

## O P I N I O N

of a dissertation for awarding the educational and scientific degree "doctor"  
professional direction 5.3. "Computer and Communication Technology"  
doctoral program "Computer Systems, Complexes and Networks"

Author: Ava Ahmed Chikurteva

Topic: Information and communication technologies in education

Scientific supervisor: Prof. Dr. Dimitar Karastoyanov

Member of the jury: Prof. Dr. Rumen Trifonov – TU - Sofia

The dissertation submitted for evaluation is a volume of 134 pages, consisting of 4 chapters, a conclusion, a list of publications on the topic, used literature, and two appendices. The literature is from 129 literary sources.

### 1. Relevance of the problem developed in the dissertation

The dissertation concerns approaches and solutions in the education system, namely "Project Based Learning". The Flipped Classroom method is offered. Electronics and robotics simulations are included. The ICT-based results were implemented in the lessons of Geography and Economics.

The purpose of the dissertation is to research and develop information technologies, resources, methods, and means to expand and improve e-education.

The topic of the dissertation is current. The PhD student demonstrates knowledge of the state of the problem and cites global approaches and solutions.

There is a correspondence between the set goal and tasks, the chosen research methodology and the stated contributions.

### 2. Degree of knowledge of the state of the problem and compliance with the chosen methodology

In Chapter 1, an overview and analysis of the application of ICT in the learning process were made and changes and modernization are therefore necessary.

Chapter 2 explores the application of ICT in Project-Based Learning. Types of platforms and multimedia solutions are presented.

In Chapter 3 solutions are developed in the field of Project Based Learning. A block structure of an information system for implementing Project Based Learning is given.

Chapter 4 describes experiments on the application of Project-Based Learning methods. Simulations have been made of robot control, and electronic circuit operation. The "Flipped Classroom" method was applied.

The doctoral student has a thorough knowledge of the approaches and solutions applied in education. Experiments and simulations using ICT have been verified with program implementations of the lessons.

### 3. Scientific and applied contributions of the dissertation work

I have no objections and accept the contributions, which can be summarized as follows:

- A systematic analysis and systematization have been prepared regarding the place, role and application of ICT in education;
- A technological model, software architecture of a web-based platform for PBO, as well as a model of an automated interactive assistant was developed;
- Digital educational resources have been developed for the simulation of a mobile robot, a laser scanner and a digital color camera;
- An example project-based lesson was developed using the innovative method of Flipped Classroom and Augmented Reality.

I believe that the described results are the personal work of the doctoral student.

#### 4. Assessment of compliance with the minimum national requirements and with the additional requirements under PPZRASRB

The 6 publications presented correspond to the topic. 2 of them are indexed in SCOPUS. These publications have a digital identification code DOI. The rest are in our country in academic publishing houses.

The submitted publications are sufficient to defend the educational and scientific degree "doctor". No citations were provided.

According to PPZRASRB and the internal rules of IIKT-BAS, it is required to have at least  $50+30=80$  points according to Group A and G indicators. A reference with the presence of  $50+100=150$  points is attached.

#### 5. Significance of the research and applied contributions of the dissertation work

I believe that the dissertation research has led to usable results in creating new solutions in Project-Based Learning and applying the Flipped Classroom method.

#### 6. Some recommendations and critical remarks

I have no objections regarding the content and contributions of the dissertation. There are minor stylistic, grammatical, and technical errors in places.

#### CONCLUSION

My opinion on the scientific-applied and applied contributions of Ava Ahmed Chikurteva's dissertation work is positive. The requirements of the Law on the Development of the Academic Staff in Bulgaria and the Regulations for its Implementation and the internal regulations of IIKT-BAS have been met. This gives me reason to vote "yes" and to recommend to the Scientific Jury to award Ava Ahmed Chikurteva the educational and scientific degree "doctor" in professional direction 5.3. "Computer and communication technology", a doctoral program "Computer systems, complexes and networks".

19.02.2022

Prepared by

НА ОСНОВАНИЕ

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