

AN APPLICATION OF PERSONAL COMPUTERS IN ASTRONOMY EDUCATION

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Observations play an important role in the process of teaching astronomical knowledge. Practical observations of astronomical phenomena lead to analysis and explanation based on natural laws and so form the basis of cognitive processes in the education. Evidently the observations are an integral part of acquiring astronomical knowledge. Giving up observations, no matter what the reasons, is equivalent to losing quality in the educational process. It decreases the possible influence over the personal development of pupils and students. At the same time, observation and observational results are important for success in education.

Carefully planned observational time has a substantial influence on cognitive and educational processes. It leads to considerably more active participation in astronomy lectures.

Implementing observations with pupils beyond doubt has objective problems: a suitable time and conditions, *etc.* The training and qualification of the lecturers for this specific kind of activity also play an important part here.

Pupils in Bulgaria receive their initial teaching about astronomy as early as in the primary schools. Afterwards, this knowledge is expanded, arranged systematically, and deepened in high schools. This fact also impedes the training of tutors and teachers for observational work in astronomy. At the same time it does not abolish the need to teach in timely fashion information for the students — future teachers — about the appearance of the stellar sky and the basics of planning observations, including the visibility of the moon, the planets, and other interesting sky objects from a site at a given moment of time.

Students' interests are so varied that the training of future teachers in their primary and secondary school education gives Bulgarian specialists in education the task of effectively and rapidly solving the problem of how to include the most necessary astronomical observations.

Since 8-bit personal computers are widely found in Bulgarian schools, their usefulness for modeling different processes and their easy operation made possible the implementation of experimental programs. Such programs included acquainting students with the appearance of the stellar sky (the constellations) and with programs for planning nighttime observations with preliminary introductions to the location of the planets among the stars, recognizing the periods of visibility, *etc.*

The first of the suggested programs offers several possibilities: a) the computer displays a constellation with its name chosen from a list on the monitor; b) the computer shows in successive series the constellations with their names, and c) it displays on the monitor an arbitrary constellation and asks about its name. If the

answer is correct, another constellation is displayed on the monitor. When the student has proposed two incorrect answers, the name of the displayed constellation is shown on the screen after which the next constellation is displayed. When this program mode is stopped, the computer show how many correct answers a student gave.

The second of the programs calculates the coordinates of a planet for an arbitrary moment of time and displays them on the screen along with the surrounding constellation. This program allows a preliminary detailed preparation for night observations in "laboratory conditions."

Our experience shows that the natural interest of pupils and students in the sky combined with their desire to handle computer techniques increases their motivation and their respective active participation in observations. Their preliminary acquaintance with the constellations on the screen of the monitor lessens considerably the moderate possibility that they would not recognize them in their natural appearance in the sky. This fact is of utmost importance for future teachers, who could swiftly train themselves for each separate observation and analyze easily both the constellations visible for the planned moment of observation and the visibility and location of the planets among the stars in laboratory conditions.

At the same time, a rapidly increasing wish to compare the materials learned with the aid of the computer with the natural appearance of the constellations on the celestial sphere under suitable conditions finally leads to the natural individual learning of the constellations.

The described positive features of the programs and the absence of suitable conditions in heavily populated cities for carrying out night observations (an obstacle for the quality training of teachers for such observations) make the suggested programs very effective and useful.

INTERACTIVE COMPUTER PROGRAMS FOR TEACHING ASTRONOMY

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1. Introduction

Astronomy is the most popular and oldest of all sciences and it has had profound influence on human thought. Unfortunately, astronomy does not find an appropriate place in our school-college syllabi. This may be due to the fact that teaching of astronomy encounters a large number of problems with regard to visualization and practical experiments. Popularization of astronomy depends heavily