

Physics Demonstrations Organized For Basic And Middle Schools By Institute Of Physics, Jan Długosz University In Częstochowa, Poland

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The paper presents the experiences of physics demonstrations and science shows, organised for basic and middle schools by Department of Physics and Astronomy of Institute of Physics, Jan Długosz University (till 2004, Pedagogical University) in Częstochowa. These shows have been organised since 1996 and there have taken place 420 of them till now, and there have attended and participated about nineteen thousands of students and pupils. Every demonstration's subject matter was chosen as teachers and students wished. According to their opinion, the physics and science shows are very useful for increasing learning physics and for developing interest in the subject.

Below, there are presented statistics of these demonstrations. Table 1 and Fig.1 present the amount of students participating in them in the 1996 - 2004 period and show the areas of physics considered in these demonstrations

year	Mechanics	Electromagnetism	Electrostatics	Optics	Waves	Hydrostatics, hydrodynamics	Thermodynamics	Astronomy	other
1996-1997	504	550	223	773	102	62	80	233	64
1998	535	550	223	464	132	62	80	233	64
1999	681	722	452	378	37	77	99	526	263
2000	584	450	330	615	355	147	178	75	299
2001	240	770	500	390	435	120	158	160	335
2002	365	422	540	370	550	50	0	165	120
2003	320	165	180	395	310	30	45	189	515
2004	427	236	110	525	142	43	60	160	288
all	3656	3865	2558	3910	2063	591	700	1741	1948

Table 1. The amount of students participating in the demonstrations in the 1996 - 2004 period

and the areas of physics considered in these demonstrations

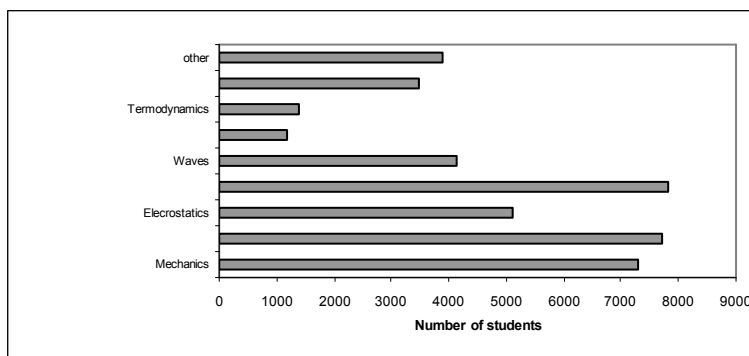


Fig.1: The amount of students participating in the demonstrations in the 1996 - 2004 period regarding the areas of physics considered in the demonstrations

Table 2 and Fig.2 present the number of demonstrations carried out in the 1996 - 2004 period and point out the areas of physics considered in these demonstrations.

year	Mechanics	Electromagnetism	Electrostatics	Optics	Waves	Hydrostatics, hydrodynamics	Thermodynamics	Astronomy	other	number in year
1996-1997	16	11	8	13	5	4	2	2	3	64
1998	12	11	2	7	2	1	4	1	1	41
1999	12	17	8	8	1	2	2	10	4	64
2000	10	8	5	10	7	3	3	2	7	55
2001	5	13	8	7	7	3	4	4	7	58
2002	7	8	9	8	8	1	0	5	3	49
2003	5	4	3	7	5	1	1	6	11	43
2004	7	4	3	9	3	1	1	4	6	38
all	74	76	46	69	38	16	17	34	42	412

Table 2. The number of demonstrations carried out in the 1996 - 2004 period regarding the areas of physics considered in these demonstrations.

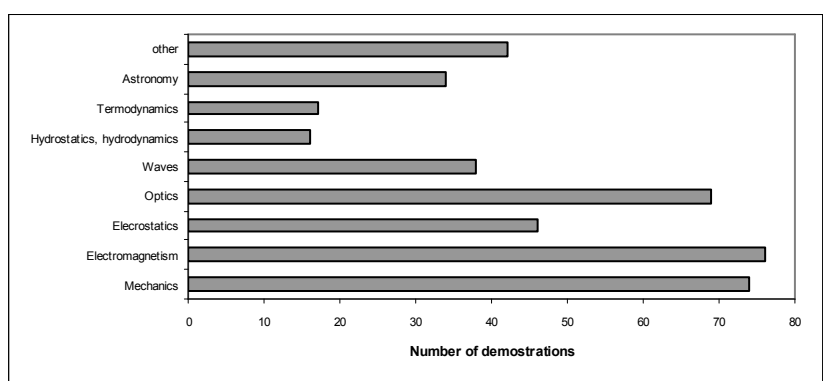


Fig.2: The number of demonstrations carried out in the 1996 – 2004 period regarding the areas of physics considered in these demonstrations.

In 1999 the system of education in Poland was changed. Until then, there had been two stages of the system of education: 1. basic school (eight years), and 2. middle school (four years) or middle technical school (five years). After the reform of education in September 1999, there have been three stages of the system of education: 1. basic school (six years), 2. gymnasium (three years) and 3. middle school-lyceum (three years). The subject of physics in basic school has no longer existed since then. In classes 4 – 6 there is a subject called “nature” and it consists of 4 elements: physics, chemistry, biology and geography.

Fig-s 3-5 present the number of pupils and students from basic schools, gymnasiums and lyceums participating in the demonstrations carried out after the reform, from 1999 to the end of 2004 regarding the areas of physics in these demonstrations.

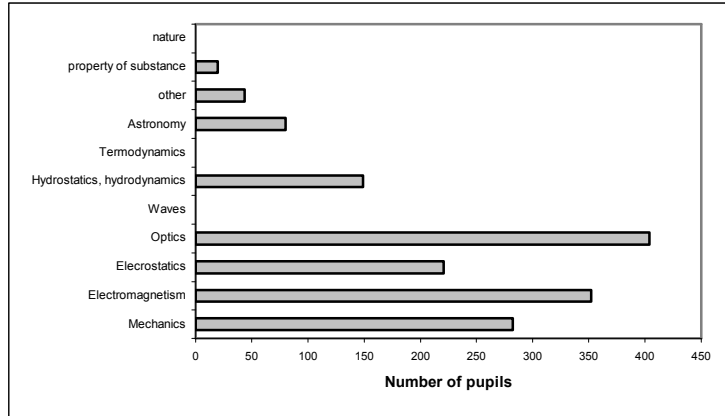


Fig.3: The number of pupils of basic schools participating in the demonstrations since 1999 to the end of 2004, regarding the areas of physics in these demonstrations.

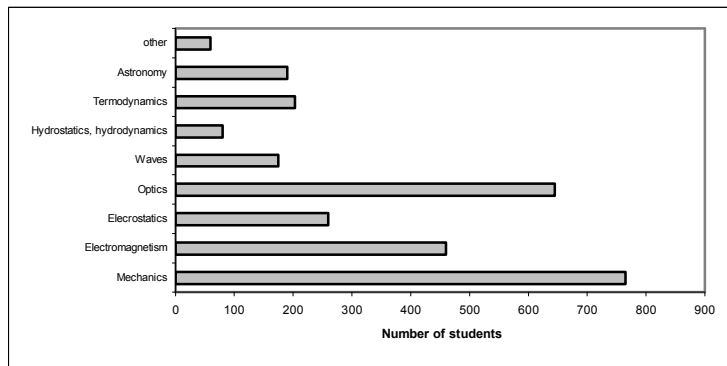


Fig.4: The number of gymnasium students participating in the demonstrations since 1999 to the end of 2004, regarding the areas of physics in these demonstrations.

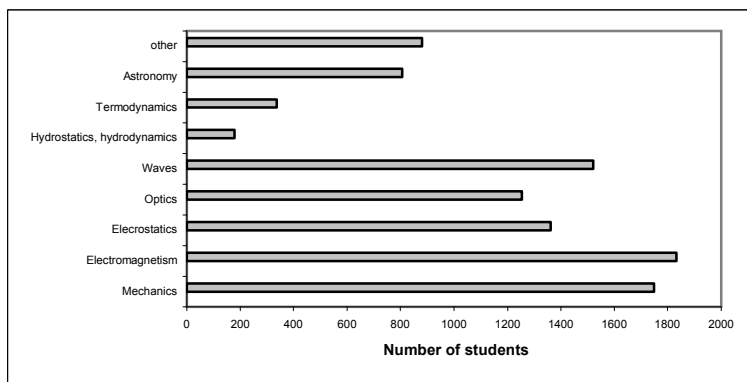


Fig.5: The number of lyceum students participating in the demonstrations since 1999 to the end of 2004, regarding the areas of physics in these demonstrations.

The authors carried out some research on information transmission during the shows [1]. It appeared that showing and explaining the experiments is not enough, because students are not always able to notice some important phenomena. That is why it is necessary to inform them before a demonstration, what they should pay attention to. The research also revealed that students sometimes have problems with describing the observed phenomena. They very often bend their relations to their expectations regardless of the real run of the phenomenon. It mostly happened while presenting seemingly paradoxical phenomena denying students' common knowledge, i.e.: hydrodynamics experiments.

References

- [1] Głowacki M, Kocik B 2000 Przekaz informacji podczas pokazów doświadczeń fizycznych organizowanych dla uczniów szkół podstawowych i ponadpodstawowych Prace Naukowe WSP w Częstochowie Fizyka III Wydawnictwo WSP Częstochowa 91–104.