

Creative Research and Creative Education

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Abstract

The article is dedicated to the issues of science producing, organisation of scientific work, the role of creativity in scientific activities and the special aspects of creative university education.

Keywords: Science producing; Search and Research; Chance and ad hoc; Egalitarian creative education

Introduction

Contemporary science undergoes serious changes with regard to its position and function in society, organization of scientific research, tools and methods of research work, which is noted by P. Feyerabend with certain uneasiness [1,2]. One of the key requirements to today's and especially tomorrow's science is creativity of research and, as a consequence, creativity of education with utmost connection to higher education.

- Science producing may be suggested as one of the tools to increase creativity of research.
- Science producing, special aspects, tasks, principles

Science producing similar to producing in other creative spheres (cinema, theatre, TV, arts, mass media, etc.) is aimed at ensuring commercial sustainability and attractiveness of science, and, most importantly, independence from state, which is especially relevant for Russia and countries with resembling political and economic structure. It is essential to note that science producing covers three major spheres of applying scientific research results.

- Subject sphere (science, R&D, engineering, development);
- Educational sphere (higher education);
- Socio-cultural sphere (material and intellectual consumption, social life).

Science producing enables packaging of results and products of scientific work into conventional form for

- Marketing and advertisement
- Business
- Service
- Infrastructure
- History and culture in a given subject field (Figure 1).

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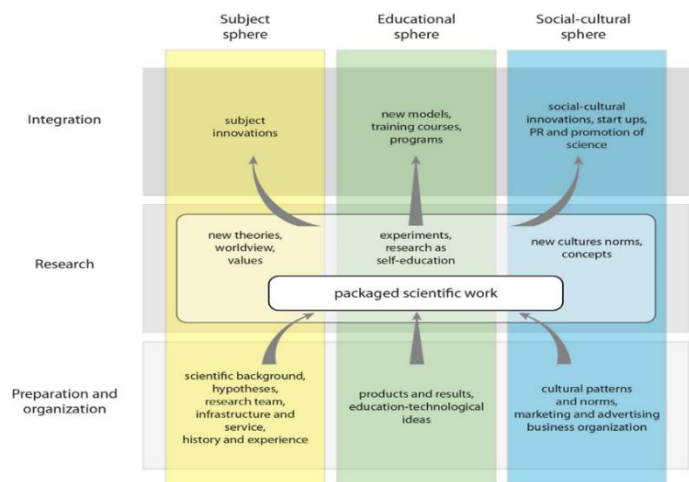


Figure 1: Emerging intersections of packaged scientific work.

In general terms, the technology of scientific research can be represented as follows:

Search

Search for literature and references: even if one takes up quite a narrow and vanguard research issue, quite soon one discovers that the issue has already been thoroughly analysed, and fuelled tons of scientific literature where one has to find:

- Valuable information;
- Unconventional perspectives;
- Theories and models (preferably, a number of them);
- Lacunae and gaps which must be covered.

A comprehensive and in-depth reference list is of high value of its own accord; during the Crimea Programme (1991–1992) the best



librarians and bibliographers of Moscow were delegated to collect a bibliography of several thousand items in Moscow, Kiev and the Crimea. Information search: strange as it may seem, the Internet in this case is as empty as our miserable domestic statistics; more often one has to produce information and statistics using one's own means by monitoring, conducting social questionnaires, in-depth interviews and applying other research tools. Search for coverage in the news media and communication media (such as the Internet). Search for executives (rarely is a research team formed beforehand and at one time). Search for actual customers (except the project owner) and market outlets.

Research (search reflection)

In real practice, a research may be conducted in parallel, at the battlefield of query: there can be no obstacle to a thought. However, the processing of a research is usually performed after the search stage. A research advances by two independent and parallel trajectories:

Processing (research design)

Compliance assessment and application of standards. Preparing scientific and engineering materials (articles, reports, monographs, presentations, poster papers, arranging seminars and conferences). Preparing publicly-broadcasted results (presentations, PR, promotion, advertisement). Preparing educational results (training courses and programmes, learning and teaching support kits, etc.). Another essential element along with the technological part is service, including self-service:

- IT and TS (technical support);
- Front office (communicating with clients, associate contractors and counterparties, general communications, negotiation support, correspondence) and back-office (cleaning, transportation, food service, etc., as required).

Besides the technological component, science producing requires management:

Project initiator: Research producer (concept, finance, marketing research, casting, promotion)

Project manager: HR, human research: casting, psychological support, conflict management, advanced professional training

Principal investigator: Research advisor (planning, delegating tasks to executors and complying with deadlines, quality assurance)

Administrator: Compliance assessment, adherence to standards, participation in results processing

The role of chance in science and ad hoc organisation of environment

Regardless of the grandeur and complexity of a scientific organisation, everything is always decided by chance, ad hoc, as

well as by those loners who seize their chances. Creative scientific work requires dedicated people with imagination, courage, ambition, scepticism, and, to be on the safe side, a good grounding in theory, but there are two more conditions:

- ad hoc
- Privacy

Were Archimedes not alone in his bathroom but in a company of beautiful ladies, he would never have devised his law and, certainly, would never have exclaimed "eureka!" Were Galileo to construct his spotter scope in midst of a military corps and not with his cat alone, he would never have engineered a telescope or thought of heliocentricism. Were Newton to be sent for mass agricultural labor, as was the custom in China or the USSR, and not idling on his farm, he would never have developed the law of gravity or the integral and differential calculus no matter how many apples fall on his head. If a shipboard physician Dr. Mayer abided in a crew's berthing and not in a single cabin, he would never have developed the energy conservation law. If Hawking were not almost alone in a train compartment (shared with a fine lady), no one would have learnt of the mischief he caused at the train's departure. The privacy of a theorist and creator is filled up with a tense dialogue with personal self, God, Nature, and other theorists. This is the communications broth where ideas, guesses, hypotheses and theories are born. What do we need to create these private conditions for a scientist? - All people of science (for example, patent engineers as Einstein) must be minimally occupied by the process work and not stick out at their offices for 40-80 hours per week: they must sit, pace or lie at home, in a library, in the open country or in any other acceptable type of solitary confinement. Most commonly, scientific outputs (ideas, hypotheses, theories which are not yet falsified or verified) are not worth a straw or are of hardly any value, much less than the payroll allocated to support these scientific creators. However, without this embryo we will have nothing, and science will turn into a factory for making up new robes for the king. It stands to mention that falsification and verification of the new knowledge is usually performed not during the ritualized sessions of scientific boards but within the liberated club space around the university campus: in a cafe, pub, sauna, at a picnic or a stadium tier [5,6]. Creative education from elitist to egalitarian. If current times bring forward creative community as the leader [4], creative education must in turn switch from elitism to egalitarianism. Several principles of creative education can be defined which should be aimed at those who have already decided on their profession, as well as at the whole school and university system:

- Autopoiesis, fantasy and imagination
- Aesthetics
- Tradition and mastery
- Play practices

Unexpectedness and unpredictability; ability to have an out-of-ordinary perspective on the commonplac

- Ontology over logic
- Reliance on the humanities knowledge
- Active usage of the left hemisphere

Mousike education over gymnastike education (Ancient Greece) and Bild-Education (germ. Bild-Bildung) over Form-Education (germ. Form-Bildung) [3].

Understanding or knowledge

What is the target of creative education: acquiring knowledge or understanding knowledge?

It may be assumed that creative education should be hermeneutic and aim at both understanding and thinking. Moreover, these intellectual processes are speculative by nature and nourish each other in the process of communication, shaping project definitions required for joint activities [4,5] (Figure 2).

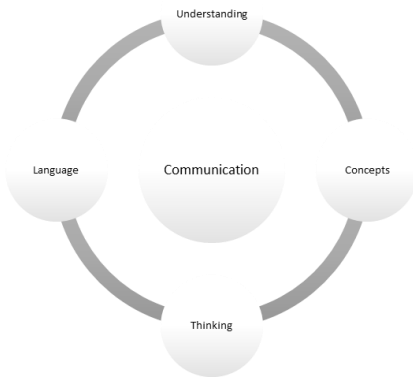


Figure 2: Understanding and thinking in the communication process.

This has two important effects:

- Creative education exists as a dialogue and subject-subject relations
- The only source for understanding is non-understanding, therefore communication does not record that which is known and comprehensible but that which is incomprehensible and requires cooperative solution

Requirements and competencies of a creative teacher

The primary focus of creative education is on the competencies and qualities to be acquired by students. However, this issue for the most part concerns the features and qualities of a teacher. What should be the competencies of a teacher?

One can mention:

- **Challenge:** every meeting with students is a challenge to oneself, to students and to the shibboleth of routine
- **Improvisation:** the usage of ready-made copy-paste presentations must be reduced, smart boards should be the impromptu space for ad hoc search and solutions

- Acknowledgement of the trueness of opinions and ideas of the other and equal trueness of one's own opinions and ideas
- Acknowledgement of the right for mistake, while reflection on one's own mistakes is a step forward in one's personal development

Unfortunately, within the educational lifecycle the meanings of education die out before the content of education, which is first noted by students and not teachers (Figure 3).

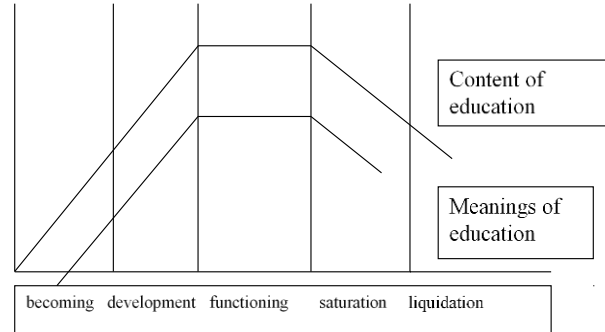


Figure 3: Interpretation of the educational lifecycle [9].

One should mention that creativeness relates only to the first two stages: becoming and development, while at the next stages education attains features of mundane reproduction [6,7] (Table 1).

Table 1: A research advances by two independent and parallel trajectories.

Development	Mastering
Development of new knowledge, vision, models, theories and mockups	Emersion of new methods, techniques, ways and tools of conducting research
Development of new design and pre-design ideas	Emersion of new methodological instrumentation and toolkit
Expansion and shift of activity and belief frameworks...	Problematisation and discrepancy record for a research work
	Expansion and deepening of conceptual framework...

The concept of 'live knowledge'

This is a rare phenomenon observed within research and learning environments which arises in the course of communication among two or three opponents and in the presence of other enchanted



witnesses when new ideas, thoughts and, most importantly, knowledge, brand-new, unconventional and unexpected knowledge is born. Unfortunately, this phenomenon is of elusive nature, but to experience it, to feel the euphoria of the flavour and charm of this new knowledge, it is worth working in science and education, because a thought which does not give birth to another thought is nothing [8].

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