METATHEORY OF TRANSDISCIPLINARY TEACHING OF SYMMETRY BASED ON STEM TECHNOLOGIES IN UNIVERSITIES OF HIGHER EDUCATION

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The implementation of elements of STEM education, which have a modernization and technological nature, are designed to ensure the implementation of the main ideas of educational reforms in the daily activities of educational universities of higher education (HEUs) of various profiles in conditions of transdisciplinarity [1]. To modernize the system of higher education, it is necessary to introduce modern approaches, theories into the teaching methodology of physics and professionally oriented disciplines using STEM technologies.

The transfer of educational innovations from the level of theoretical knowledge in the process of teaching physics and professionally oriented disciplines (the study of cross-generating concepts, in particular symmetry) to the level of their productive use becomes possible if the technology for their implementation is developed. It is the implementation of STEM technologies in the teaching methodology of physics and professionally oriented disciplines that is an indicator of relevance and effectiveness.

We consider the meta-theory of transdisciplinarity through the description of the fundamental features of the world system and the forms of their manifestation, which form the basis of the entire system of human knowledge about the surrounding reality.

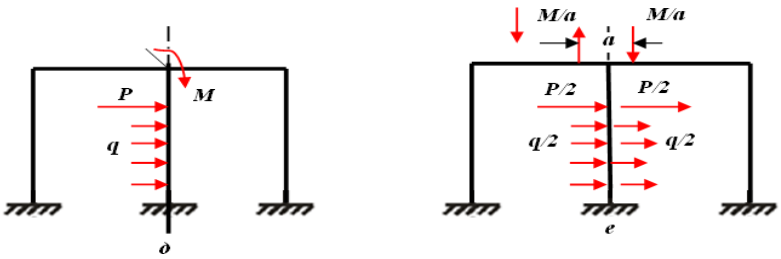
The set of components of transdisciplinarity and the main philosophical categories within the meta-theory of transdisciplinarity are determined by intellectuality, which leads to their rethinking, ordering and generalization, which is important for the methodology of

teaching physics and professionally oriented disciplines using STEM education technologies.

Metatheories of transdisciplinarity-4 consider the creation of a picture of a unified world. Disciplinary (local) pictures of the world in this case are abstract models of some areas (fragments) of a single world. As a result, the meta-theory of transdisciplinarity-4 defines the method and context of building scientific models of the investigated areas of reality, and also sets a set of the most general conditions that provide a way of understanding special theories constructed by scientists. Such a scheme, due to its abstractness, provides a transdisciplinarity interpretation of the results of modeling fragments of reality within the framework of various disciplinary and interdisciplinary approaches used in the context of STEM education.

Let's give an example of the use of a fundamental physical concept, such as symmetry, in the process of teaching students of higher education in the disciplines of physics and professionally oriented disciplines (theoretical mechanics, resistance of materials).

The system is called symmetrical about the axis if, with the help of a straight line that coincides with the axis of symmetry, it is divided into two parts and is a mirror image of the other *(Fig. 1).*



a) b)

Fig. 1. Image of hinged and fixed supports

In addition to symmetric ones, there are not completely symmetric systems that can be considered symmetric. If we consider the frame (Fig. 1., b), which is not completely symmetrical, since it has a hinged-fixed support on the left, and a hinged-movable one on the right, under the action of a vertical load it can be considered as symmetrical, because the horizontal reaction of the left support is zero.

This support can be interpreted as hinged and movable. Systems of this type are called conditionally symmetric.

The process of implementation of STEM innovations in the teaching of physics and professionally oriented disciplines in HEUs ensures practical use and introduction of changes in the pedagogical system, which helps to bring it to such a level of functioning that will help to obtain qualitatively new sustainable results of its activity and will be determined by the innovative potential of the innovation.

STEM technology is a means of developing innovative projects and enables large-scale, manageable and accessible use of innovations in the teaching methodology of physics and professionally oriented disciplines in higher education institutions of various educational profiles, saves resources for their implementation and guarantees the effectiveness of innovative changes.

REFERENCES

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