Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2, 193-207
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i2.4443

Classification of natural specializations by priority component of the telescopic model of the natural cycle of activity

Aleksandr Ishkov[1*]
[1]Moscow State University of Civil Engineering, Moscow, Russian Federation; aishkov@gmail.com (A.I.).

Abstract: The article considers the classification of natural specializations according to the priority components of the telescopic model of the natural cycle of activity. The model reflects the structural organization of the human nervous system. The main purpose of the research was to develop a classification of natural specializations of people based on a telescopic model. The classification is structured as a hierarchical system with three levels of detail. The first, classical level classification, corresponding to the small telescopic model, identifies four natural specializations. The second, basic classification level increases the number of natural specializations from four classical to eight basics. This is due to the allocation of two subtypes (basic specializations) in each classical specialization: concrete (right-hemisphere) and abstract (left-hemisphere). The third, detailed level of specialization increases the number of natural specializations from eight basic to sixteen detailed ones. This is due to the allocation of two subtypes (detailed specializations) in each basic specialization, reflecting the orientation to the input (afference) or output (efference) of the non-priority pole of the "interocept or exterocept" dichotomy. The classification of natural specializations highlights the initial (natural, neurophysiological) characteristics of people, which will improve the accuracy of predictions of their behavior.

Keywords: *Afferent, Classification of natural specializations, Efferent, Interocept, Exterocept, Natural cycle of activity, Telescopic model.*

1. Introduction

Activity cycle models are an effective tool for analyzing and managing cyclical processes and are used in a wide variety of fields of knowledge. In the Soviet Union, the foundations of the theory of active systems were laid, on the basis of which a unified theory of complex activity and the theoretical foundations of individual types of activity were later developed [1-5]. Other countries have created their own models. The following are widely used: the Boyd's OODA loop [6-18] the Kolb's experiential learning model [19-33] the McCarthy's 4MAT model [34-46] the PDCA cycle [47-63] etc. Activity cycle models have shown their usefulness in training and managing people, especially those models that emphasize not only stages but also activity styles (personality types), in particular: Kolb's model, 4MAT model, Honey and Mumford's learning styles [64-74] Felder and Silverman's learning style model (FSLSM) [75-90] Gregorc's mind style model [91-105] and others.

The similarity of the descriptions of the four styles of Honey and Mumford [106] identified on the basis of D. Kolb's model, with the descriptions of the four classical (Hippocratic) types of temperament [107] and the four types of temperament of the classification "Priority" [108] [108, 109] allowed us to look at the classical types of temperament as the stages of the cycle of activity inherent in nature in the structure nervous system. As is known, it is the structure that determines the properties and features of the functioning of any system (including the nervous system) [110].

History: Received: 7 November 2024; Revised: 14 January 2025; Accepted: 20 January 2025; Published: 25 January 2025
* Correspondence: aishkov@gmail.com

Based on the similarity of the descriptions of these types (styles), considered as stages of the activity cycle, and the idea of dialectical materialism that the structure of the system is the basis on which the properties and features of the system are formed, a comprehensive telescopic model of the natural cycle of activity was developed [111-115]. The term "natural" in the name of the model means that its structure corresponds to the structural organization of the human nervous system and the principle of hierarchy.

The aim of the study is to develop a classification of natural specializations (types, styles) of people based on the telescopic model of the activity cycle. The classification, repeating the structure and hierarchy of nervous system components, highlights the initial (natural, neurophysiological) characteristics of people, which will improve the accuracy of forecasts of their behavior. In the course of the research, we searched and analyzed scientific publications devoted to models of activity cycles and styles (typologies) of activity. Such methods of scientific cognition as comparative analysis, system approach, as well as analysis and synthesis procedures were used.

2. Telescopic Model of the Natural Cycle of Activity

The telescopic model includes 3 partial activity models: the small telescopic model (the "2/4" model); the middle telescopic model (the "3/8" model) and the large telescopic model (the "4/16" model). The components (stages) of the telescopic model are distinguished using the dichotomies of the classification "Priority" associated with the hierarchical structure of the nervous system. The numbers in the numerator of the model's name (2; 3; 4) indicate the number of bases (criteria, dichotomies) by which the stages (components) of activity are identified, and the numbers in the denominator of the fraction (4; 8; 16) indicate the number of components of the model.

The small telescopic model "2/4" (Figure 1) contains 4 stages: search → analysis → synthesis → realization. Identification of one of the stages, prevailing in human life, is carried out according to the priority poles of two dichotomies: "orientation on internal factors (own ideas) or orientation on external factors" and "orientation on perception (comprehension) or orientation on actions (visible activity)".

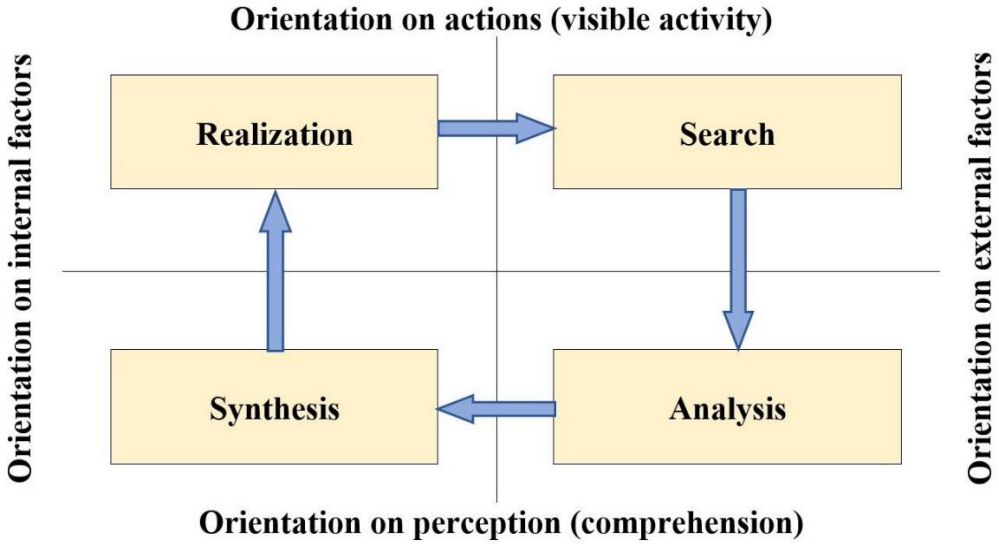

Figure 1.
Small telescopic model (model "2/4") of the natural cycle of activity.

The "2/4" model is the result of combining the four stages (activity styles) of D. Kolb's model (acquisition of experience → reflection (analysis) → conceptualization → application in practice) and the four classical temperament types of the classification "Priority" (motor, sensory, intuitive, tonic). The

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

classical temperament types in the classification "Priority" are distinguished as a result of identifying the priority poles of two dichotomies: "visceral (internal) or somatic (external)" and "afferent (input) or efferent (output)" nervous subsystems. These dichotomies correspond to the dichotomies "orientation on own (internal) factors or orientation on external factors" and "orientation on perception (comprehension) or orientation on actions (visible activity)" of the "2/4" model.

Priority visceral (internal) and afferent (input) nervous subsystems give in the classification "Priority" intuitive type of temperament (stage of synthesis in the model "2/4"). The dominance of visceral and efferent (output) nervous subsystems determines in the classification "Priority" tonic (tonus) type of temperament (stage of realization in the model "2/4"). Priority somatic (external) and afferent nervous subsystems give in the classification "Priority" sensory type of temperament (stage of analysis in the model "2/4"). Priority somatic and efferent nervous subsystems give in the classification "Priority" motor type of temperament (stage of search in the model "2/4"). The four listed types of temperament are called in the classification "Priority" classical, because their descriptions practically coincide with the descriptions of classical (Hippocratic) types of temperament: intuitive with phlegmatic, tonic with choleric, sensory with melancholic, and motor with sanguine.

The middle telescopic model "3/8" (Figure 2) differs from the model "2/4" in that each of the four stages of the model "2/4" has two components (half-stages), one of which prioritizes the left hemisphere of the brain and the other the right hemisphere of the brain. Involvement of both half-stages is necessary for qualitative elaboration of a stage. However, in practice, at each stage of each specific cycle of activity, the interaction of the hemispheres can be very diverse: the hemispheres may interact once or repeatedly, may not interact, or only one of the hemispheres may be involved.

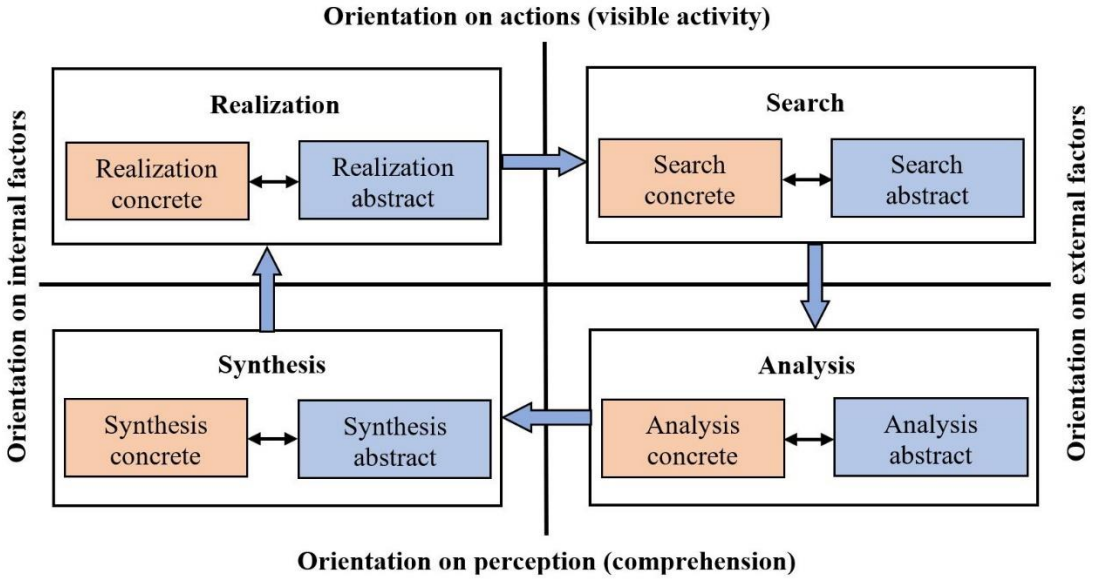

Figure 2.
Middle telescopic model (model "3/8") of the natural cycle of activity.

Identification of the prioritized component (half-stage) is done according to the dichotomy "abstract or concrete". This dichotomy corresponds to the "left brain hemisphere or right brain hemisphere" dichotomy in the classification of temperaments "Priority". The terms "abstract" and "concrete" reflect that the left cerebral hemisphere is associated with abstract thinking and the right cerebral hemisphere with concrete thinking. The identification of the priority half-stage is made for the stage that is a priority.

Thus, the middle telescopic model "3/8" contains 8 half-stages:

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

- Search concrete (priority of the right hemisphere) and search abstract (priority of the left hemisphere);
- Analysis concrete and analysis abstract;
- Synthesis concrete and synthesis abstract;
- Realization concrete and realization abstract.

The large telescopic model "4/16" (Figure 3) reveals the mechanism of full elaboration of each of the four stages of the "2/4" model. The "4/16" model differs from the "3/8" model by the allocation of two quarter-stages at each of the eight half-stages, reflecting the specifics of processing information of the non-priority pole of the dichotomy "internal (visceral) or external (somatic)" information. If the stages of synthesis or realization were priority (orientation on internal factors and own ideas is a priority), then for the non-priority pole of this dichotomy (orientation on external factors and, accordingly, the stages of search or analysis), the quarter-stages can be sensory and motor (by analogy with their names in the classification "Priority"). If the stages of search or analysis were the priority (the focus on external factors is the priority), then for the non-priority pole of this dichotomy (the focus on one's own ideas and, accordingly, the stages of synthesis or realization), the quarter-stages can be sensory and motor.

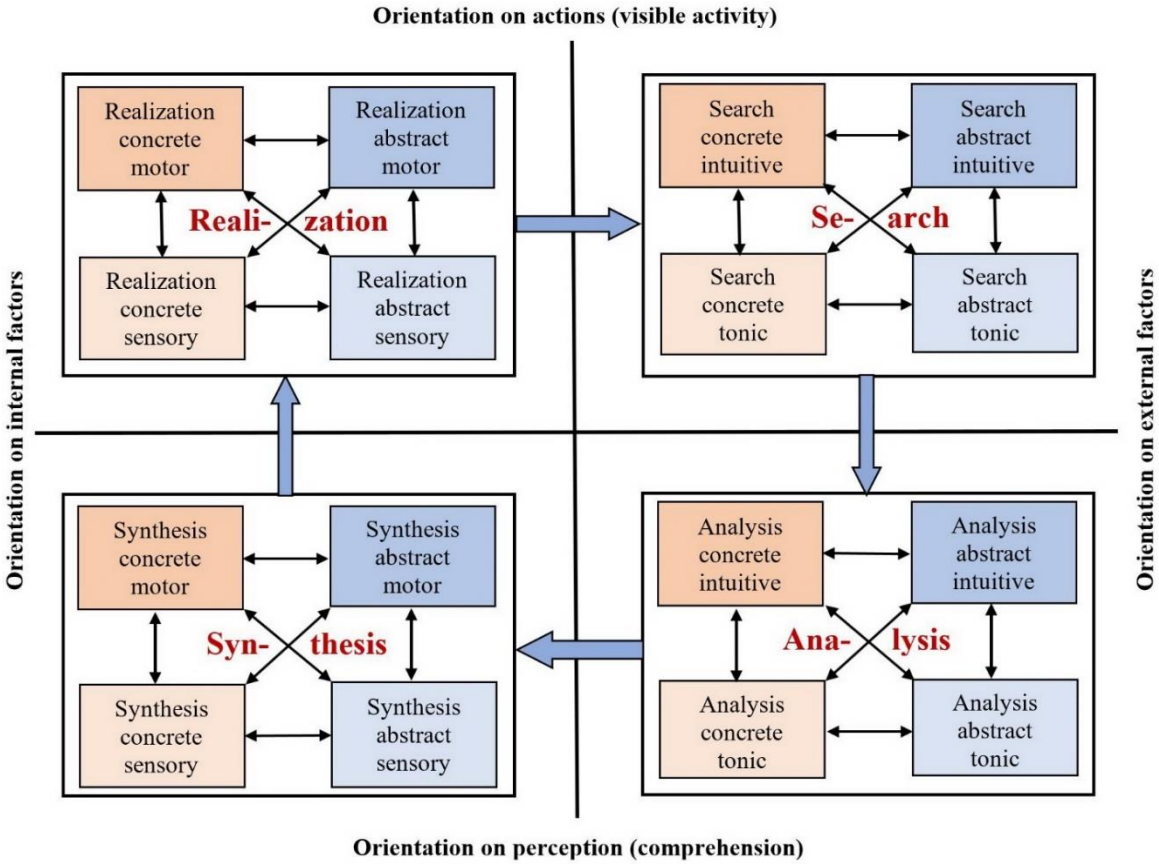

Figure 3.
Large telescopic model (model "4/16") of the natural cycle of activity.

Thus, the large telescopic model "4/16" contains 16 quarter-stages:

- At The Search Stage:
- 1) intuitive quarter-stage and 2) tonic quarter-stage, which are part of a concrete half-stage, and
- 3) intuitive quarter-stage and 4) tonic quarter-stage, which are part of a abstract half-stage;

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

- At The Analysis Stage:
- 5) intuitive quarter-stage and 6) tonic quarter-stage, which are part of a concrete half-stage, and
- 7) intuitive quarter-stage and 8) tonic quarter-stage, which are part of a abstract half-stage;

- At The Synthesis Stage:
- 9) motor quarter-stage and 10) sensory quarter-stage, which are part of a concrete half-stage, and
- 11) motor quarter-stage and 12) sensory quarter-stage, which are part of a abstract half-stage;

- At The Realization Stage:
- 13) motor quarter-stage and 14) sensory quarter-stage, which are part of a concrete half-stage, and
- 15) motor quarter-stage and 16) sensory quarter-stage, which are part of a abstract half-stage.

As in the case of the "3/8" model, in a particular situation, at each stage of the activity cycle of the "4/16" model, the interaction of the quarter-stages can be very diverse: quarter-stages can interact with each other once or repeatedly, all quarter-stages can be involved, some of them can be involved, or only one of the quarter-stages can be involved.

The presence in the telescopic model of the natural cycle of activities of three private models (small "2/4", middle "3/8" and large "4/16"), containing a different number of components (stages, half-stages, quarter-stages), allows to adapt it flexibly depending on the specifics of tasks or specific conditions.

3. Classification of Natural Specializations

Activity cycle models, as already noted, are often used as bases for typologies (activity styles) of people, highlighting as types certain stages of activity to which these people have a predisposition [116]. Since the telescopic model of the natural cycle of activity was created as a result of the merger of D. Kolb's model, which has its own typology, and the classification of temperaments "Priority", which is itself a typology, the telescopic model can also be considered as the basis of typology - the classification of natural specializations of the nervous system (psyche, people, workers).

In this case, the description of specialization types (i.e. specificity of people's behavior) will be based on the deep natural (neurophysiological, innate and unchangeable) features of the human nervous system. This is a fundamental difference between the Classification of Natural Specializations (CNS) and the currently widespread empirical typologies that distinguish types of people by a set of external (behavioral, psychological) characteristics.

Classification of natural specializations at the level of a small telescopic model ("2/4") of the activity cycle (Figure 4) includes 4 specializations corresponding to a certain stage of the cycle:

- Searcher (priority is given to the search stage of the telescopic model);
- Analyst (priority is given to the analysis stage);
- Synthetic (priority is given to the synthesis stage);
- Realizator (priority is given to the implementation stage).

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

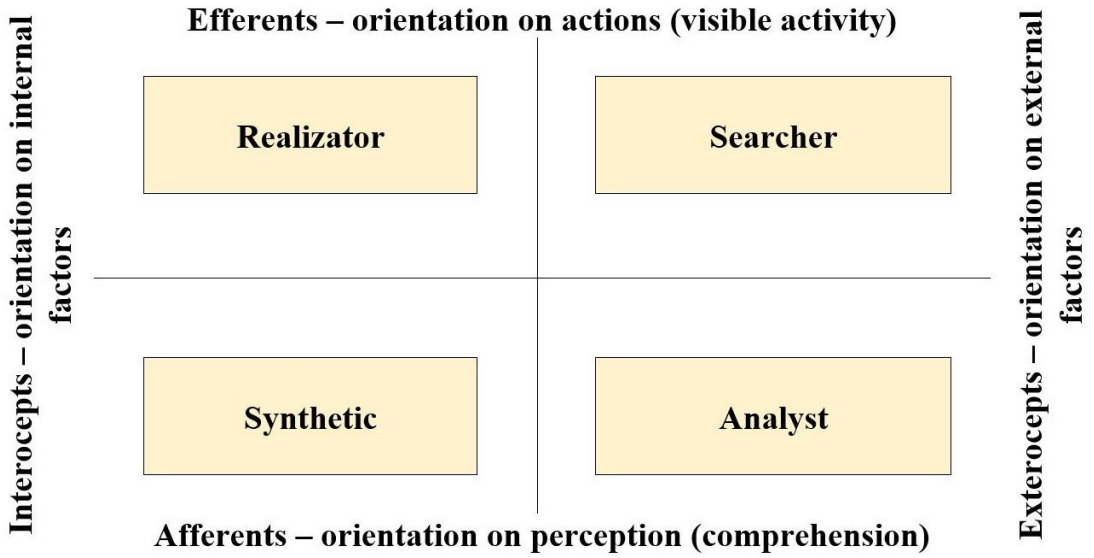

Figure 4.
Classical natural specializations at the level of the small telescopic model ("2/4") of the natural cycle of activity.

Searchers and Analysts are exterocepts (priority of the somatic nervous subsystem), i.e., they have a predominant orientation to external factors [114]. Synthetics and Realizators are interocepts (priority of the visceral nervous subsystem) – they have a predominant orientation to their own ideas and states predominates [114]. Exterocepts and interocepts should not be confused with Jungian extroverts and introverts, which C.G. Jung associates [117] respectively, with concrete and abstract thinking, that is, with the dichotomy "right or left hemisphere of the brain" of the temperament classification "Priority".

Analysts and Synthetics have predominant orientation to perception (comprehension), i.e., priority is given to the afferent (input) nervous subsystem, therefore they are referred to afferents. Realizators and Searchers have predominant orientation to action (external activity), i.e., the priority is the efferent (output) nervous subsystem, so they are referred to efferents.

Because of the coincidence of the descriptions of the four natural specializations with the descriptions of the classical (Hippocratic) temperament types, they (as well as the types of the classification "Priority") are named classical.

Classification of natural specializations at the level of the middle telescopic model ("3/8") of the activity cycle (Figure 5) includes 8 basic specializations associated with the half-stages of the telescopic model:

- Searcher concrete (right-hemispheric) and Searcher abstract (left-hemispheric);
- Analyst concrete and Analyst abstract;
- Synthetic concrete and Synthetic abstract;
- Realizator concrete and Realizator abstract.

The eight basic specializations are segregate by adding to the two dichotomies ("interocept or exterocept" and "afferent or efferent") used in the step of distinguishing the four classical specializations a third dichotomy: "concrete (right-hemispheric) or abstract (left-hemispheric)" type.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

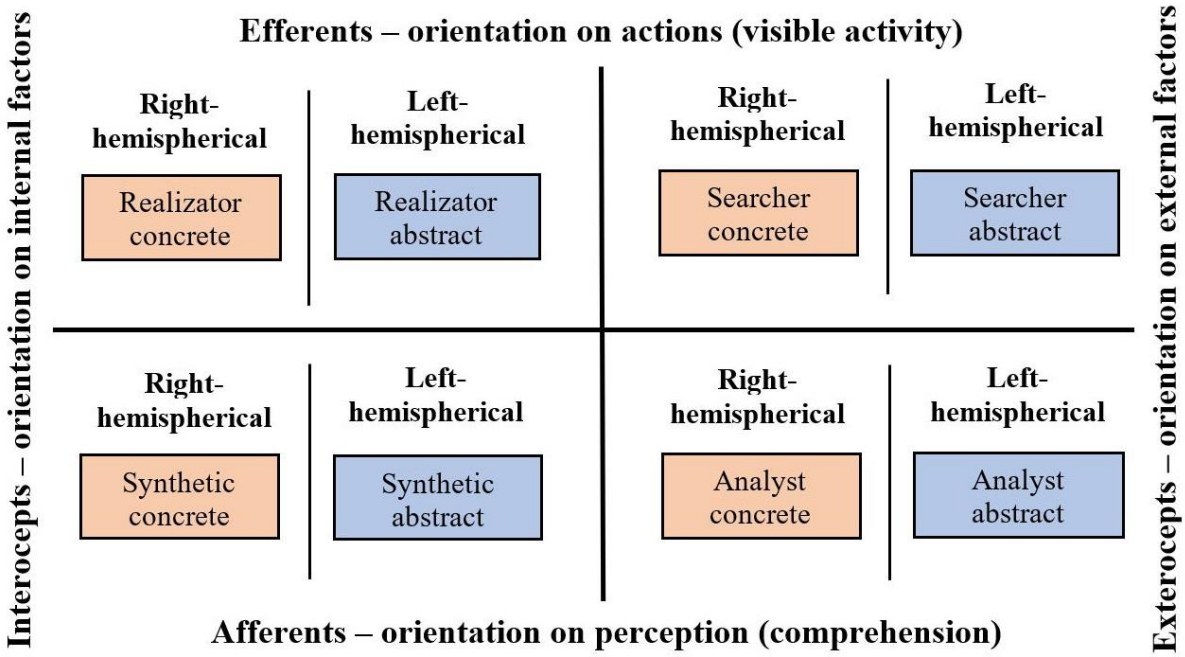

Figure 5.
Basic natural specializations at the level of the middle telescopic model ("3/8") of the natural cycle of activity.

Classification of natural specializations at the level of the large telescopic model ("4/16") of the activity cycle (Figure 6) includes sixteen detailed (full) specializations associated with sixteen corresponding quarter-stages of the telescopic model:

1. Searcher concrete intuitive.
2. Searcher concrete tonic.
3. Searcher abstract intuitive.
4. Searcher abstract tonic.
5. Analyst concrete intuitive.
6. Analyst concrete tonic.
7. Analyst abstract intuitive.
8. Analyst abstract tonic.
9. Synthetic concrete motor.
10. Synthetic concrete sensory.
11. Synthetic abstract motor.
12. Synthetic abstract sensory.
13. Realizator concrete motor.
14. Realizator concrete sensory.
15. Realizator abstract motor.
16. Realizator abstract sensory.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

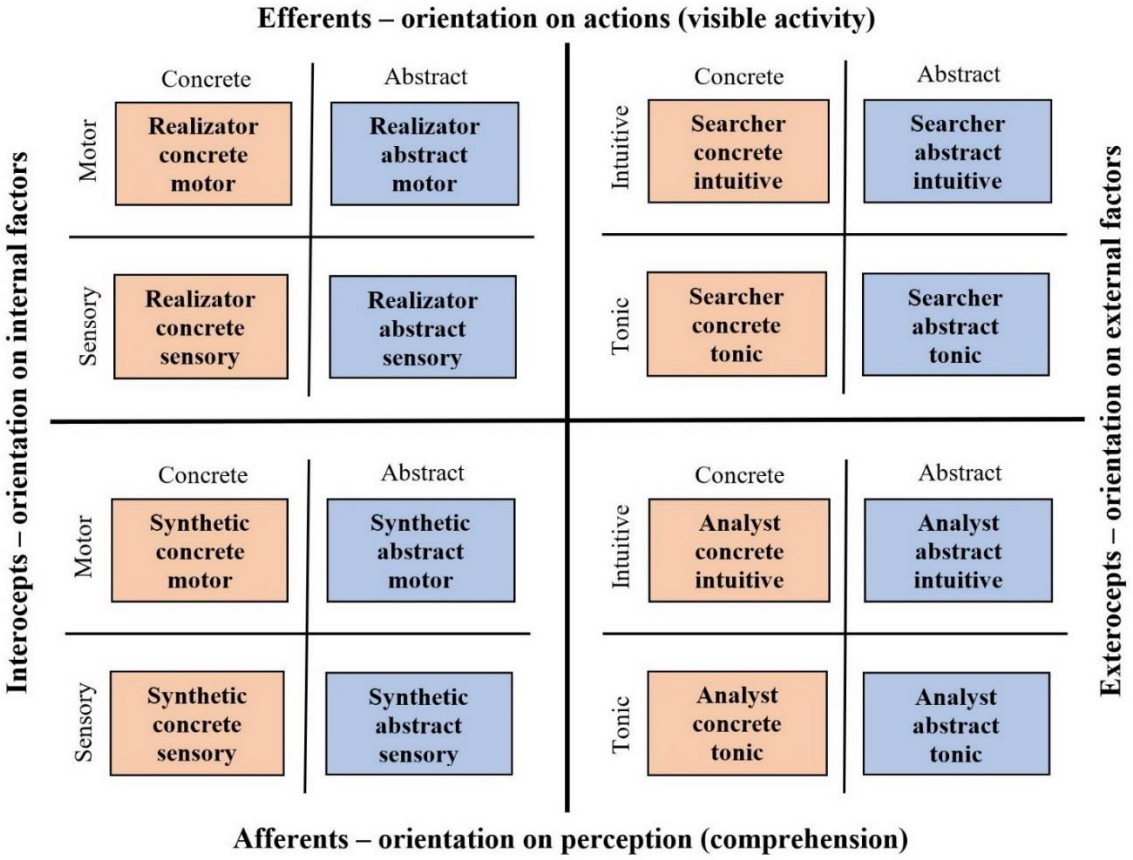

Figure 6.
Detailed natural specializations at the level of the large telescopic model ("4/16") of the natural cycle of activity.

Sixteen detailed natural specializations are identified by adding to the three dichotomies used at the stage of identification of eight basic specializations a fourth dichotomy reflecting orientation to input (afferent) or to output (efferent) of the non-priority pole of the dichotomy "interocept or exterocept". If a person's priority is interoception (in classical specialization it is Synthetic or Realizator), then for the non-priority pole of this dichotomy (exteroception) the detailed specialization can be sensory or motor. If the priority is exteroception (in classical specialization it is Searcher or Analyst), then for the non-priority pole of this dichotomy (interoception) the detailed specialization can be intuitive or tonic.

Thus, the classification of natural specializations (as well as the telescopic model of the activity cycle, which is its structural and functional basis) contains 3 levels: classical, basic and detailed. At the first level of classification on the basis of dichotomies "interocept or exterocept" and "afferent or efferent" 4 classical specializations are distinguished: Searcher, Analyst, Synthetic and Realizator. At the second level of classification due to the third dichotomy "concrete (right-hemispheric) or abstract (left-hemispheric)" each of the four classical specializations is subdivided into two basic specializations: concrete and abstract. At the third level of classification, the fourth dichotomy determines the afferent or efferent of the non-priority pole of the dichotomy "interocept or exterocept".

Based on the innate characteristics (structure) of the nervous system, which remain unchanged throughout a person's life, the classification of natural specializations allows increasing the accuracy of forecasts of employee behavior and the efficiency of personnel management. The presence of three levels in the classification makes it possible to regulate the depth of personalized approach to employees depending on the specific situation.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

4. Classification of Natural Specializations and Typology of C.G. Jung

Comparison of theoretical classification of natural specializations with empirical psychological typology of C.G. Jung allows us to assume that behind the four basic functions of C.G. Jung there are the same classical types of temperament (or 4 classical natural specializations): Sensation - sanguine (Searcher); Intuition- melancholic (Analyst); Thinking - phlegmatic (Synthetic); Feeling - choleric (Realizator). C.G. Jung's dichotomy "introversion or extraversion" correlates with the dichotomy "abstract or concrete" ("right or left hemisphere of the brain") of the classification of natural specializations.

C.G. Jung considers Thinking (phlegmatic, Synthetic) and Feeling (choleric, Realizator) to be rational functions, probably because they are connected with the somatic (external) nervous subsystem. Accordingly, the reaction to external factors appears to outside observers as reasonable, rational. Sensation (sanguine, Searcher) and Intuition (melancholic, Analyst) are considered by C.G. Jung to be irrational functions, probably because they are connected with the visceral (internal) nervous subsystem. Accordingly, the reaction to internal factors (states, perceptions) often looks unreasonable and irrational to an external observer.

The dichotomies "Thinking or Feeling" and "Intuition or Sensation" of C.G. Jung are special cases of the dichotomy "afferent or efferent" of the classification of natural specializations, respectively, for interocepts (orientation to internal factors) and exterocepts (orientation to external factors).

From the position of the telescopic model of the natural cycle of activity, the 4 main functions of C.G. Jung's typology represent 4 stages of the small model "2/4": search (Sensation) → analysis (Intuition) → synthesis (Thinking) → realization (Feeling).

5. Conclusion

Classification of natural specializations of people is developed on the basis of the telescopic model of the natural cycle of activity. The model, built in accordance with the structural organization of the human nervous system, is complex and consists of three private models: small model "2/4", middle model "3/8" and large model "4/16", each of which successively increases the detail of activity stages.

The classification of natural specializations, structured hierarchically like the human nervous system, includes three levels of detail:

- The classical level of specialization, corresponding to the small telescopic model ("2/4") of the natural cycle of activity;
- The basic level of specialization corresponding to the middle telescopic model ("3/8") of the natural cycle of activity;
- The detailed level of specialization corresponding to the large telescopic model ("4/16") of the natural cycle of activity.

The classification reflects the innate neurophysiological characteristics of a person, which determine his preferences in activity and, accordingly, behavior in professional and social environment.

At the first (classical) level, the classification distinguishes four natural specializations, which correspond to the stages of the small telescopic model ("2/4") of the natural cycle of activity and Hippocratic types of temperament:

- Searcher (sanguine), focused on searching and experimenting with new information.
- Analyst (melancholic), focused on analyzing information in depth and identifying patterns.
- Synthetic (phlegmatic), specializing in building systems and concepts.
- Realizator (choleric), focused on turning ideas and concepts into reality.

At the second (basic) level of classification, the number of natural specializations increases from four classical to eight basic specializations. This is due to the allocation of two subtypes (basic specializations) in each classical specialization: concrete (right-hemispheric) and abstract (left-

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

hemispheric). This expansion of the number of specializations allows for a more accurate reflection of the diversity of people's cognitive and behavioral preferences.

At the third (detailed) level of classification, the number of natural specializations increases from eight basic to sixteen detailed specializations. This is due to the allocation in each basic specialization of two subtypes (detailed specializations), reflecting the orientation to the input (afferent) or output (efferent) of the non-priority pole of the dichotomy "interocept or exterocept". This approach makes it possible to take into account more subtle differences in human perception and response to internal and external stimuli.

The classification of natural specializations is a theoretical classification, highlighting, in comparison with empirical classifications, more profound and bases, which opens new perspectives for explaining the available factual material. The key advantage of the proposed classification is its reliance on the natural, unchangeable characteristics of the human nervous system, which makes it possible to significantly improve the accuracy of behavior prediction and the efficiency of personnel management. The classification of natural specializations can be used, for example, to identify professional aptitudes of employees, to optimize the distribution of roles in the team and to build individual career trajectories. It can provide an individualized approach to training adapted to the natural characteristics of trainees, and so on.

The comparison of the developed classification with C.G. Jung's typology allowed us to identify the correspondence between C.G. Jung's four main functions and classical natural specializations: Sensation - Searcher; Intuition - Analyst; Thinking - Synthetic; Feeling - Realizator. This confirms the universality and theoretical validity of the developed model.

Thus, the classification of natural specializations by priority components of the telescopic model of the natural cycle of activity has a significant potential for application in education, personnel management and professional orientation as a tool for analysis and support of individual development.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

References

[1] M. Belov and D. Novikov, *Methodology of complex activity: Foundations of understanding and modelling*. Springer. https://doi.org/10.1007/978-3-030-48610-5, 2020.

[2] M. Belov and D. Novikov, "Structure of methodology of complex activity," *Ontology of Designin*, vol. 7, no. 4, pp. 366-387, 2017. https://doi.org/10.18287/2223-9537-2017-7-4-366-387

[3] A. Novikov and D. Novikov, *Structure research methodology: From philosophy of science to research design*. Amsterdam: CRC Press, 2013.

[4] D. Novikov, *Control methodology*. New York: Nova Science Publishers, 2013.

[5] M. V. Belov and D. A. Novikov, "General-system approach to the development of complex activity technology," *Procedia Computer Science*, vol. 112, pp. 2076-2085, 2017. https://doi.org/10.1016/j.procs.2017.08.220

[6] T. Koritarov, "Enhancing UAV operations: integrating human factors and the OODA loop for improved decision-making," *Norwegian Journal of development of the International Science*, vol. 144, pp. 140-143, 2024. https://doi.org/10.5281/zenodo.14169159

[7] Y. Wang, "Unmanned aerial vehicle cooperative search model for sea based on OODA," *Highlights in Science, Engineering and Technology*, vol. 72, pp. 1264-1270, 2023. https://doi.org/10.54097/wxfetx68

[8] X. Li and D. Liu, "Modeling method of combat mission based on OODA loop," *MATEC Web of Conferences*, vol. 355, p. 02015, 2022. https://doi.org/10.1051/matecconf/202235502015

[9] L. Xiao, W. Li, and G. Feng, ""The method of human-machine division for UAV system based on double OODA Loop," in *Proceedings of 2022 International Conference on Autonomous Unmanned Systems (ICAUS 2022)*, 2023, doi: https://doi.org/10.1007/978-981-99-0479-2_169.

[10] B. Mednikarov and S. Lutzkanova, "Applicability of the OODA loop theory for analysis of human error processes in the maritime safety," *Pedagogika-Pedagogy*, vol. 93, pp. 241-250, 2021. https://doi.org/10.53656/ped21-7s.21ooda

[11] Y. Huang, "Modeling and simulation method of the emergency response systems based on OODA," *Knowledge-Based Systems*, vol. 89, pp. 527-540, 2015. https://doi.org/10.1016/j.knosys.2015.08.020

[12] A. Baron, J. Hodgson, G. Beirne, A. Quinton, and J. Bendall, "The sonographic ooda loop: Proposing a beginner's model for learning point-Of-care ultrasound," *Australasian Journal of Paramedicine*, vol. 19, pp. 1-4, 2022. https://doi.org/10.33151/ajp.19.948

[13] P. Zanna, P. Radcliffe, and D. Kumar, "Preventing attacks on wireless networks using SDN controlled OODA loops and cyber kill chains," *Sensors*, vol. 22, no. 23, p. 9481, 2022. https://doi.org/10.3390/s22239481

[14] A. Bhatt and A. Ganatra, "Explosive weapons and arms detection with singular classification (WARDIC) on novel weapon dataset using deep learning: enhanced OODA loop," *Engineered Science*, vol. 20, no. 3, pp. 252-266, 2022. https://doi.org/10.30919/es8e718

[15] M. Ryder and C. Downs, "Rethinking reflective practice: John Boyd's OODA loop as an alternative to Kolb," *The International Journal of Management Education*, vol. 20, no. 3, p. 100703, 2022. https://doi.org/10.1016/j.ijme.2022.100703

[16] D. Yang, Q. Li, F. Zhu, H. Cui, W. Yi, and J. Qin, "Parallel emergency management of incidents by integrating OODA and PREA loops: The C2 mechanism and modes," *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 53, no. 4, pp. 2160-2172, 2022. https://doi.org/10.1109/TSMC.2022.3229036

[17] D. Van Stralen and T. A. Mercer, "High-reliability organizing (HRO), Decision making, the OODA loop, and COVID-19,," *Neonatology Today*, vol. 16, no. 8, 2021. https://doi.org/10.51362/neonatology.today/202181688696

[18] G. Rathnayaka, "Role of social media and online news in 2022 Sri Lankan riots and utilization of OODA Loop Based OSINT Framework," presented at the 16th International Research Conference 2023, General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka, 2023.

[19] M. A. Baker, J. S. Robinson, and D. A. Kolb, "Aligning Kolb's experiential learning theory with a comprehensive agricultural education model," *Journal of Agricultural Education*, vol. 53, no. 4, pp. 1-16, 2012. https://doi.org/10.5032/jae.2012.04001

[20] H. Bergsteiner, G. C. Avery, and R. Neumann, "Kolb's experiential learning model: critique from a modelling perspective," *Studies in Continuing Education*, vol. 32, no. 1, pp. 29-46, 2010. https://doi.org/10.1080/01580370903534355

[21] H. Bergsteiner and G. C. Avery, "The twin-cycle experiential learning model: Reconceptualising Kolb's theory," *Studies in Continuing Education*, vol. 36, no. 3, pp. 257-274, 2014. https://doi.org/10.1080/0158037X.2014.904782

[22] G. Haritha and R. Rao, "A Holistic Approach to Professional Development: Integrating Kolb's Experiential Learning Theory for Soft Skills Mastery," *Journal of Engineering Education Transformations*, vol. 37, no. Special Issue 2, pp. 415-424, 2024. https://doi.org/10.16920/jeet/2024/v37is2/24069

[23] L. Sugarman, "Kolb's model of experiential learning: Touchstone for trainers, students, counselors, and clients," *Journal of Counseling and Development*, vol. 64, pp. 264-268, 1985. https://doi.org/10.1002/j.1556-6676.1985.tb01097.x

[24] M. Terry, "Translating learning style theory into university teaching practices: An article based on Kolb's experiential learning model," *Journal of College Reading and Learning*, vol. 32, no. 1, pp. 68-85, 2001. https://doi.org/10.1080/10790195.2001.10850128

[25] G. Atkinson Jr and P. H. Murrell, "Kolb's experiential learning theory: A meta-model for career exploration," *Journal of Counseling & Development*, vol. 66, no. 8, pp. 374-377, 1988. https://doi.org/10.1002/j.1556-6676.1988.tb00890.x

[26] G. Rossetti, "Applying Kolb's experiential learning theory to an event management course: Practical guidelines for educators," *Event Management*, vol. 27, no. 7, pp. 1025-1040, 2023. https://doi.org/10.3727/152599523X16896548396752

[27] L. Tomkins and E. Ulus, "'Oh, was that "experiential learning"?!'Spaces, synergies and surprises with Kolb's learning cycle," *Management Learning*, vol. 47, no. 2, pp. 158-178, 2016. https://doi.org/10.1177/1350507615587451

[28] A. Fitzgibbon, "Kolb's experiential learning model as a model for supervision of classroom teaching for student teachers," *European Journal of Teacher Education*, vol. 10, no. 2, pp. 163-177, 1987. https://doi.org/10.1080/0261976870100206

[29] B. Ardiyanto, F. Firmansah, and T. Tasari, "Differentiated learning using ESS-MATH-based PBL model on problem-solving ability reviewed from learning style," *Mathema: Jurnal Pendidikan Matematika*, vol. 7, no. 1, 2025. https://doi.org/148.10.33365/jm.v7i1.4791

[30] P. Liu, Z. Yang, J. Huang, and T.-K. Wang, "The effect of augmented reality applied to learning process with different learning styles in structural engineering education," *Engineering, Construction and Architectural Management*, 2024. https://doi.org/10.1108/ECAM-06-2023-0596

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 2: 172-207, 2025
DOI: 10.55214/25768484.v9i2.4443

[31] M. T. Harun and N. Salamuddin, "Promoting social skills through outdoor education and assessing its' effects," *Asian Social Science*, vol. 10, no. 5, p. 71, 2014. https://doi.org/10.5539/ass.v10n5p71

[32] W. H. Goodridge, O. Lawanto, and H. B. Santoso, "A learning style comparison between synchronous online and face-to-face engineering graphics instruction," *International Education Studies*, vol. 10, no. 2, pp. 1-14, 2017. https://doi.org/10.1-1.10.5539/ies.v10n2p1

[33] H. Altun, "Investigation of high school students' geometry course achievement according to their learning styles," *Higher education studies*, vol. 9, no. 1, pp. 1-8, 2019. https://doi.org/10.5539/hes.v9n1p1

[34] Y. Liu, L. Othakanon, and D. Saleewong, "Development of psychological course based on social stories and 4MAT method to enhance preschool students' emotional intelligence in Hancheng Jiada School," *International Journal of Sociologies and Anthropologies Science Reviews*, vol. 4, no. 6, pp. 711-722, 2024. https://doi.org/10.60027/ijsasr.2024.5584

[35] G. Tezcan and H. Güvenç, "The Effects of 4MAT teaching model and whole brain model on academic achievement in science," *Education & Science*, vol. 42, no. 192, 2017. https://doi.org/10.15390/EB.2017.7085

[36] F. Aliustaoğlu, "Prospective mathematics teachers' opinions on developing a lesson plan for geometry learning area: 4MAT Model and Whole Brain Model," *Ahi Evran University Kirsehir Faculty of Education Journal*, vol. 21, no. 3, pp. 1440-1493, 2020.

[37] J. M. Nicoll-Senft and S. N. Seider, "Assessing the impact of the 4MAT teaching model across multiple disciplines in higher education," *College Teaching*, vol. 58, no. 1, pp. 19-27, 2009. https://doi.org/10.1080/87567550903245623

[38] I. Aktas and İ. Bılgın, "The effect of the 4MAT learning model on the achievement and motivation of 7th grade students on the subject of particulate nature of matter and an examination of student opinions on the model," *Research in Science & Technological Education*, vol. 33, no. 1, pp. 1-21, 2015. https://doi.org/10.1080/02635143.2014.968536

[39] F. Aliustaoglui and A. Tuna, "Analysis of the pedagogical content knowledge development of prospective teachers in the lesson plan development process: 4MAT Model," *International Journal of Progressive Education*, vol. 18, no. 1, pp. 298-321, 2022. https://doi.org/10.29329/ijpe.2022.426.17

[40] F. H. Alanazı, "The effectiveness of the 4MATteaching approach in enhancing conceptions of electricity in physics for female students in the kingdom of Saudi Arabia," *Journal of Turkish Science Education*, vol. 17, no. 2, pp. 271-288, 2020. https://doi.org/10.36681/tused.2020.26

[41] S. Ergin and Ş. Atasoy, "Comparative analysis of the effectiveness of 4Mat teaching method in removing pupils' physics misconceptions of electricity," *Journal of Baltic Science Education*, vol. 12, no. 6, p. 730, 2013. https://doi.org/10.33225/jbse/13.12.730

[42] S. M. Uyangör, "The effectiveness of the 4MAT teaching model upon student achievement and attitude levels," *International Journal of Research Studies in Education*, vol. 1, no. 2, pp. 43-53, 2012. https://doi.org/10.5861/ijrse.2012.v1i2.63

[43] R. M. Wilkerson and K. P. White, "Effects of the 4MAT system of instruction on students' achievement, retention, and attitudes," *The Elementary School Journal*, vol. 88, no. 4, pp. 357-368, 1988. https://doi.org/10.1086/461544.

[44] B. S. Şeker and F. T. D. Övez, "The integration of the 4MAT teaching model with the interdisciplinary structure: A new model proposal and test," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 14, pp. 1767-1790, 2018. https://doi.org/10.29333/ejmste/82986

[45] E. Tatar and R. Dikici, "The effect of the 4MAT method (learning styles and brain hemispheres) of instruction on achievement in mathematics," *International Journal of Mathematical Education in Science and Technology*, vol. 40, no. 8, pp. 1027-1036, 2009. https://doi.org/10.1080/00207390903121750

[46] T. Kösa and E. Ö. Ardıç, "Geometrik cisimler konusunun öğretiminde 4MAT öğretim modelinin etkisi," *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, vol. 9, no. 3, pp. 536-562, 2018. https://doi.org/10.16949/turkbilmat.358637

[47] A. Silva and G. Miranda, "To Err is human? The use of the PDCA cycle as Poka Yoke," *Revista Ciências Exatas*, vol. 30, p. 2, 2024. https://doi.org/10.69609/1516-2893.2024.v30.n2.a725

[48] L. Yan, Y. Gu, C. Zheng, X. Chen, and R. Gao, "Application of PDCA cycle management in outpatient blood collection room management," *Journal of Clinical and Nursing Research*, vol. 8, no. 12, pp. 205-210, 2025. https://doi.org/10.26689/jcnr.v8i12.9307

[49] T. Gueorguiev, "Research and application of The PDCA Cycle in artificial intelligence management systems," *Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 32, pp. 255-262, 2024. https://doi.org/10.53656/str2024-5s-25-cyc

[50] Q. Liu and M. Tan, "Application evaluation and analysis of PDCA cycle quality management in RICU instrument and equipment Management," *Academic Journal of Management and Social Sciences*, vol. 7, no. 3, pp. 103-106, 2024. https://doi.org/10.54097/ay9zhw59

[51] H. Chen and B. Chen, "Research on the teaching mode of hydraulics based on PDCA cycle theory," *Academic Journal of Management and Social Sciences*, vol. 7, no. 2, pp. 44-48, 2024. https://doi.org/10.54097/7ay6r826

[52] N. Wang, "Exploration of teaching reform of data collection and web crawler course based on PDCA cycle," *Higher Education Research*, vol. 9, no. 4, pp. 92-96, 2024. https://doi.org/10.11648/j.her.20240904.13

[53] K. Danova, V. Malysheva, L. Kolybelnikova, and S. Lohvinkov, "The PDCA cycle in the context of reducing psycho-emotional tension in the workplace," *Municipal Economy of Cities*, vol. 6, pp. 202-206, 2023. https://doi.org/10.33042/2522-1809-2023-6-180-202-206

[54] J. Chen *et al.*, "Enhancing the timeliness of EMR documentation in resident doctors: the role of PDCA cycle management," *BMC Medical Education*, vol. 24, no. 1, pp. 1-10, 2024. https://doi.org/10.21203/rs.3.rs-3881618/v1

[55] X. Gong, S. Yu, J. Xu, A. Qiao, and H. Han, "The effect of PDCA cycle strategy on pupils' tangible programming skills and reflective thinking," *Education and Information Technologies*, vol. 29, no. 5, pp. 6383-6405, 2024. https://doi.org/10.1007/s10639-023-12037-4

[56] P. Yuliarty, A. Sudibyo, and R. Avrizal, "Kaizen implementation in the motorcycle tire testing stage with the PDCA cycle," *Indonesian Journal of Industrial Engineering and Management*, vol. 5, no. 1, 2024. https://doi.org/10.22441/ijiem.v5i1.22296

[57] R. Ds and A. Purwanto, "Increasing factory productivity through casting machines with cycle time analysis using theoretical value production & PDCA methods," *International Journal of Innovative Science and Research Technology*, pp. 965-975, 2024. https://doi.org/10.38124/ijisrt/IJISRT24JUL828

[58] N. Pan, Y. Y. Luo, and Q. X. Duan, "The influence of PDCA cycle management mode on the enthusiasm, efficiency, and teamwork ability of nurses," *BioMed Research International*, vol. 2022, no. 1, p. 9352735, 2022. https://doi.org/10.1155/2022/9352735

[59] D. Taufik, "PDCA cycle method implementation in industries: a systematic," *Indonesian Journal of Industrial Engineering and Management*, vol. 1, pp. 157-166, 2020. https://doi.org/10.22441/ijiem.v1i3.10244

[60] V. K. Rai, A. Sharma, and A. Thakur, "Quality control of nanoemulsion: by PDCA cycle and 7QC tools," *Current Drug Delivery*, vol. 18, no. 9, pp. 1244-1255, 2021. https://doi.org/10.2174/1567201818666210203180516

[61] M. H. Song and M. Fischer, "Daily plan-do-check-act (PDCA) cycles with level of development (LOD) 400 objects for foremen," *Advanced Engineering Informatics*, vol. 44, p. 101091, 2020. https://doi.org/10.1016/j.aei.2020.101091

[62] A. Leitmann, S. Reinert, and H. Weise, "Surgical suture course for dental students with the Peyton-4-step approach versus the PDCA cycle using video assisted self-monitoring," *BMC Oral Health*, vol. 20, pp. 1-6, 2020. https://doi.org/10.1186/s12903-020-01309-x

[63] K. Kowalik, "The SWOT-TOWS analysis as a tool of the PDCA cycle in improving the quality of the postal service," *Journal of Education, Health and Sport*, vol. 10, no. 6, pp. 296-308, 2020. https://doi.org/10.12775/JEHS.2020.10.06.032

[64] P. Choong, H. Yean, L. Siok, and A. Ammar, "Investigating the preferences of the learning style in third language learning at a public university," *International Journal of Academic Research in Business and Social Sciences*, vol. 14, no. 3, pp. 475-495, 2024. https://doi.org/10.6007/IJARBSS/v14-i3/20986

[65] E. Sadler-Smith, "'Learning style': frameworks and instruments," *Educational Psychology*, vol. 17, no. 1-2, pp. 51-63, 1997. https://doi.org/10.1080/0144341970170103

[66] A. I. Czepula, W. E. Bottacin, E. Hipólito Jr, D. R. Baptista, R. Pontarolo, and C. J. Correr, "Predominant learning styles among pharmacy students at the Federal University of Paraná, Brazil," *Pharmacy Practice (Granada)*, vol. 14, no. 1, 2016. https://doi.org/10.18549/PharmPract.2016.01.650

[67] G. Gamage, C. Gamage, and W. Sudusinghe, "The learning styles and academic performance of nursing undergraduates in a Sri Lankan Defence University," *South-East Asian Journal of Medical Education*, vol. 17, no. 1, pp. 12-18, 2023. https://doi.org/10.4038/seajme.v17i1.528

[68] P. Sangvigit, S. Mungsing, and A. Theeraroungchaisri, "Correlation of Honey & Mumford learning styles and online learning media preference," *International Journal of Computer Technology and Applications*, vol. 3, no. 3, pp. 1312-1317, 2012.

[69] E. Sadler-Smith, "'Learning styles' and instructional design," *Innovations in Education and Training International*, vol. 33, no. 4, pp. 185-193, 1996. https://doi.org/10.1080/1355800960330405

[70] J. Caple and P. Martin, "Reflections of two pragmatists: a critique of honey and mumford′ s learning styles," *Industrial and Commercial Training*, vol. 26, no. 1, pp. 16-20, 1994. https://doi.org/10.1108/00197859410051235

[71] N. Ratnaningsih and E. Hidayat, "Reflective mathematical thinking process and student errors: an analysis in learning style," in *Journal of Physics: Conference Series. https://doi.org/10.1088/1742-6596/1613/1/012037*, 2020, vol. 1613, no. 1: IOP Publishing, p. 012037.

[72] R. D. Ferdiani, "Honey and Mumford: Application of interactive e-LKPD to improve students' creative thinking abilities," *Pythagoras: Jurnal Program Studi Pendidikan Matematika*, vol. 13, no. 1, pp. 20-30, 2024. https://doi.org/10.33373/pyth.v13i1.6116

[73] J. Hernández, J. García, and D. García, "Comprehensive diagnosis and dendrograms: Model for understanding students and their learning styles," *Revista de Gestão Social e Ambiental*, vol. 18, no. 1, p. e010015, 2024. https://doi.org/10.24857/rgsa.v18n12-110

[74] P. J. Puse Jr, J. L. B. Sinangote, M. R. Macayan, M. L. Porbolan, and M. Ed, "Delving into the Learning Styles of a Technical Higher Education Institution in the Bicol, Region, Philippines," *International Journal of Research and Scientific Innovation*, vol. 10, no. 12, pp. 681-690, 2024. https://doi.org/10.51244/IJRSI.2023.1012052

[75] B. Maulana, Wiga, R. E. Saputro, F. S. Utomo, and S. Sarmini, "Novel predictive framework for student learning styles based on felder-silverman and machine learning model," *Journal of Applied Data Sciences*, vol. 5, no. 4, pp. 1726-1737, 2024. https://doi.org/10.47738/jads.v5i4.408

[76] A. R. Hananto, A. Musdholifah, and R. Wardoyo, "Identifying student learning styles using support vector machine in felder-silverman model," *Journal of Applied Data Sciences*, vol. 5, no. 3, pp. 1495-1507, 2024. https://doi.org/10.47738/jads.v5i3.337

[77] W. Wanniarachchi and H. Premadasa, "Identifying the Learning Style of Students Using Machine Learning Techniques: An Approach of Felder Silverman Learning Style Model (FSLSM)," *Asian Journal of Research in Computer Science*, vol. 17, no. 3, pp. 15-37, 2024. https://doi.org/10.9734/ajrcos/2024/v17i3422

[78] M. Hasibuan, R. A. Aziz, D. A. Dewi, T. B. Kurniawan, and N. A. Syafira, "Recommendation model for learning material using the felder silverman learning style approach," *HighTech and Innovation Journal*, vol. 4, no. 4, pp. 811-820, 2023. https://doi.org/10.28991/HIJ-2023-04-04-010

[79] R. Isal, H. Santoso, and E. Novandi, "Development and evaluation of a mobile-learning application based on the felder-silverman learning styles model," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 16, no. 15, pp. 107-124, 2021. https://doi.org/10.3991/ijet.v16i15.24165

[80] Y. Ikawati, M. U. H. Al Rasyid, and I. Winarno, "Student behavior analysis to predict learning styles based felder silverman model using ensemble tree method," *EMITTER International Journal of Engineering Technology*, vol. 9, no. 1, pp. 92-106, 2021. https://doi.org/10.24003/emitter.v9i1.590

[81] L. Joseph, S. Abraham, B. P. Mani, and R. N, "Exploring the effectiveness of learning path recommendation based on Felder-Silverman learning style model: A learning analytics intervention approach," *Journal of Educational Computing Research*, vol. 60, no. 6, pp. 1464-1489, 2022. https://doi.org/10.1177/07356331211057816

[82] D. Zagulova, V. Boltunova, S. Katalnikova, N. Prokofyeva, and K. Synytsya, "Personalized e-Learning: relation between Felder–silverman model and academic performance," *Applied Computer Systems*, vol. 24, no. 1, pp. 25-31, 2019. https://doi.org/10.2478/acss-2019-0004

[83] E. Idowu, "Assessment and evaluation of learning styles: A review of instruments and methods," *Preprints*, p. 2024110693, 2024.

[84] S. Graf, S. R. Viola, T. Leo, and Kinshuk, "In-depth analysis of the Felder-Silverman learning style dimensions," *Journal of Research on Technology in Education*, vol. 40, no. 1, pp. 79-93, 2007. https://doi.org/10.1080/15391523.2007.10782498

[85] U. Lestari, S. Salam, Y.-H. Choo, A. Alomoush, and K. Al Qallab, "Automatic prediction of learning styles: a comprehensive analysis of classification models," *Bulletin of Electrical Engineering and Informatics*, vol. 13, no. 5, pp. 3675-3685, 2024. https://doi.org/10.11591/eei.v13i5.7456

[86] E. Ashraf, S. u. A. Laghari, S. Manickam, K. Mahmood, S. Abrejo, and S. Karuppayah, "Intelligent course recommendation approach based on modified felder-silverman learning style model," *E-Learning and Digital Media*, p. 20427530241279965, 2024. https://doi.org/10.1177/20427530241279965

[87] A. Ezzaim, A. Dahbi, A. Aqqal, and A. Haidine, "AI-based learning style detection in adaptive learning systems: a systematic literature review," *Journal of Computers in Education*, pp. 1-39, 2024. https://doi.org/10.1007/s40692-024-00328-9

[88] D. I. Sensuse, L. M. Hasani, and B. Bagustari, "Personalization strategies based on Felder-Silverman learning styles and its impact on learning: A literature review," in *2020 3rd International Conference on Computer and Informatics Engineering (IC2IE). https://doi.org/10.1109/IC2IE50715.2020.9274670*, 2020: IEEE, pp. 293-298.

[89] L. G. I. Domínguez, A. Robles-Gómez, and R. Pastor-Vargas, "A data-driven approach to engineering instruction: exploring learning styles, study habits, and machine learning," *IEEE Access*, 2025. https://doi.org/10.1109/ACCESS.2025.3528263

[90] M. M. El-Bishouty *et al.*, "Use of Felder and Silverman learning style model for online course design," *Educational Technology Research and Development*, vol. 67, no. 1, pp. 161-177, 2019. https://doi.org/10.1007/s11423-018-9634-6

[91] E. Ahmad, M. A. Radzali, M. Misdi, and M. Z. Jaafar, "Congruency of mind between lecturers and students in engineering disciplines," *Asian Social Science*, vol. 5, no. 8, pp. 78-86, 2009. https://doi.org/10.5539/ass.v5n8p78

[92] H. Haeruddin, S. Pahar, Z. Prasetyo, and M. Syamsuriwal, "Metacognition and thinking style: Unlocking the potential of physics problem solving," *Jurnal Penelitian Pendidikan IPA*, vol. 9, no. 12, pp. 11429-11440, 2023. https://doi.org/10.29303/jppipa.v9i12.6151

[93] A. S. Pamungkas and M. Masduki, "Student's Logical Reasoning Ability in Terms of Sequential Thinking Style," *Kreano, Jurnal Matematika Kreatif-Inovatif*, vol. 13, no. 2, pp. 257-268, 2022. https://doi.org/10.15294/kreano.v13i2.37421

[94] M. Terry, "Translating learning style theory into developmental education practice: An article based on Gregorc's cognitive learning styles," *Journal of College Reading and Learning*, vol. 32, no. 2, pp. 154-176, 2002. https://doi.org/10.1080/10790195.2002.10850295

[95] W. Yen, "The role of learning style in engineering design thinking via project-based STEM course," *Asia Pacific Journal of Education*, vol. 43, no. 3, pp. 1-19, 2021. https://doi.org/10.1080/02188791.2021.1957776

[96] S. N. Fitri, M. Liana, and L. R. Tambunan, "Tambunan, students' mathematical reasoning is reviewed from the thinking style according to Gregorc," *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, vol. 14, no. 2, pp. 131-146, 2023. https://doi.org/10.26877/aks.v14i2.16324

[97] S. E. Krisdiantoro and E. Prihatnani, "Student's thinking to identify concave plane based on Gregorc model," *Beta: Jurnal Tadris Matematika*, vol. 12, no. 2, pp. 109-121, 2019. https://doi.org/10.20414/betajtm.v12i2.338

[98] M. C. Gridley and J. Cripps, "Cross-cultural comparison of engineers' thinking styles," *Psychology Journal*, vol. 11, no. 2, pp. 55-59, 2014.

[99] N. Albadi and S. W. Zollinger, "Dominant learning styles of interior design students in Generation Z," *Journal of Interior Design*, vol. 46, no. 4, pp. 49-65, 2021. https://doi.org/10.1111/joid.12204

[100] V. I. Toktarova and A. A. Panturova, "Learning and teaching style models in pedagogical design of electronic educational environment of the university," *Mediterranean Journal os Social Sciences*, vol. 6, no. 3, p. 281, 2015. https://doi.org/10.5901/mjss.2015.v6n3s7p281

[101] M. C. Gridley, "Concrete and abstract thinking styles and art preferences in a sample of serious art collectors," *Psychological Reports*, vol. 98, no. 3, pp. 853-857, 2006. https://doi.org/10.2466/PR0.98.3.853-857

[102] G. Ekici, "The analysis of teacher candidates' learning styles in terms of gender and overall academic success according to Gregorc and Kolb learning style models," *Egitim ve Bilim*, vol. 38, no. 167, pp. 211-225, 2013.

[103] P. Harasym, E. Leong, G. Lucier, and F. Lorscheider, "Gregorc learning styles and achievement in anatomy and physiology," *Advances in Physiology Education*, vol. 268, no. 6, p. S56, 1995. https://doi.org/10.1152/advances.1995.268.6.S56

[104] M. Yanık, "Evaluation of the school of physical education and sports students learning styles according to the gregorc learning style," *International Refereed Academic Journal of Sports*, vol. 19, pp. 32-43, 2016. https://doi.org/10.17363/SSTB.20161919749

[105] T. E. Gould and S. V. Caswell, "Stylistic learning differences between undergraduate athletic training students and educators: Gregorc mind styles," *Journal of Athletic Training*, vol. 41, no. 1, pp. 109-116, 2006.

[106] P. Honey and A. Mumford, *A manual of learning styles*. London: P Honey, 1982.

[107] A. Ishkov, *Student's educational activity: Psychological factors of success*. Moscow: ACU, 2004.

[108] A. Ishkov and A. Kosyakov, "Typological approach in personnel management: Classification of temperaments according to the priority of dichotomous components of the nervous system," *Natural Sciences and Humanities Research*, vol. 3, no. 53, pp. 518-526, 2024.

[109] A. Kosyakov and A. Ishkov, "Typology of temperaments" Priority": Sustainable development of the organization due to the increase in the personnel work efficiency," in *BIO Web of Conferences*. *https://doi.org/10.1051/bioconf/202411608013*, 2024, vol. 116: EDP Sciences, p. 08013.

[110] A. Spirkin, *Dialectical materialism*. Moscow: Progress Publishers, 1983.

[111] A. Ishkov, "Telescopic model of the natural cycle of activity," *Edelweiss Applied Science and Technology*, vol. 8, no. 6, pp. 8454-8464, 2024. https://doi.org/10.36871/ek.up.p.r.2024.08.09.019

[112] A. Ishkov, "Diagnostics of the psychophysiological potential of employees: Integration of D. Kolb's activity model and classification of temperaments 'Priority," *Economics and Management: problems, solutions*, vol. 2, no. 10, pp. 181-187, 2024.

[113] A. Ishkov, "Identification of typological features of an employee's labor potential: integration of M. Belbin's team roles with the classification of temperaments 'Priority' and D. Kolb's model of activity," *Personnel and Intellectual Resources Management in Russia*, no. 6, pp. 62-73., 2024.

[114] A. Ishkov, "The '3/8' activity cycle model: Integration of approaches to improve the efficiency of managing the labor potential of employees," *Natural Sciences and Humanities Research*, vol. 5, no. 55, pp. 514-518, 2024.

[115] A. Ishkov, "Improving the efficiency of using labor potential: A telescopic model of the employee's activity cycle," *Economics and Management: Problems, solutions*, vol. 9, no. 8, pp. 137-144, 2024. https://doi.org/10.36871/ek.up.p.r.2024.08.09.019

[116] A. Ishkov, "Employee activity cycle as a tool to increase labor productivity," *Leadership and Management*, vol. 12, no. 1, 2025. https://doi.org/10.18334/lim.12.1.122333

[117] C. Jung, *Psychological types*. Princeton, New Jersey: Princeton University Press, 1971.