

***Abobakr Khussein***

Researcher

Institute of Mechanical Engineering Research

Assistant Professors

Bauman Moscow State Technical University

Fellowship (D2) of Advanced

Higher Education Academy (Great Britain)

***Spasskaya Daria***

PhD researcher

Bauman Moscow State Technical University

Assistant Professors

Bauman Moscow State Technical University

## **DEWEYAN PRAGMATISM AND ENGINEERING EDUCATION**

***Abstract:*** *in education, pragmatism is an approach to learning and teaching that focuses on keeping things practical. Its key theorist is John Dewey. It has four principles: Unity, Interest, Experience, and Integration. Proponents of this approach among teachers, use active project-based learning and problem-based strategies in the classroom and focus on topics relevant to students' lives. This paper starts by shedding light on John Dewey's educational philosophy and its implication on Engineering education. It further discusses how the basic principles of pragmatism can be applied in learning thereby making the process of teaching-learning more effective in the Additional and Upskilling courses we architected at the Institute of Contemporary Educational Technologies of the Bauman Moscow State University.*

***Keywords:*** *Pragmatism, Problem-based Learning, Inquiry, Dialogic teaching.*

***Хуссейн Абобакр Мохамед Аббакар***

старший преподаватель

ФГБОУ ВО «Московский государственный  
технический университет им. Н.Э. Баумана»

**Спасская Дарья Дмитриевна**

старший преподаватель

ФГБОУ ВО «Московский государственный  
технический университет им. Н.Э. Баумана»

г. Москва

**Аннотация:** в статье дается взгляд на прагматизм в образовании прагматизм как подход к обучению, который фокусируется на сохранении практичности. Теоретическая база исследования строится на трудах Джона Дьюи. Он выделяет 4 принципа: единство, интерес, опыт и интеграция. Сторонники этого подхода среди учителей используют активное обучение на основе проектов и проблемные стратегии в классе и сосредотачиваются на темах, имеющих отношение к жизни учащихся. Статья проливает свет на образовательную философию Джоан Дьюи и ее влияние на инженерное образование. Обсуждается, как основные принципы прагматизма могут быть применены в обучении, тем самым делая процесс преподавания более эффективным на дополнительных курсах и курсах повышения квалификации, которые мы организовали в Институте современных образовательных технологий Московского государственного университета им. Н.Э. Баумана.

**Ключевые слова:** прагматизм, проблемно-ориентированное обучение, опрос, диалогическое обучение.

### *1. Introduction.*

The word pragmatic means the quality of dealing with the problem in a sensible way that suits the existing conditions rather than following a fixed theories, ideas or rules. Pragmatism is an educational philosophy that says education should be teaching students the things that are practical for life and encourages them to grow into better people. Many famous educators including John Dewey, William James were pragmatists. Pragmatists believe in the idea of practical learning i.e. education should apply to the real world. John Dewey is the founding father of this philosophical approach to life.

His approaches to education and learning have been influential worldwide. The purpose of education as he sees it is to cultivate thoughtful, critically reflective, socially engaged individuals rather than passive recipients of established knowledge so growth is Dewey's ultimate educational goal [1]. He developed a concept of inquiry, stimulated by a sense of need and followed by intellectual work such as defining problems, testing hypotheses, and finding satisfactory solutions, as the central activity of such an educational approach [2]. This organic cycle of doubt, inquiry, reflection and the reestablishment of sense or understanding contrasted with the «reflex arc» model of learning popular in his time.

The reflex arc considered learning as a mechanical process, measurable by standardised tests, without reference to the role of emotion or experience in learning [7]. Defining education, John Dewey said, "Education is the continuous reconstruction of experiences". His major concept on education has been quoted in his books: «Democracy and Education» (1916), «Logic» (1938), and «Experience and Education» (1938) [1].

## *2. Deweyan Educational Philosophy and some implications on Engineering Education.*

There are at least four main aspects of Dewey's theory that have important implications of the philosophy on engineering education. These involve the development of an attitude of skepticism, valuing change individually and organizationally, emphasizing the centrality of context, and the importance of teaching the function of theory in the process of inquiry [9].

First, Dewey argues that knowledge remains forever subject to change, and inquirers should leave open the possibility that their most cherished solutions may need to be modified or even denounced. The effectiveness of science and engineering emerges exactly from this. Since we each engineering students we always try and pass on this mindset to our students, creating an environment that genuinely encourages this skeptical attitude. It is worth mentioning that, one need to put into consideration that this requires a safe environment, ample time and resources to question and reject received explanations and to attempt to find better ones.

Second, Dewey argues that all inquiry involves transforming the environment. Knowledge making is by definition transformative. For Dewey, an inquiring mind is going to change the environment in some way, alter the old ways of doing things. It will be respectful of past ways of doing things but will not revere those ways so much so as not to try new ways. Thus, the educational environment should anticipate, encourage, and adapt to such changes. In Baumann Moscow State Technical University, we are asked to be to change the syllabus. We also try and tailor our instruction styles to the specific needs of students. Such changes cost money, resources efforts, Iwe dare say but if the goal is the teaching of thinking, then as Dewey argues that the cost is well spent, since the alternative is directly inimical to thinking.

Third, Dewey argues that facts are facts in the context of inquiry. They are “operational... [and] not self-sufficient and complete in themselves. They are selected and described for a purpose, namely statement of the problem involved in such a way that its material both indicates a meaning relevant to resolution of the difficulty and serves to test its worth” [3]. As teachers we noticed that the teaching of facts outside context of inquiry is counterproductive as students spend much of their time memorizing such facts, which they may quickly forget after exams. We don't usually require students to memorize large quantities of decontextualized facts in a hope that time is freed for investigation.

Fourth, Dewey argues, “science takes its departure from commonsense”, which consists of “beliefs, conceptions, customs and institutions”. Dewey emphatically argues against teaching to students the findings of science as ready-made ideas to believe in. So we keep encouraging our engineering students to come to see the theory in the context of a meaningful inquiry, which will definitely advance their vision and capability.

3. *Dewey's pragmatism and our teaching practice.* At the Institute of Contemporary Educational Technologies, Dewey's theory had an impact on our educational practices and the way we interact with our students. Here are some aspects.

1. *Individualised instruction:* We always exert great efforts as a teacher to learn about our students and their motivating interests and desires in order to find subject

matter, events and experiences that they may find appealing and that will provoke a need to develop the knowledge, skills and values of the curriculum. encouraging them to relate learning to their lives and experiences. This seems to be in line with Dewey's ideas that teaching and learning should be designed to be responsive to the specific needs, interests, and cultural knowledge of students.

2. *Problem-based learning*: As we mainly teach engineering- related disciplines to engineering students, we need do a lot of problem-based learning where we begin with a practical task or problem which is complex, comprehensive, multi-layered, collaborative in order to extend students' knowledge, skills and understandings, this resonates well with Dewey's principle of inquiry.

3. *Dialogic teaching*: Building on Dewey's ideas about the importance of communication and social interaction we keep encouraging our students to get involved in dialogue and meaning -making. In Dialogic Teaching students are encouraged to form habits of careful listening and thoughtful speaking [8].

#### 4. *Empirical evidence for this philosophy in practice*

While there is no direct evidence that Dewey's approach improves student outcomes, Dewey's theory of students' learning aligns with current theories of education which emphasise how individuals develop cognitive functioning by participating in sociocultural practices [11], and with empirical studies examining the positive impact of interactions with peers and adults on students' learning [5]. Quantative research also underlines a link between heightened engagement and children's learning outcomes, with strategies such as making meaningful connections to students' home lives and encouraging student ownership of their learning found to increase student engagement [12]. A few empirical studies which examined the effectiveness of aesthetic experiences for students confirmed that students experienced those lessons as more meaningful, compelling and connected than a comparison group [4].

#### *Conclusion.*

The student-centered approach of teaching calls for encourages teamwork and peer teaching. Projects and hands-on experiences have definite advantages over traditional lectures. According to pragmatists, this methodology focuses on giving students

autonomy as well as alternatives to their current learning circumstances. The learning environment turns into a methodical laboratory in which thoughts are experienced to determine whether they can be authenticated.

Pragmatic philosophy is a practical philosophy, with no fixed or absolute standards. Being practical and utilitarian school of philosophy, pragmatism has very much influenced education.

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