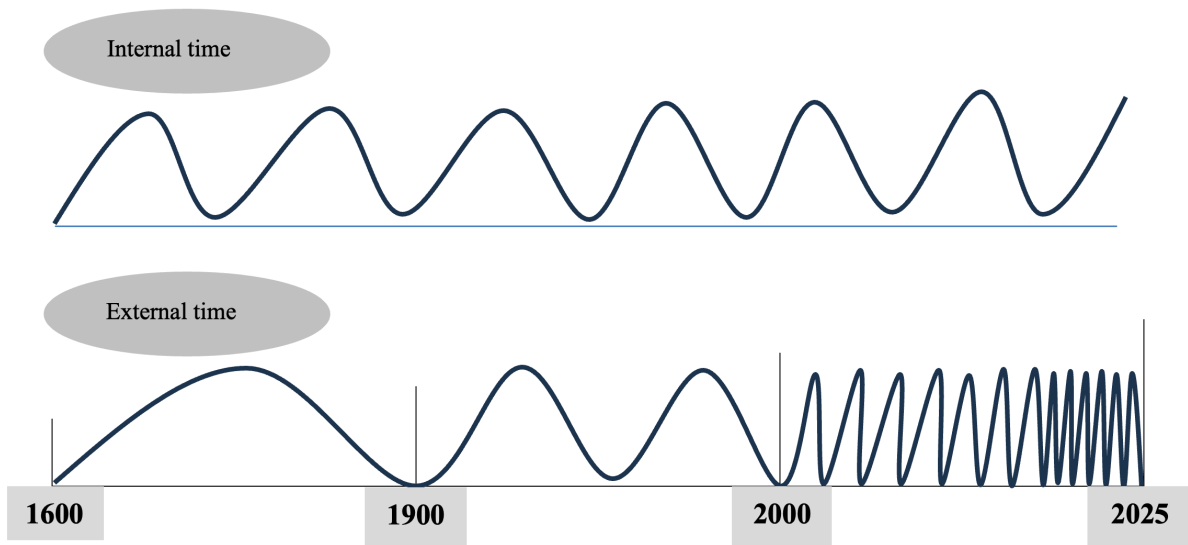


Figure 4 Comparison of frequency of change of the external and internal time
(by authors)

Analysis of Figure 5 on the basis of quantitative time measurement allows finding that there is a dissonance between the external and internal time.

Discussion

Dissonance between the external and internal time experienced by learners might lead to lower learning achievements.

In instance, when Indian students join a study programme in Germany, they recognize the difference between their own (internal time) and their educators' (external time) cultural norms related to time: in India, time is stretchable while in Germany punctuality is crucial (Gruenwald, Ahrens, Zaščerinska, Melnikova, & Andreeva, 2018). Non-punctuality of students from India in study programmes implemented in Germany creates an impression of their non-professional performance.

Another example is related to the Indian students' inner (internal) clock in circadian rhythm in Germany (external time) (Gruenwald, Ahrens, Zaščerinska, Melnikova, & Andreeva, 2018). In India, the light part of the day mostly starts at six o'clock in the morning and ends at six o'clock in the evening. In Germany, days are longer during the summer and shorter during the winter. Due to longer days in summer in Germany, students from India could not follow their circadian

rhythm in Germany. The consequences were that students felt tired and sleepy during lectures. Therefore, students' learning results in the lecture decreased.

Dissonance between the external and internal time in education is expressed by learners and teachers as "I have no time for discussions", "I have not time for myself", "I have not time for my hobbies", "I do not have time!" (Karademir, Mitri, Schneider, Jivet, Allmang, Gombert, Kubsch, Neumann, & Drachsler, 2024), "No time to talk!" (Schad, 2019), etc.

Either dissonance or consonance between the external and internal time can impact individual's health. Dissonance between the external and internal time creates tensions that lead to health problems. Consonance between the external and internal time helps individuals feel better and happy.

In education, consonance between the external and internal time for learners is promoted by the introduction of online studies and distance study programmes. Learners can join online classes from any place. Video lectures can be used at any time appropriate for learners to support their well-being, too. Another method of ensuring of the consonance between the external and internal time for learners encompasses the use of slower pace of delivery (Zaščerinska, 2009; Yurtbaşı, 2015) as understanding of the content by learners prevails over time of delivery taken by teachers (Zaščerinska, 2011). This mirrored in the paradigm shift from time-based education to competence-based education (Gagnon, 2023).

Dissonance between the nature of time and education has to be emphasised as well. Education is cyclic in nature (Ahrens, Lange, Zaščerinska, & Aleksejeva, 2020). It means that educational cycle or educational process (teaching – peer-learning - learning) can be repeated (Ahrens, Lange, Zaščerinska, & Aleksejeva, 2020) as many times as required. Contrary, time is a non-renewable educational resource. It means that each repetition of the educational cycle needs the educational content, also known as knowledge (Zaščerinska, 2011), to be updated as knowledge growth has significantly increased. Therefore, education reforms are becoming regular. Education reforms should address the team, organization, and country levels (Aeon, & Aguinis, 2017).

Conclusion

Theoretical analysis carried out in this research promotes the conclusion that time can be segmented into external and internal time. The conclusion about the links between the external and internal time has been drawn as well.

External time has significantly fastened due to the knowledge growth that led to technology development. In turn, internal time remains steady. The difference between the frequency of change related the external and internal time creates dissonance between the external and internal time for individuals in general, and learners particularly. Dissonance between the external and internal time leads to lower learning achievement as well as impacts individuals' health in a negative way.

For diminishing the consequences of dissonance between the external and internal time, education reform is regularly implemented. Online studies as well as distance study programmes have been widely leveraged.

The present research was limited by the use of scientific literature only. Only theoretical methods were applied in this research. Theoretical analysis was carried out on the basis of only one methodology, namely the development of the system of the external and internal perspectives. The use of other methodologies might contribute to reaching other results.

The new research question is formulated: What educational methods promote the balance between learners' external and internal time?

The current research might be also interesting for other social sciences, specifically economy, human resource management, demography, political science, etc.

In future, research is expected to detail the procedural aspects of the development of the links between the external and internal time. This search for the process, that connects external and internal time, could assist in finding efficient solutions for education modernisation. For this, empirical studies aimed at quantitative and qualitative time measurement are proposed in different disciplines within social sciences. Transdisciplinary comparative studies with the focus on educational, organisational, and cultural context would be beneficial for scientific community.

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