МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

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імені К. Д. Ушинського

МАТЕРІАЛИ ДЕВ'ЯТОЇ МІЖНАРОДНОЇ КОНФЕРЕНЦІЇ З АДАПТИВНИХ ТЕХНОЛОГІЙ УПРАВЛІННЯ НАВЧАННЯМ ATL-2023

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Організатори конференції започаткували традицію обміну досвідом зі створення та використання адаптивних технологій управління навчанням. У конференції приймають участь науковці України, Словенії, Ізраїлю, Литви, Казахстану, Болгарії, Латвії.

Тематика конференції охоплює наступне коло питань: психолого-педагогічні проблеми адаптивного навчання; інформаційні та інтелектуальні технології в управлінні навчанням; методика адаптивного навчання інформатиці у ВНЗ та школі; освітні вимірювання в адаптивному управлінні; адаптивні технології соціальної інформатики; системи управління контентом.

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не лише ефективно освоювати знання, але й розвивати навички критичного мислення, роботи в команді та рішення проблем в ігровому контексті.

Література

1. Капп К. М. Гейміфікація навчання та інструкцій: ігрові методи та стратегії для навчання та освіти: Сан-Франциско: Pfeiffer, 2012. 302 с.
2. Пренскі М. Цифрове гральне навчання: Нью-Йорк: McGraw-Hill, 2001. 304 с.
3. Макґоніґал Дж. Реальність зламана: чому ігри роблять нас кращими та як вони можуть змінити світ: Нью-Йорк: Penguin Press, 2011. 416 с.
4. Лі Дж. Дж., Гаммер Дж. Гейміфікація в освіті: що, як, навіщо турбуватися?: Академічний обмін квартал, 15(2), 2011. С. 1-5
5. Чиксентмихайі М. Потік: психологія оптимального досвіду: Нью-Йорк: Harper & Row, 1990. 303 с.

УДК 004.9

COMPLEXITY PERSPECTIVES IN THE LEARNING SCIENCES: THE NATURE OF LEARNING CAPABILITY

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The model of learning capability is built on the basis of the paradigm of extreme/limiting generalizations (LGP) [1], [2]. The paradigm tells us about the nature of learning capability (The Best Ways to Teach Students How to Think: Leap of Learning from Information to Knowledge to Wisdom). The model includes the following concepts/theories (The nature of Intelligence/Mind; The nature of subjective causality; Nature and origins of competence in the everyday world):

- The Philosophy/Nature of Subjectivity (‘Subjective Reality’, Physics of the Mind: the informational structure of physical feelings as a transition into subjectivity; World-likeness); Understanding the nature of abstraction;

- Cognitive System Theory: Complexity, Uncertainty, Associativity, Relativity, Criticality, Systematicity, Compositionality, Cognitive Unconscious, Intelligence, Thinking, Entanglement and Dynamism; Creativity as Emergence: Order-chaos dynamics, Self-organization, and Emergence;

- Superstructure "Sketch Networks": The Self-Form of Human; Mental Modeling: Mental Synthesis / Symbiosis / Unlimited Semiosis (the ability to mentally simulate any plan; creation-synthesis of new sketches of images; Mental synthesis involves the synchronization of independent neuronal ensembles; Visual-Verbal Synthesis: Infinite Leap of Complexity); Constructing the Internal Infinity; Living Smart-Structure: they have properties of the wholeness (holon);

- A Theory of Imagining, Knowing, and Understanding: What is mental imagery, what is its role in intuition, and how it can be used to enhance intuition?;

- The Self and Its Nature: Origin of Self-assembly, Freedom of the Mind, Free Will, D-Factor, hallucinations, Creative Ignorance (Faith and the necessity of pseudo-religion);

- Formal Description of the Cognitive Process of Memorization: understanding

human cognition & memorization as the optimal use of limited computational resources;

- Inquiring System: The instinct to learn, Knowledge Instinct, Psychological Suffering; Suffering from Ignorance -> Aesthetic Sense of Beauty/Perfection; Art and Learning: the relationship between art and learning is indeed fundamental and pervasive (art sketches);

- Information as Cognitive Construction; Multi-formalism in Different Levels of Abstraction; Ladder of Abstraction is abstract thinking; Self-referential abstraction as a form of subjectivity; Combinatorial generalization; Fuzzy-trace theory; Meaning as a Multi-Scale Phenomenon;

- Distinguishing Tasks, “Distinguishing Tasks Continuum”, “Creative Stirring / Mixing Layer”: Dynamic Competition Mechanism of Instant Decision; Mental Saccades;

- The Extended Body-Affectome-Connectome-Cognitome-Interactome;

- A mathematical model of beauty or wholeness: A new kind of beauty that exists in fine structure of mental space; Processes of Creating Meaning: In banishing the chaotic complexity, we are searching for order and stability;

- Intuition: Spiritual Networks of Sketches; morphological calculations, bodily intelligence; ‘Jury of Intuition’; Intuition as a Self-Completing;

- Networks of transformations of scenes & objects, Structured Graph of Activity, Object Manipulation Graphs; Space of Possible Affordances;

- Over-connectivity abilities, generalized entanglement; Social Entanglement; Entanglement Mechanisms – Inductor Space, Critical-like Region; Information as Entanglement;

- Narrative Space, Web of Events, Web of Memes;

- Weak Control Hierarchies; Holonic Control Architectures;

- What defines a new idea? How do new ideas emerge in the realms of science, art, and politics?; Unconscious self-organization: Arrows of Causality, Z-Arrow of Cognition (self-organized criticality);

- The Theory of Thin Slices: A Principlal Model of Mental Self-organization and Autopoiesis, Mental and Social Codepoiesis, Predictive Coding, IFS codes, Invariant Region, Latent Attractors, Intuition and Thin Slice Judgments;

- LGP Occam learning, Ockham's razor, Principle of parsimony, Free Energy Principle;

- Strategic Thinking; Thinking Through Other Minds; Subjective Construal; Design Thinking (Design Ideas: Design cognition in the early phases of the design process; Understanding How Designers Think: investigating the nature of design thinking);

- Maximization of Eco-Cognitive Openness: Generating Novelty in Open-world Multi-agent Environments: Community-Based Serendipity (“prepared mind”: being in a state of readines); "Creativity is born in chaos": Cultivating the Art of the Unexpected; Serendipity as chaos or discovery; Sketch networks: serendipitous discovery often involves reformulation; Exploring the boundaries of serendipity; Exploring the Role of Catalyzing Agents; Emergence of serendipity in hybrid science systems;

- Subjective Space-Time-Action (Exploring the Dynamics of Human Experience; Global Access); Action-thoughts; Geometry/topology of living space;

- Subjective dynamic logic: Processes "from vague-unconscious to crisp-

conscious"; Diversity's Logic: The Diversity-Ability Trade-Off; Self-similarity Logic; the problem of "dark decisions"; Asymptotic rationality; Less-is-more effects, Doing more with less: Meta-reasoning and meta-learning in humans and machines; Simple Heuristics That Make Us Smart: It is about fast and frugal heuristics; The Development of Wisdom Across the Lifespan: «I am becoming the best version of myself»;

- «The Beginning of Infinity»: What makes for a good explanation? Complexity as an epistemological problem: Design approaches for supporting students' understanding of complex systems; Unpacking hidden views: 'view on formula' specified by several specific views (sketches); multiple meanings of symbolic expressions.

Brief Summary. Sketch Networks are representational elements forming an agent's mental world and are also 'living' objects that have the power of self-organization. The dynamic subjective order (in the interpretation of the LGP) refers to a kind of structural-energetic character, called living smart-structure, which is defined as a mathematical structure that consists of numerous substructures with an inherent holarchy / hierarchy along with activity/energy (the flow of energy in living things). For each task of distinguishing, its own sketch of a dynamic subjective order is possible (Arrow of Cognition). Key point of the LGP: Any sketch is a "living smart-entity" (analogous to a cell). The network of sketches is a "living smart-entity". A network of networks of sketches is a "living smart-entity". Contextual activity/energy dynamics determine "smart" properties. Networks of sketches generate elementary energy forms (oscillators, vortices, solitons, LGP-adaptive resonance, etc.). Generalized entanglement creates subjective reality itself. The self-realization of 'I' in multi-unity (unity-in-difference). Due to the generation of rough sketches, the ability of intuitive foresight and anticipation in situations of high uncertainty of input data arises [3], [4]. Generalized heuristics can recognize weak signals (expert level) [4].

Reference

1. Prokopchuk Y. (2017). Sketch of the Formal Theory of Creativity. Dnipro: PSACEA Press.
2. Prokopchuk Y. (2022). Intuition: The Experience of Formal Research. Dnipro, Ukraine: PSACEA Press.
3. Nosov P., Zinchenko S., Ben A., Prokopchuk Y., Mamenko P., Popovych I., Moiseienko V., Kruglyj D. (2021). Navigation safety control system development through navigator action prediction by data mining means. Eastern-European Journal of Enterprise Technologies, Vol. 2 No. 9 (110): Information and controlling system. 55-68. DOI: 10.15587/1729-4061.2021.229237
4. Nosov P. S., Popovych I. S., Cherniavskyi V. V., Zinchenko S. M., Prokopchuk Y. A., Makarchuk D. V. (2020). Automated Identification Of An Operator Anticipation On Marine Transport. Radio electronics, Computer science, Control. № 3 (54). pp. 158–172. DOI: 10.15588/1607-3274-2020-3-15