The History of Education

Preparation Programs

For Science and Mathematics teachers in English

Prepared by Foundations of Education Department

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ABOUT FACULTY OF EDUCATION:

The faculty was constructed in **1970** , its site at the past was secondary school for boys in Qena , in Sabry Abu Alam street (in the past), but now this place became site of faculty of engineering. it was the first faculty of Assuit university branch in Qena, then faculties of science, arts, and other faculties of south valley university are opened. Faculty of education site now is beside faculty of arts. the superior objective of faculty of education is developing a better capacity of the individual, personality traits, ethical and religious values on the basis of reverence and respect for rights, taking into account the criteria of complementarities and inclusiveness, intelligent and innovative, international and global, allowing for independent thinking person pursuant to an effective result in good cooperation with his own people for the benefit of society. The College of Education, Qena colleges in the history of the prestigious University of the South Valley as it contains three divisions.

FACULTY VISION

Working on faculty of Education to be honored achieving quality in the level of knowledge and educational programs and its various activities which are reflected in its graduates and working to develop education in various educational stages.

FACULTY MISSION

Preparing the teacher in line with scientific, technical, and professional progress and developing a spirit of loyalty to the homeland. Working on the development, advancement and cooperation with various institutions that help in preparation of

teacher, to work through the public education and through being able to specialist professional and skills, and continuing development. From this mission, the faculty does the following: 1- Preparing students of secondary school, and its equivalents, and graduates of institutions, and university faculties excellent preparation for teaching profession through the provision of vocational programs with high standards of quality in all disciplines from kindergarten to the end of secondary school.

2- Uplifting professional and scientific level of all workers in the field of education and defining them with modern educational trends, developing the development of self-efficacy trend and working on strengthening values of continuing education.

3- Preparing specialists in various educational fields.

4- Doing research and educational studies in various specializations in faculty and solving educational issues and real problems in reality that impede educational process and providing solutions to work on developing education and reforming it.

5- Contributing in developing educational thought and publishing modern educational trends and applying it to solve problems of environment and society in which they exist

6- Providing research and advisory services that contribute in developing institutions of non-formal education.

7- Working on educating students integrated education, and developing creative thought to them.

8- Participating in preparing demonstrators and assistant lecturers in many specializations in university faculties and institutions of higher education and forming them educational formation continuously, helps them to perform their role effectively and efficiently.

9- Working on spreading the ethics of the teaching profession between faculty members, students, employees, and educators, according to ethical covenant adhered by everyone in the field of education and education in its various levels.

10- The faculty through Primary Education division, preparing a teacher to first levels of primary school and teacher specialized material for the last years of education.

11- The faculty participates in literacy and eliminates the phenomenon of dropping out of education through preparation of teacher.

12- Adopting the concept of Total Quality and its applicants in faculty, and interesting in self-rectification, and being ready to achieve total quality and continuous development.

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Chapter 1: Education in ancient Egypt

Unlike modern societies, in ancient Egypt the child's world was not separated from that of the adult. Once having survived infant mortality and well before the commencement of maturity, children increasingly adopted adult behavior, maybe even from as early as age five onwards (Strouhal and Forman 1992: 28): obtaining practical skills took the place of playing and sporting, and knowledge was gained from mimicking parents or other adult relatives.

Education comprised general upbringing and training for a particular profession. On the other hand, education in writing and reading could overcome social barriers and was prerequisite for ancient Egyptians entering into a high-ranking profession. It is interesting to note that there were no class restrictions on who could be educated as a scribe (Szpakowska 2008: 104). Educated people could rise socially, as seen with AMENHO- TEP, SON OF HAPU, serving under Amenhotep III. He came from the Delta, born into a low-ranking family and became the king's favorite (Janssen 2007: 57).

At home boys learned mainly from their fathers, girls from their mothers. It is thought they taught the children the basics of MAAT, including the right behavior within their environment, religious belief, rites, and performance, as well as ethical principles. After about the age of five, boys and girls were separated in their learning experiences, in the sense that girls often stayed with their mothers. In tomb scenes, they are often shown playing separately, as in the Saqqara tomb of Mereruka from the 6th Dynasty (chamber A13, east wall). In scenes of daily life, girls are usually shown with their mothers rather than their fathers, while the sons are depicted standing next to their fathers. Boys from the elite became "schoolboys" and received a formal education (Janssen 2007: 60).

There was no formal school system for all children, so the

majority of people stayed illiterate. Peasant children probably never had a proper education. It is likely they received basic education and vocational training – all that they needed to know for being farmers – staying within their family (Feucht 1995: 307–36). This knowledge was handed down from generation to generation. Boys from poor families began helping with the men's jobs in the occupation their father held, often seen as an apprenticeship. This was called a father-son-relationship, but also could be taken on by non-blood-related boys. However, male children of higher classes and from scribal families started early with their school career.

A boy's education started between the ages of five and ten and lasted until he was between twelve and sixteen, which would also have been the time of circumcision as transition to adulthood (Janssen 2007: 60–79; Strouhal and Forman 1992: 35). At this time, they were considered adults and could begin to work for themselves. This would be the earliest age for men to marry, but normally they were between sixteen and twenty years of age when they took their first wife (Strouhal and Forman 1992: 51–2; Brewer and Teeter 2007:110). Education took a large amount of the average life span.

Girl's lives were different, more centered on the home and family. At an early age, girls would begin to learn from their mothers how to keep house and maintain the fields, to sew, and to prepare food (Janssen 2007: 42; Feucht 1995: 315, 336–9), which took more time than the educational hours of boys. Girls were expected to marry after they began menstruating around the age of twelve or thirteen, as indicated in Ptolemaic marriage contracts, although there is evidence of girls marrying earlier (Feucht 1995: 32–3; Strouhal and Forman 1992: 51–2; Brewer and Teeter 2007: 110). The famous scribe Qenherkhepeshef of DEIR EL-MEDINA married the twelve-year-old girl Nanakht when he was fifty-four.

Taimhotep mentioned on her private funerary stela (British

Museum EA147), from the late Ptolemaic period, that she married the high priest of Ptah in Memphis when she was still thirteen and gave birth to four children within the next thirteen years, before she died four years later, aged thirty (Lichtheim 1980: 59–65). Most newlywed women had a child within the first year of marriage, as mentioned in the demotic story of Setne Khamwas and Naneferkaptah (Setne I, Lichtheim 1980: 128). The school texts refer to students being boys, as stated in the Teaching of Khety mentioned below and P. Anastasi III 3/13, as well as in The Instruction of Any, where it is said, that "he understands little when he recites the words in the books" (Lichtheim 1976: 144). However, texts never particularly refer to girls, suggesting other environments for teaching them. The rare exception is Pap. Leiden I370, a late Ramesside letter, where within the usual encouragement to study hard, a daughter of a Khonsumes is mentioned. It is also said that she actively shall produce a letter to a superior scribe (Toivari-Viitala 2001: 189). Girls from higher rank or elite families normally received training in singing, dancing, and musical instruments (Strouhal and Forman 1992: 35).

Pap. Anastasi III (3, 7–8) mentions a school for (probably female) singers at Memphis. From the 6th Dynasty we know of Rawer, being a "teacher (seba) of the royal singers" (Giza, Central Field, Porter and Moss 1974: 265; Manniche 1991: 122). We can find reliefs in tombs of musicians and dancers, showing them with their female students (Brunner 1957: 47–9). The best known is in the Middle Kingdom tomb of the "instructor (sekhedj) of singers" Khesuwer at Kom el-Hisn, showing him giving lessons in sistrum playing and hand clapping (Manniche 1991: 123). These girls could have careers as musicians, but also take part in other musical employment such as "overseer (imira) of female singers," as we know from a woman called Hemetre. She seemed to have been a high ranking woman at the end of the 5th or the 6th Dynasty, as she was able to usurp her tomb Saqqara No. 6 (C 15) from a man named Ty who was wab-priest of Re in

the sun temple of Sahure, the second ruler of the 5th Dynasty (Porter and Moss 1978: 450).

Furthermore, scenes showing girls or young professional per- formers dancing or doing acrobatics, such as those seen on the Red Chapel of Hatshepsut in Karnak, are connected with religion, cult, and ritual and therefore suggest that these elaborate skills were learnt gradually. They are known as female dancers (khebyt). Professional titles as female musicians of a god/goddess (shemayt or khenwt of mostly Amun or Hathor) also imply some method of education, so that they could follow the required ritual. Women possessing these titles owned their individual statues, such as the one belonging to Meryt, the wife of Maya, treasurer of Tutankhamun (18th Dynasty), found in Saqqara (tomb LS 27). She is shown clasping a menat (RMO Leiden AST.2). Since the Old Kingdom, female dancers belonged to groups of male and female musicians delivering funerary endowments, who acted for the deceased in front of his tomb chapel. This is made clear from an inscription (jba jn khener en perdjet, dancing by the group of musicians of the house of eternity; i.e., tomb or the endowment for the tomb) in the tomb of Neb-Kaw-Khor in Sakkara from the 6th Dynasty. Acting performances during funerary rites appear to imply membership of a profession.

Swimming may also have been taught to girls. Again, the texts and reliefs only speak of male students, as we also know from Min (TT109), the mayor of Tjeny (Thinis), who was Overseer of the prophets of Onuris and tutor of Amenhotep II, to whom he taught archery. Another document, the Autobiography of Kheti, prince of Siut, speaks of receiving swimming lessons (nebj) together with the royal children (Decker 1975: 22–3). However, looking at the many spoons with young female swimmers as handles, we can assume that girls were taught swimming as well, even if we take into consideration that these spoons had a primary fertility aspect. The motif of the swimming

girl also appears on other objects (Decker 1992: 91–5).

The fact that girls were taught reading and writing in some way is shown by female literacy; they were possibly taught by family members such as fathers or older brothers. Even though we know of literate woman, such as female scribes in the entourage of a queen of the 13th Dynasty or a female official employed by the god's wife of the 26th Dynasty (Brunner 1957: 46), we have no evidence for the schooling of girls. In lower ranking families, they seem to have had tuition from – maybe female – family members, in elite families also by special tutors. One prominent example of a royal tutor was Senenmut for princess Nefrure, the daughter of Hatshepsut, who was very likely appointed by Nefrure's father Thutmose II. The title Royal Tutor (mena neswt) only appears in the 18th Dynasty. Little is known about this office. We only have images depicting the tutors with children, who are sometimes boys, where in one case he is shown teaching archery, and sometimes girls. The tutors seem to have acted as guardians before teaching the children themselves, either in physical skills or intellectual ones or overseeing their education (Roehrig 2005: 112).

Relatively easy access to the career path of a scribe and the prospect of a high-status position at the end of such a career made this profession very attractive to boys and their parents. In the Teaching of Khety – a so-called instruction text compiled in the 12th Dynasty, also called Satire on the trades – being a scribe is seen as being superior to all other professions (Foster 1999). Even though it is mentioned at the beginning of this instruction that the author sent his son to a central "writing school" as a location for formal education, we know only a little about the route and practice of such education and becoming a scribe.

Unfortunately, we have no fully reliable information about the sites where schools might have been located or how schools were organized before the Middle Kingdom. During the Old Kingdom, students were trained by their fathers or officials in the

houses of the latter and took part in a “father-son-relation- ship” (Janssen 2007: 59), even though there was some organized teaching in the family residence, as the Old Kingdom title “Chief teacher of royal children” suggests. We also have references to palace schools from the First Intermediate period and the New Kingdom (Williams 1972: 215–6). The word for school (lit.: house of instructions – at-seba or seba) is attested since the 10th Dynasty. At the beginning of the Middle Kingdom, the administration was reorganized and new bureaucracies were formed, which brought about the need for the training of more scribes with the ability to read and write to record transactions, royal events, and new policies.

The Middle Kingdom, with its new and extended bureaucracy, needed more capable administrators. This might be one reason for the creation of formal education outside the family. Schools seemed to be attached to administrative units, palaces, or temples. Due to obvious orthographic differences in the Asyut Coffin Text spells and the local type of coffin decoration as well as a specific style of calcite statuettes, we can assume the existence of a writing school during the Middle Kingdom, as well as an art school during the First Intermediate period and the Middle Kingdom in Asyut, which produced high-quality texts and art work. Furthermore, more than one hundred and forty graffiti in tomb N13.1 give evidence of school teaching during the New Kingdom, mainly the 18th Dynasty. Teachers and students seem to have made excursions to this tomb, quoting literary texts and drawings on the walls. Ostraca found in tomb 3 are also connected with scribal or artistic exercises (Kahl 2007: 15, 152–4). During the New Kingdom, we also have special evidence from the Ramesseum (mortuary temple of RAMESES II in THEBES- WEST), where there are plenty of inscribed ostraca as well as small offices and storage rooms, but where no clearly identifiable class rooms were found (Janssen 2007: 65), and the Temple of Mut, just outside the Karnak precinct.

Nevertheless, we know that education in schools was focused on scribal training, as this was fundamental for administration, economic organization, and the priesthood. There is no school that we know of in Lahun, and the school of Deir El-Medina seems to have been located outside the village. The students went here on their days off (McDowell 1996: 602; contrary to Brunner 1957: 19, who suggests the school was located in town). Even though we do not know exactly where the school was situated, we know of its existence from ostraca such as O DeM 438, a so-called "Call to lessons," where the instructing scribe informs his pupil about the next assignment and the student promises to do it. Such facts as school age, class numbers, and curriculum are only known from the New Kingdom onwards (Janssen 2007: 60).

One papyrus from Lahun (Petrie Museum London, UC32196) contains model letters, some with red corrections, suggesting students and teachers at work. Similar examples can be found on various ostraca all over the country. There is more evidence from Lahun: writing tablets, ready to use, or a board used to teach counting (Szpakowska 2008: 106). We know more from Deir El-Medina, the Theban workmen's village. Many students' exercises on ostraca or writing board, covered with plaster, have survived, some even with the red corrections carried out by the scribe himself or more experienced scribes/teachers (McDowell 2000). One text group, the so-called Miscellanies, clearly describes a teacher–student relationship. Some, mainly on ostraca, seem at times to be in an inexperienced hand, the work of beginners; while the Late Egyptian Miscellanies look as if they have been written in a later stage of education such as an apprenticeship (kherya). They are longer, mostly well written on papyrus, and sometimes dedicated by a student/assistant to his master. Evidence for further education is also found in colophons on ostraca, stating that this text was copied for a more senior scribe (McDowell 1996).

The scribal education started with penmanship (cursive hieroglyphs and hieratic), rather than with the monumental hieroglyphic texts (Williams 1972: 219). These monumental signs were the domain of the draftsman (seshkedu) and stonemason; we do not have evidence for their use by scribes in education. However, students learned writing while copying these texts again and again from a master copy or by dictation, starting with complete words, later analyzing the individual inherent signs (Janssen 2007: 66). This was based on the method of memorization: the learners would have known a set of texts by heart, depending on the specific profession to be taken on after their education.

There are mistakes in some of the texts, which can be only explained as mnemonic lapses (Brunner 1957: 72). Knowing the right texts showed the students the correct form of letter writing, with all the important formulas as well as the right grammar and orthography. However, if we look at the poor quality of some school texts, we have to admit that grammar did not seem to have the highest priority. The exercises were written on very cheap and readily available ostraca: stone flakes or potsherds. More experienced students used writing boards: small wooden plaster-covered planks, sometimes with a hole in one corner for binding together with the writing equipment (Brunner 1957: 73–4). Expensive papyrus was only used by advanced students for final documents. Rhetoric was always valued, and good examples were given in the chosen manuscripts as instructions, teachings, religious texts, or the classical canon of Egyptian literature, which also supplied the proper moral qualities and ethics. Subjects taught also included mathematics, needed for bookkeeping, and geography, knowledge of which might have been handy for dealing with foreign affairs (Szpakowska 2008: 107).

We have no evidence for teaching foreign languages, but at the very least scribes in Amarna must have been able to read and

write in cuneiform and presumably must have learned this skill in a formal setting. Students were "encouraged" by punishment (Brunner 1957: 56–9), as it is written in P. Anastasi III 3/13: "the ears of a boy are on his back," or as in the above-mentioned Satire on the trades, which makes propaganda for the scribal profession: "I have seen many beatings –/ Set your heart on books!" (Stanza 2; Foster 1999: 121). A very popular school text in Deir El-Medina was the Kemyt ("the compilation"), which is even quoted in the aforesaid Satire on the trades. These New Kingdom examples of a Middle Egyptian composition, copying a hieratic used at the beginning of the Middle Kingdom, were designed to introduce an apprentice to idioms, forms of writings, letter formulae and word spellings (Wente 1990: 15–17, Williams 1972: 217).

Chapter 2: The Old Greek Education

I. GREECE AND ITS PEOPLE

THE LAND:

Ancient Greece, or Hellas as the Greeks called their homeland, was but a small country. The map given below shows the Aegean world superimposed on the States of the old Northwest Territory, from which it may be seen that the Greek mainland was a little less than half as large as the State of Illinois. Greece proper was about the size of the State of West Virginia, but it was a much more mountainous land. No spot in Greece was over forty miles from the sea. Attica, where a most wonderful intellectual life arose and flourished for centuries, and whose contributions to civilization were the chief glory of Greece, was smaller than two average−size Illinois counties, and about two thirds the size of the little State of Rhode Island. [1] The country was sparsely populated, except in a few of the City−States, and probably did not, at its most prosperous period, contain much more than a million and a half of people citizens, foreigners, and slaves included.

The land was rough and mountainous, and deeply indented by the sea. The climate and vegetation were not greatly unlike the climate and vegetation of Southern California. Pine and fir on the mountain−slopes, and figs, olives, oranges, lemons, and grapes on the hillsides and plains below, were characteristic of the land. Fishing, agriculture, and the raising of cattle and sheep were the important industries. A temperate, bracing climate, short, mild winters, and a long, dry summer gave an opportunity for the development of this wonderful civilization. Like Southern California or Florida in winter, it was essentially an out−of−doors country. The high mountains to the rear, the sun−steeped skies, and the brilliant sea in front were alike the beauty of the land and the inspiration of the people. Especially was this true of Attica, which had the seashore, the plain, the high mountains, and

everywhere magnificent views through an atmosphere of remarkable clearness. A land of incomparable beauty and charm, it is little wonder that the Greek citizen, and the Athenian in particular, took pride in and loved his country, and was willing to spend much time in preparing himself to govern and defend it.

THE GOVERNMENT:

Politically, Greece was composed of a number of independent City−States of small size. They had been settled by early tribes, which originally held the land in common. Attica, with its approximately seven hundred square miles of territory, was an average−size City−State. The central city, the surrounding farming and grazing lands, and the coastal regions all taken together, formed the State, the citizens of which city−residents, farmers, herdsmen, and fishermen controlled the government. There were in all some twenty of these City−States in mainland Greece, the most important of which were Attica, of which Athens was the central city; Laconia, of which Sparta was the central city; and Boeotia, of which Thebes was the central city. Some of the States developed democracies, of which class Athens became the most notable example, while some were governed as oligarchies. Of all the different States but few played any conspicuous part in the history of Greece. Of these few Attica stands clearly above them all as the leader in thought and art and the most progressive in government. Here, truly, was a most wonderful people, and it is with Attica that the student of the history of education is most concerned. The best of all Greece was there.

The little City−States of Greece, as has just been said, were independent States, just like modern nations. While all the Greeks regarded themselves as tribes of a single family, descended from a common ancestor, Hellen, and the bonds of a common race, language, and religion tended to unite them into a sort of brotherhood, the different City−States were held apart by their tribal origins, by narrow political sympathies, and by petty laws.

A citizen of one city, for example, was an alien in another, and could not hold property or marry in a city not his own. Such attitudes and laws were but natural, the time and age considered.

Sometimes, in case of great danger, as at the time of the Persian invasions (492−479 B.C.), a number of the States would combine to form a defensive league; at other times they made war on one another. The federal principle, such as we know it in the United States in our state and national governments, never came into play. At different times Athens, Sparta, and Thebes aspired to the leadership of Greece and tried to unite the little States into a Hellenic Nation, but the mutual jealousies and the extreme individualism of the people, coupled with the isolation of the States and the difficulties of intercommunication through the mountain passes, stood in the way of any permanent union. What Rome later accomplished with relative ease and on a large scale, Greece was unable to do on even a small scale. A lack of capacity to unite for cooperative undertakings seemed to be a fatal weakness of the Greek character.

THE PEOPLE:

The Greeks were among the first of the European peoples to attain to any high degree of civilization. Their story runs back almost to the dawn of recorded history. As early as 3500 B.C. they were in an advanced stone age, and by 2500 B.C. had reached the age of bronze. The destruction of Homer's Troy dates back to 1200 B.C., and the Homeric poems to 1100 B.C., while an earlier Troy (Schliemann's second city) goes back to 2400 B.C. This history concerns the mainland of Asia Minor. By 1000 B.C. the southern peninsula of Greece had been colonized, between 900 and 800 B.C. Attica and other portions of upper Greece had been settled, and by 650 B.C. Greek colonization had extended to many parts of the Mediterranean.

The lower part of the Greek peninsula, known as Laconia, was settled by the Dorian branch of the Greek family, a practical,

forceful, but a wholly unimaginative people. Sparta was their most important city. To the north were the Ionic Greeks, a many−sided and a highly imaginative people. Athens was their chief city. In the settlement of Laconia the Spartans imposed themselves as an army of occupation on the original inhabitants, whom they compelled to pay tribute to them, and established a military monarchy in southern Greece. The people of Attica, on the other hand, absorbed into their own body the few earlier settlers of the Attic plain. They also established a monarchy, but, being a people more capable of progress, this later evolved into a democracy. The people of Attica were in consequence a somewhat mixed race, which possibly in part accounts for their greater intellectual ability and versatility.

It accounts, though, only in part. Climate, beautiful surroundings, and contact with the outside world probably also contributed something, but the real basis underneath was the very superior quality of the people of Attica. In some way, just how we do not know, these people came to be endowed with a superior genius and the rather unusual ability to make those progressive changes in living and government which enabled them to make the most of their surroundings and opportunities, and to advance while others stood still. Far more than other Greeks, the people of Attica were imaginative, original, versatile, adaptable, progressive, endowed with rare mental ability, keenly sensitive to beauty in nature and art, and possessed of a wonderful sense of proportion and a capacity for moderation in all things. Only on such an assumption can we account for their marvelous achievements in art, philosophy, literature, and science at this very early period in the development of the civilization of the world.

CLASSES IN THE POPULATION:

Greece, as was the ancient world in general, was built politically on the dominant power of a ruling class. In consequence, all of course could not become citizens of the State,

even after a democracy had been evolved. Citizenship came with birth and proper education, and, before 509 B.C., foreigners were seldom admitted to privileges in the State. Only a male citizen might hold office, protect himself in the courts, own land, or attend the public assemblies. Only a citizen, too, could participate in the religious festivals and rites, for religion was an affair of the ruling families of the State. In consequence, family, religion, and citizenship were all bound up together, and education and training were chiefly for citizenship and religious (moral) ends.

Even more, citizenship everywhere in the earlier period was a degree to be attained to only after proper education and preliminary military and political training. This not only made some form of education necessary, but confined educational advantages to male youths of proper birth. There was of course no purpose in educating any others. Education in Greece was essentially the education of the children of the ruling class to perpetuate the rule of that class.

Attica almost alone among the Greek States adopted anything approaching a liberal attitude toward the foreign−born; in Sparta, and generally elsewhere in Greece, they were looked upon with deep suspicion. As a result, most of the foreign residents of Greece were to be found in Athens, or its neighboring port city (the Piraeus), attracted there by the hospitality of the people and the intellectual or commercial advantages of these cities. After Athens had become the center of world thought, many foreigners took up their residence in the city because of the importance of its intellectual life. Foreigners, though, they remained up to 509 B.C. Only rarely before this date, and then only for some conspicuous act of patriotism, and by special vote of the citizens, was a foreigner admitted to citizenship. Unlike Rome, which received those of alien birth freely into its citizenship, and opened up to them large opportunities of every kind, the Greeks persistently refused to assimilate the foreign−born. Regarding themselves as a superior people,

descended from the gods, they held themselves apart rather exclusively as above other peoples. This kept the blood pure, but, from the standpoint of world usefulness, it was a serious defect in Greek life.

Beneath both citizens and foreign residents was a great foundation mass of working slaves, who rendered all types of menial and intellectual services. Sailors, household servants, field workers, clerks in shops and offices, accountants, and pedagogues were among the more common occupations of slaves in Greece. Many of these had been citizens and learned men of other City−States or countries, but had been carried off as captives in some war. This was a common practice in the ancient world, slavery being the lot of alien conquered people almost without exception. The composition of Attica, just before the outbreak of the Peloponnesian War (431 B.C.) is shown in Figure 4. The great number of slaves and foreigners is clearly seen, even though the citizenship had by this time been greatly extended. In Sparta and in other City−States somewhat similar conditions prevailed as to numbers but there the slaves (Helots) occupied a lower status than in Athens, being in reality serfs, tied to and being sold with the land, and having no rights which a citizen was bound to respect.

Education, then, being only for the male children of citizens, and citizenship a degree to be attained to on the basis of education and training, let us next see in what that education consisted, and what were its most prominent characteristics and results.

II. EARLY EDUCATION IN GREECE

Some form of education that would train the son of the citizen for participation in the religious observances and duties of a citizen of the State, and would prepare the State for defense against outward enemies, was everywhere in Greece recognized as a public necessity, though its provision, nature, and extent varied in the different City−States. We have clear information

only as to Sparta and Athens, and will consider only these two as types. Sparta is interesting as representing the old Greek tribal training, from which Sparta never progressed. Many of the other Greek City−States probably maintained a system of training much like that of Sparta. Such educational systems stand as undesirable examples of extreme state socialism, contributed little to our western civilization, and need not detain us long. It was Athens, and a few other City−States which followed her example, which presented the best of Greece and passed on to the modern world what was most valuable for civilization.

1- Education in Sparta

THE PEOPLE:

The system of training which was maintained in Sparta was in part a reflection of the character of the people, and in part a result of its geographical location. A warlike people by nature, the Spartans were for long regarded as the ablest fighters in Greece. Laconia, their home, was a plain surrounded by mountains. They represented but a small percentage of the total population, which they held in subjection to them by their military power. The slaves (Helots) were often troublesome, and were held in check by many kinds of questionable practices. Education for citizenship with the Spartans meant education for usefulness in an intensely military State, where preparedness was a prerequisite to safety. Strength, courage, endurance, cunning, patriotism, and obedience were the virtues most highly prized, while the humane, literary, and artistic sentiments were neglected. Aristotle well expressed it when he said that Sparta prepared and trained for war, and in peace rusted like a sword in its scabbard.

THE EDUCATIONAL SYSTEM:

At birth the child was examined by a council of elders, and if it did not appear to be a promising child it was exposed to die in the mountains. If kept, the mother had charge of the child until seven if a boy, and still longer if a girl. At the beginning of the

eighth year, and until the boy reached the age of eighteen, he lived in a public barrack, where he was given little except physical drill and instruction in the Spartan virtues. His food and clothing were scant and his bed hard. Each older man was a teacher. Running, leaping, boxing, wrestling, military music, military drill, ball−playing, the use of the spear, fighting, stealing, and laconic speech and demeanor constituted the course of study. From eighteen to twenty was spent in professional training for war, and frequently the youth was publicly whipped to develop his courage and endurance. For the next ten years that is, until he was thirty years old, he was in the army at some frontier post. At thirty the young man was admitted to full citizenship and compelled to marry, though continuing to live at the public barrack and spending his energies in training boys. Women and girls were given gymnastic training to make them strong and capable of bearing strong children. The family was virtually suppressed in the interests of defense and war. The intellectual training consisted chiefly in committing to memory the Laws of Lycurgus, learning a few selections from Homer, and listening to the conversation of the older men.

As might naturally be supposed, Sparta contributed little of anything to art, literature, science, philosophy, or government. She left to the world some splendid examples of heroism, as for example the sacrifice of Leonidas and his Spartans to hold the pass at Thermopylae, and a warning example of the brutalizing effect on a people of excessive devotion to military training. It is a pleasure to turn from this dark picture to the wonderful (for the time) educational system that was gradually developed at Athens.

2-The old Athenian education:

SCHOOLS AND TEACHERS.

Athenian education divides itself naturally into two divisions the old Athenian training which prevailed up to about the time of the close of the Persian Wars (479 B.C.) and was an outgrowth of earlier tribal observances and practices, and later Athenian education, which characterized the period of maximum

greatness of Athens and afterward. We shall describe these briefly, in order.

The state military socialism of Sparta made no headway in more democratic Attica. The citizens were too individualistic, and did their own thinking too well to permit the establishment of any such plan. While education was a necessity for citizenship, and the degree could not be obtained without it, the State nevertheless left every citizen free to make his own arrangements for the education of his sons, or to omit such education if he saw fit. Only instruction in reading, writing, music, and gymnastics were required. If family pride, and the sense of obligation of a parent and a citizen were not sufficient to force the father to educate his son, the son was then by law freed from the necessity of supporting his father in his old age. The State supervised education, but did not establish it.

The teachers were private teachers, and derived their livelihood from fees. These naturally varied much with the kind of teacher and the wealth of the parent, much as private lessons in music or dancing do to−day. As was common in antiquity, the teachers occupied but a low social position, and only in the higher schools of Athens was their standing of any importance. Greek literature contains many passages which show the low social status of the schoolmaster. Schools were open from dawn to dark. The school discipline was severe, the rod being freely used both in the school and in the home. There were no Saturday and Sunday holidays or long vacations, such as we know, but about ninety festival and other state holidays served to break the continuity of instruction. The schoolrooms were provided by the teachers, and were wholly lacking in teaching equipment, in any modern sense of the term. However, but little was needed. The instruction was largely individual instruction, the boy coming, usually in charge of an old slave known as a pedagogue, to receive or recite his lessons. The teaching process was essentially a telling and a learning−by−heart procedure.

For the earlier years there were two schools which boys attended the music and literary school, and a school for physical training. Boys probably spent part of the day at one school and part at the other, though this is not certain. They may have attended the two schools on alternate days. From sixteen to eighteen, if his parents were able, the boy attended a state−supported gymnasium, where an advanced type of physical training was given. As this was preparatory for the next two years of army service, the gymnasia were supported by the State more as preparedness measures than as educational institutions, though they partook of the nature of both.

EARLY CHILDHOOD:

As at Sparta the infant was examined at birth, but the father, and not a council of citizens, decided whether or not it was to be exposed or preserved. Three ceremonies, of ancient tribal origin, marked the recognition and acceptance of the child. The first took place five days after birth, when the child was carried around the family hearth by the nurse, followed by the household in procession. This ceremony, followed by a feast, was designed to place the child forever under the care of the family gods. On the tenth day the child was named by the father, who then formally recognized the child as his own and committed himself to its rearing and education. The third ceremony took place at the autumn family festival, when all children born during the preceding year were presented to the father's clansmen, who decided, by vote, whether or not the boy or girl was the legitimate and lawful child of Athenian parents. If approved, the child's name was entered on the registry of the clan, and he might then aspire to citizenship and inherit property from his parent.

Up to the age of seven both boys and girls grew up together in the home, under the care of the nurse and mother, engaging in much the same games and sports as do children anywhere. From the first they were carefully disciplined for good behavior and for the establishment of self−control. After the age of seven the boy

and girl parted company in the matter of their education, the girl remaining closely secluded in the home (women and children were usually confined to the upper floor of the house) and being instructed in the household arts by her mother, while the boy went to different teachers for his education. Probably many girls learned to read and write from their mothers or nurses, and the daughters of well− to−do citizens learned to spin, weave, sew, and embroider. Music was also a common accomplishment of women.

THE SCHOOL OF THE GRAMMATIST:

A Greek boy, unlike a modern school child, did not go to one teacher. Instead, he had at least two teachers, and sometimes three. To the grammatist, who was doubtless an evolution from an earlier tribal scribe, he went to learn to read and write and count. The grammatist represented the earliest or primary teacher. To the music teacher, who probably at first taught reading and writing also, he went for his instruction in music and literature. Finally, to the palaestra he went for instruction in physical training.

Reading was taught by first learning the letters, then syllables, and finally words. Plaques of baked earth, on which the alphabet was written, like the more modern horn−book, were frequently used. The ease with which modern children learn to read was unknown in Greece. Reading was very difficult to learn, as accentuation, punctuation, spacing between words, and small letters had not as yet been introduced. As a result, the study required much time, and much personal ingenuity had to be exercised in determining the meaning of a sentence. The Athenian accent, too, was hard to acquire.

The pupil learned to write by first tracing, with the stylus, letters cut in wax tablets, and later by copying exercises set for him by his teacher, using the wax tablet and writing on his knee. Still later the pupil learned to write with ink on papyrus or parchment, though, due to the cost of parchment in ancient times,

this was not greatly used. Slates and paper were of course unknown in Greece. There was little need for arithmetic, and but little was taught. Arithmetic such as we teach would have been impossible with their cumbrous system of notation. Only the elements of counting were taught, the Greek using his fingers or a counting−board, such as is shown in Figure 8, to do his simple reckoning.

GREAT IMPORTANCE OF READING AND LITERATURE:

After the pupil had learned to read, much attention was given to accentuation and articulation, in order to secure beautiful reading. Still more, in reading or reciting, the parts were acted out. The Greeks were a nation of actors, and the recitations in the schools and the acting in the theaters gave plenty of opportunity for expression. There were no schoolbooks, as we know them. The master dictated and the pupils wrote down, or, not uncommonly, learned by heart what the master dictated. Ink and parchment were now used, the boy making his own schoolbooks. Homer was the first and the great reading book of the Greeks, the Iliad and the Odyssey being the Bible of the Greek people. Then followed Hesiod, Theognis, the Greek poets, and the fables of Aesop. Reading, declamation, and music were closely interrelated. To appeal to the emotions and to stir the will along moral and civic lines was a fundamental purpose of the instruction. A modern writer well characterizes the ancient instruction in literature in the following words:

By making the works of the great poets of the Greek people the material of their education, the Athenians attained a variety of objects difficult of attainment by any other one means. The fact is, the ancient poetry of Greece, with its finished form, its heroic tales and characters, its accounts of peoples far removed in time and space, its manliness and pathos, its directness and simplicity, its piety and wisdom, its respect for law and order, combined with its admiration for personal initiative and worth, furnished, in the

hands of a careful and genial teacher, a material for a complete education such as could not well be matched even in our own day. What instruction in ethics, politics, social life, and manly bearing could not find a fitting vehicle in the Homeric poems, not to speak of the geography, the grammar, the literary criticism, and the history which the comprehension of them involved? Into what a wholesome, unsentimental, free world did these poems introduce the imaginative Greek boy! What splendid ideals of manhood and womanhood did they hold up for his admiration and imitation! From Hesiod he would learn all that he needed to know about his gods and their relation to him and his people. From the elegiac poets he would derive a fund of political and social wisdom, and an impetus to patriotism, which would go far to make him a good man and a good citizen. From the iambic poets he would learn to express with energy his indignation at meanness, feebleness, wrong, and tyranny, while from the lyric poets he would learn the language suitable to every genial feeling and impulse of the human heart. And in reciting or singing all these, how would his power of terse, idiomatic expression, his sense of poetic beauty and his ear for rhythm and music be developed! With what a treasure of examples of every virtue and vice, and with what a fund of epigrammatic expression would his memory be furnished! How familiar he would be with the character and ideals of his nation, how deeply in sympathy with them! And all this was possible even before the introduction of letters. With this event a new era in education begins. The boy now not only learns and declaims his Homer, and sings his Simonides or Sappho; he learns also to write down their verses from dictation, and so at once to read and to write. This, indeed, was the way in which these two (to us) fundamental arts were acquired. As soon as the boy could trace with his finger in sand, or scratch with a stylus on wax, the forms of the letters, and combine them into syllables and words, he began to write poetry from his master's dictation. The writing−lesson of to−day was the reading, recitation, or singing−lesson of to−morrow. Every boy made his own reading

book, and, if he found it illegible, and stumbled in reading, he had only himself to blame. The Greeks, and especially the Athenians, laid the greatest stress on reading well, reciting well, and singing well, and the youth who could not do all three was looked upon as uncultured. Nor could he hide his want of culture, since young men were continually called upon, both at home and at more or less public gatherings, to perform their part in the social entertainment.

THE MUSIC SCHOOL:

The teacher in this school gradually separated himself from the grammatist, and often the two were found in adjoining rooms in the same school. In his functions he succeeded the wandering poet or minstrel of earlier times. Music teachers were common in all the City− States of Greece. To this teacher the boy went at first to recite his poetry, and after the thirteenth year for a special music course. The teacher was known as a citharist, and the instrument usually used was the seven−stringed lyre. This resembled somewhat our modern guitar. The flute was also used somewhat, but never grew into much favor, partly because it tended to excite rather than soothe, and partly because of the contortions of the face to which its playing gave rise. Rhythm, melody, and the feeling for measure and time were important in instruction, whose office was to soothe, purge, and harmonize man within and make him fit for moral instruction through the poetry with which their music was ever associated. Instead of being a distinct art, as with us, and taught by itself, music with the Greeks was always subsidiary to the expression of the spirit of their literature, and in aim it was for moral−training ends. Both Aristotle and Plato advocate state control of school music to insure sound moral results. Inferior as their music was to present−day music, it exerted an influence over their lives which it is difficult for an American teacher to appreciate.

The first lessons taught the use of the instrument, and the simple chants of the religious services were learned. As soon as

the pupil knew how to play, the master taught him to render the works of the great lyric poets of Greece. Poetry and music together thus formed a single art. At thirteen a special music course began which lasted until sixteen, but which only the sons of the more well−to−do citizens attended. Every boy, though, learned some music, not that he might be a musician, but that he might be musical and able to perform his part at social gatherings and participate in the religious services of the State. Professional playing was left to slaves and foreigners, and was deemed unworthy a free man and a citizen. Professionalism in either music or athletics was regarded as disgraceful. The purpose of both activities was harmonious personal development, which the Greeks believed contributed to moral worth.

THE PALAESTRA; GYMNASTICS:

Very unlike our modern education, fully one half of a boy's school life, from eight to sixteen, was given to sports and games in another school under different teachers, known as the palaestra. The work began gradually, but by fifteen had taken precedence over other studies. As in music, harmonious physical development and moral ends were held to be of fundamental importance. The standards of success were far from our modern standards. To win the game was of little significance; the important thing was to do the part gracefully and, for the person concerned, well. To attain to a graceful and dignified carriage of the body, good physical health, perfect control of the temper, and to develop quickness of perception, self−possession, ease, and skill in the games were the aims not mere strength or athletic prowess. Only a few were allowed to train for participation in the Olympian games.

The work began with children's games, contests in running, and ball games of various kinds. Deportment how to get up, walk, sit, and how to achieve easy manners was taught by the masters. After the pupils came to be a little older there was a definite course of study, which included, in succession: (1) leaping and

jumping, for general bodily and lung development; (2) running contests, for agility and endurance; (3) throwing the discus, for arm exercise; (4) casting the javelin, for bodily poise and coordination of movement, as well as for future use in hunting; (5) boxing and wrestling, for quickness, agility, endurance, and the control of the temper and passions. Swimming and dancing were also included for all, dancing being a slow and graceful movement of the body to music, to develop grace of motion and beauty of form, and to exercise the whole human being, body and soul.

The minuet and some of our folk− dancing are our nearest approach to the Greek type of dancing, though still not like it. The modern partner dance was unknown in ancient Greece. The exercises were performed in classes, or in small groups. They took place in the open air, and on a dirt or sandy floor. They were accompanied by music usually the flute, played by a paid performer. A number of teachers looked after the boys, examining them physically, supervising the exercises, directing the work, and giving various forms of instruction.

THE GYMNASIAL TRAINING, SIXTEEN TO EIGHTEEN:

Up to this point the education provided was a private and a family affair. In the home and in the school the boy had now been trained to be a gentleman, to revere the gods, to be moral and upright according to Greek standards, and in addition he had been given that training in reading, writing, music, and athletic exercises that the State required parents to furnish. It is certain that many boys, whose parents could ill afford further expense for schooling, were allowed to quit the schools at from thirteen to fifteen. Those who expected to become full citizens, however, and to be a part of the government and hold office, were required to continue until twenty years of age. Two years more were spent in schooling, largely athletic, and two years additional in military service. Of this additional training, if his parents chose and could

afford it, the State now took control.

For the years from sixteen to eighteen the boy attended a state gymnasium, of which two were erected outside of Athens by the State, in groves of trees, in 590 B.C. Others were erected later in other parts of Greece. Figure 11 shows the ground plan of one of these gymnasia, and a study of the explanation of the plan will reveal the nature of these establishments. The boy now had for teachers a number of gymnasts of ability. The old exercises of the palaestra were continued, but running, wrestling, and boxing were much emphasized. The youth learned to run in armor, while wrestling and boxing became more severe. He also learned to ride a horse, to drive a chariot, to sing and dance in the public choruses, and to participate in the public state and religious processions.

Still more, the youth now passed from the supervision of a family pedagogue to the supervision of the State. For the first time in his life, he was now free to go where he desired about the city; to frequent the streets, market−place, and theater; to listen to debates and jury trials, and to witness the great games; and to mix with men in the streets and to mingle somewhat in public affairs. He saw little of girls, except his sisters, but formed deep friendships with other young men of his age. Aside from a requirement that he learn the laws of the State, his education during this period was entirely physical and civic. If he abused his liberty, he was taken in hand by public officials charged with the supervision of public morals. He was, however, still regarded as a minor, and his father (or guardian) was held responsible for his public behavior.

THE CITIZEN−CADET YEARS, EIGHTEEN TO TWENTY:

The supervision of the State during the preceding two years had in a way been joint with that of his father; now the State took complete control. At the age of eighteen his father took him before the proper authorities of his district or ward in the city, and

presented him as a candidate for citizenship. He was examined morally and physically, and if sound, and if the records showed that he was the legitimate son of a citizen, his name was entered on the register of his ward as a prospective member of it. His long hair was now cut, he donned the black garb of the citizen, was presented to the people along with others at a public ceremony, was publicly armed with a spear and a shield, and then, proceeding to one of the shrines of the city, on a height overlooking it, he solemnly took the Ephebic oath.

He was now an Ephebos, or citizen−cadet, with still two years of severe training ahead of him before he could take up the full duties of citizenship. The first year he spent in and near Athens, learning to be a soldier. He did what recruits do almost everywhere drill, camp in the open, learn the army methods and discipline, and march in public processions and take part in religious festivals. This first year was much like that of new troops in camp being worked into real soldiers. At the end of the year there was a public drill and inspection of the cadets, after which they were sent to the frontier. It was now his business to come to know his country thoroughly its topography, roads, springs, seashores, and mountain passes. He also assisted in enforcing law and order throughout the country districts, as a sort of state constabulary or rural police. At the end of this second year of practical training the second examination was held, the cadet was now admitted to full citizenship, and passed to the ranks of a trained citizen in the reserve army of defense, as does a boy in Switzerland to−day.

RESULTS UNDER THE OLD GREEK SYSTEM:

Such was the educational system which was in time evolved from the earlier tribal practices of the citizens of old Athens. If we consider Sparta as representing the earlier tribal education of the Greek peoples, we see how far the Athenians, due to their wonderful ability to make progress, were able to advance beyond this earlier type of preparation for citizenship.

Not only did Athens surpass all Greece, but, for the first time in the history of the world, we find here, expressing itself in the education of the young, the modern western, individualistic and democratic spirit, as opposed to the deadening caste and governmental systems of the East. Here first we find a free people living under political conditions which favored liberty, culture, and intellectual growth, and using their liberty to advance the culture and the knowledge of the people.

Here also we find, for the first time, the thinkers of the State deeply concerned with the education of the youth of the State, and viewing education as a necessity to make life worth living and secure the State from dangers, both within and without. To prepare men by a severe but simple and honest training to fear the gods, to do honest work, to despise comfort and vice, to obey the laws, to respect their neighbors and themselves, and to reverence the wisdom of their race, was the aim of this old education. The schooling for citizenship was rigid, almost puritanical, but it produced wonderful results, both in peace and in war. Men thus trained guided the destinies of Athens during some two centuries, and the despotism of the East as represented by Persia could not defeat them at Marathon, Salamis, and Plataea.

THE SIMPLE AND EFFECTIVE CURRICULUM:

The simplicity of the curriculum was one of its marked features. In a manner seldom witnessed in the world's educational history, the Greeks used their religion, literature, government, and the natural activities of young men to impart an education of wonderful effectiveness. The subjects we have valued so highly for training were to them unknown. They taught no arithmetic or grammar, no science, no drawing, no higher mathematics, and no foreign tongue. Music, the literature and religion of their own people, careful physical training, and instruction in the duties and practices of citizenship constituted the entire curriculum.

It was an education by doing; not one of learning from books. That it was an attractive type of education there is

abundant testimony by the Greeks themselves. We have not as yet come to value physical education as did the Greeks, nor are we nearly so successful in our moral education, despite the aid of the Christian religion which they did not know. It was, to be sure, class education, and limited to but a small fraction of the total population. In it girls had no share. There were many features of Greek life, too, that are repugnant to modern conceptions. Yet, despite these limitations, the old education of Athens still stands as one of the most successful in its results of any system of education which has been evolved in the history of the world. Considering its time and place in the history of the world and that it was a development for which there were nowhere any precedents, it represented a very wonderful evolution.

Chapter 3: Education During the Early Middle Ages

I. CONDITION AND PRESERVATION OF LEARNING: THE LOW INTELLECTUAL LEVEL:

As was stated in the preceding chapter, the lamp of learning burned low throughout the most of Western Europe during the period of assimilation and partial civilization of the barbarian tribes. The western portion of the Roman Empire had been overrun, and rude Germanic chieftains were establishing, by the law of might, new kingdoms on the ruins of the old. The

Germanic tribes had no intellectual life of their own to contribute, and no intellectual tastes to be ministered unto. With the destruction of cities and towns and country villas, with their artistic and literary collections, much that represented the old culture was obliterated, and books became more and more scarce. The destruction was gradual, but by the beginning of the seventh century the loss had become great. The Roman schools also gradually died out as the need for an education which prepared for government and gave knowledge of Roman law passed away, and the type of education approved by the Church was left in complete control of the field. As the security and leisure needed for study disappeared, and as the only use for learning was now in the service of the Church, education became limited to the narrow lines which offered such preparation and to the few who needed it. Amid the ruins of the ancient civilization the Church stood as the only conservative and regenerative force, and naturally what learning remained passed into its hands and under its control.

The result of all these influences and happenings was that by the beginning of the seventh century Christian Europe had reached a very low intellectual level, and during the seventh and eighth centuries conditions grew worse instead of better. Only in England and Ireland, as will be pointed out a little later, and in a few Italian cities, was there anything of consequence of the old Roman learning preserved. On the Continent there was little general learning, even among the clergy. Many of the priests were woefully ignorant, and the Latin writings of the time contain many inaccuracies and corruptions which reveal the low standard of learning even among the better educated of the clerical class. The Church itself was seriously affected by the prevailing ignorance of the period and incorporated into its system of government and worship many barbarous customs and practices of which it was a long time in ridding itself. So great had become the ignorance and superstition of the time, among priests, monks, and the people; so much had religion taken on the worship of

saints and relics and shrines; and so much had the Church developed the sensuous and symbolic, that religion had in reality become a crude polytheism instead of the simple monotheistic faith of the early Church.

Along scientific lines especially the loss was very great. Scientific ideas as to natural phenomena disappeared, and crude and childish ideas as to natural forces came to prevail. As if barbarian chiefs and robber bands were not enough, popular imagination peopled the world with demons, goblins, and dragons, and all sorts of superstitions and supernatural happenings were recorded. Intercommunication largely ceased; trade and commerce died out; the accumulated wealth of the past was destroyed; and the old knowledge of the known world became badly distorted, as is evidenced by the many crudes' mediaeval maps. The only scholarship of the time, if such it might be called, was the little needed by the Church to provide for and maintain its government and worship. Almost everything that we to−day mean by civilization in that age was found within the protecting walls of monastery or church, and these institutions were at first too busy building up the foundations upon which a future culture might rest to spend much time in preserving learning, much less in advancing it.

THE MONASTERIES DEVELOP SCHOOLS:

In this age of perpetual lawlessness and disorder the one opportunity for a life of repose and scholarly contemplation lay in the monasteries. Here the rule of might and force was absent, and the timid, the devout, and the studiously inclined here found a refuge from the turbulence and brutality of a rude civilization. The early monasteries, and especially the monastery of Saint Victor, at Marseilles, founded by Cassian in 404, had represented a culmination of the western feeling of antagonism to all ancient learning, but with the founding of Monte Cassino by Saint Benedict, in 529 A.D., and the promulgation of the Benedictine rule, a more liberal attitude was shown. This rule was adopted

generally by the monasteries throughout what is now Italy, Spain, France, Germany, and England, and the Benedictine became the type for the monks of the early Middle Ages. To this order we are largely indebted for the copying of books and the preservation of learning throughout the mediaeval period.

The 48th rule of Saint Benedict, it will be remembered, had imposed reading and study as a part of the daily duty of every monk, but had said nothing about schools. Subsequent regulations issued by superiors had aimed at the better enforcement of this rule, that the monks might lead devout lives and know the Bible and the sacred writings of the Church. Imposed at first as a matter of education and discipline for the monks, this rule ultimately led to the establishment of schools and the development of a system of monastic instruction. As youths were received at an early age into the monasteries to prepare for a monastic life, it was necessary that they be taught to read if they were later to use the sacred books. This led to the duty of instructing novices, which marks the beginning of monastic instruction for those within the walls. As books were scarce and at the same time necessary, and the only way to get new ones was to copy from old ones, the monasteries were soon led to take up the work once carried on by the publishing houses of ancient Rome, and in much the same way. This made writing necessary, and the novices had to be instructed carefully in this, as well as in reading. The chants and music of the Church called for instruction of the novices in music, and the celebration of Easter and the fast and festival days of the Church called for some rudimentary instruction in numbers and calculation.

Out of these needs rose the monastery school, the copying of manuscripts, and the preservation of books. Due to their greater security and quiet the monasteries became the leading teaching institutions of the early part of the Middle−Age period, and those who wished their children trained for the service of the Church gave them to the monasteries. The development of the

monastic schools was largely voluntary, though from an early date bishops and rulers began urging the monasteries to open schools for boys in connection with their houses, and schools became in time a regular feature of the monastic organization. From schools only for those intending to take the vows (oblati), the instruction was gradually opened, after the ninth century, to others (externi) not intending to take the vows, and what came to be known as outer monastic schools were in time developed.

The monasteries became the preservers of learning. Another need developed the copying of pagan books, and incidentally the preservation of some of the best of Roman literature. The language of the Church very naturally was Latin, as it was a direct descendant of Roman life, governmental organization, citizenship, and education. The writings of the Fathers of the Western Church had all been in Latin, and in the fourth century the Bible had been translated from the Greek into the Latin. This edition, known as the Vulgate Bible, became the standard for Western Europe for ten centuries to come. The German tribes which had invaded the Empire had no written languages of their own, and their spoken dialects differed much from the Latin speech of those whom they had conquered. Latin was thus the language of all those of education, and naturally continued as the language of the Church and the monastery for both speech and writing. All books were, of course, written in Latin.

Under the rude influences and the general ignorance of the period, though, the language was easily and rapidly corrupted, and it became necessary for the monasteries and the churches to have good models of Latin prose and verse to refer to. These were best found in the old Latin literary authors particularly Caesar, Cicero, and Vergil. To have these, due to the great destruction of old books which had taken place during the intervening centuries, it was necessary to copy these authors, as well as the Psalter, the Missal, the sacred books, and the writings of the Fathers of the

Church. It thus happened that the monasteries unintentionally began to preserve and use the ancient Roman books, and from using them at first as models for style, an interest in their contents was later awakened. While many of the monasteries remained as farming, charitable, and ascetic institutions almost exclusively, and were never noted for their educational work, a small but increasing number gradually accumulated libraries and became celebrated for their literary activity and for the character of their instruction. The monasteries thus in time became the storehouses of learning, the publishing houses of the Middle Ages.

THE COPYING OF MANUSCRIPTS:

The work of the more important monasteries and the monastic churches in copying books was a service to learning of large future significance. While many of the books copied were for the promotion of the religious service, such as Missals and Psalters, and many others were tales of saints and wearisome comments on the sacred writings, a few were old classical texts representing the best of Roman literary work. A few monastic chronicles and histories of importance were composed by the brothers, and also preserved for us by the copying process.

The production of a single book was a task of large proportions, and explains in part the small number of volumes the monasteries accumulated. After the raids of the Mohammedans across Egypt, in the seventh century, the supply of Egyptian papyrus stopped because of the interruption of communications, and the only writing material during the Middle Ages was the skin of sheep or goats or calves. Sheepskins were chiefly used, and a book of size might require a hundred or more skins. These were first soaked in limewater to loosen the hair, then scraped clean of hair and flesh, and then carefully stretched on board frames to dry. After they had dried they were again scraped with sharp knives to secure an even thickness, and then rubbed smooth with pumice and chalk. When finished, the clean, shining, cream−colored skin was known as vellum, or parchment. This

was next cut into pages of the desired size and arranged ready for writing. The larger pieces were used for large books, such as are shown in Plate 2, and the remnants to produce small books. The inks, too, had to be prepared, and the pages ruled.

The main writing was done with black, but the page was frequently bordered with red, gold, or some other bright color, while many beautiful illustrations were inserted by artistic monks. Sometimes an initial letter was beautifully embellished; sometimes illustrations were introduced in the body of the page; and sometimes a colored illustration was painted on a sheet of vellum and inserted in the book. Finally, when completed, the lettered and illustrated parchment sheets were arranged in order, sewed together with a deerskin or pigskin string, bound together between oaken boards and covered with pigskin, properly lettered in gold, fitted with metal corners and clasps, as shown in Plate 2, and often chained to their bookrack in the library with heavy iron chains as well. Still further to protect the volume from theft, an anathema against the thief was usually lettered in the volume.

Such was the painfully slow method of producing and multiplying books before the advent of printing, and in days when skill in copying manuscripts was not particularly common, even among the monks. It required from a few months to a year or more to produce a few copies, depending on the size and nature of the work, whereas to−day, with printing presses, five thousand copies of such a book as this can be printed and bound in a few days.

THE SCRIPTORIUM:

An important part of the material equipment of many monasteries, in consequence, came to be a scriptorium, or writing room, where the copying of manuscripts could take place undisturbed. In some monasteries one general room was provided, though it was customary to have a number of small rooms at the side of the library. In the monastery shown in Figure 38, seven small rooms for this purpose are shown built out on one

side of the library. Sometimes individual cells along a corridor were provided. The advantage of the single room in which a number of monks worked came when an edition of eight or ten copies of a book was to be prepared. One monk could then dictate, while eight or ten others carefully printed on the skins before them what was dictated by the reader, though here he is copying from a book before him. After an edition of eight or ten copies of a book had been prepared and bound the extra copies were sent to neighboring and sometimes distant monasteries, sometimes in exchange for other books, and sometimes as gifts to brothers who had longed to read the work. New monasteries were provided with the beginnings of a library in this way, and churches were supplied with Missals, Psalters, and other books needed for their services.

The writing room, or rooms, came to be a very important place in those monasteries noted for their literary activity. West gives an interesting description of the scriptorium at Tours, where the learned English monk, Alcuin, was Abbot from 796 to 804, and which at the time was the principal book−writing monastery in Frankland.

MONASTIC COLLECTION:

Despite the important work done by a few of the monasteries in preserving and advancing learning, large collections of books were unknown before the Revival of Learning, in the fourteenth century. The process of book production in itself was very slow, and many of the volumes produced were later lost through fire, or pillage by new invaders. During the early days of wood construction, a number of monastic and church libraries were burned by accident. In the pillaging of the Danes and Northmen on the coasts of England and northern France, in the ninth and tenth centuries, a number of important monastic collections there were lost. In Italy the Lombards destroyed some collections in their sixth−century invasion, and the Saracens burned some in southern Italy in the

ninth. Monte Cassino, among other monasteries, was destroyed by both the Lombards and the Saracens. From a number of extant catalogues of old monastic libraries we know that, even as late as the thirteenth and fourteenth centuries, a library of from two to three hundred volumes was large. The catalogues show that most of these were books of a religious nature, being monastic chronicles, manuals of devotion, comments on the Scriptures, lives of miracle working saints, and books of a similar nature. A few were commentaries on the ancient learning, or mediaeval textbooks on the great subjects of study of the time. A still smaller number were copies of old classical literary works, and of the utmost value.

THE CONVENTS AND THEIR SCHOOLS:

The early part of the Middle Ages also witnessed a remarkable development of convents for women, these receiving a special development in Germanic lands. Filled with the same aggressive spirit as the men, but softened somewhat by Christianity, many women of high station among the German tribes founded convents and developed institutions of much renown. This provided a rather superior class of women as organizers and directors, and a conventual life continued, throughout the entire Middle Ages, to attract an excellent class of women. This will be understood when it is remembered that a conventual life offered to women of intellectual ability and scholarly tastes the one opportunity for an education and a life of learning.

The convents, too, were much earlier and much more extensively opened for instruction to those not intending to take the vows than was the case with the monasteries, and, in consequence, it became a common practice throughout the Middle Ages, just as it is to−day among Catholic families, to send girls to the convent for education and for training in manners and religion. Many well−trained women were produced in the

convents of Europe in the period from the sixth to the thirteenth centuries.

The instruction consisted of reading, writing, and copying Latin, as in the monasteries, as well as music, weaving and spinning, and needlework. Weaving and spinning had an obvious utilitarian purpose, and needlework, in addition to necessary sewing, was especially useful in the production of altar−cloths and sacred vestments. The copying and illuminating of manuscripts, music, and embroidering made a special appeal to women, and some of the most beautifully copied and illuminated manuscripts of the mediaeval period are products of their skill. Their contribution to music and art, as it influenced the life of the time, was also large. The convent schools reached their highest development about the middle of the thirteenth century, after which they began to decline in importance.

THE RISE OF THE UNIVERSITIES

EVOLUTION OF THE STUDIUM GENERALE:

In the preceding chapter we described briefly the new movement toward association which characterized the eleventh and the twelfth centuries the municipal movement, the merchant guilds, the trade guilds, etc. These were doing for civil life what monasticism had earlier done for the religious life. They were collections of like-minded men, who united themselves into associations or guilds for mutual benefit, protection, advancement, and self−government within the limits of their city, business, trade, or occupation. This tendency toward association, in the days when state government was weak or in its infancy, was one of the marked features of the transition time from the early period of the Middle Ages, when the Church was virtually the State, to the later period of the Middle Ages, when the authority of the Church in secular matters was beginning to weaken, modern nations were beginning to form, and an interest in worldly affairs was beginning to replace the previous inordinate interest in the world to come.

We also noted in the preceding chapters that certain cathedral and monastery schools, but especially the cathedral schools, stimulated by the new interest in Dialectic, were developing into much more than local teaching institutions designed to afford a supply of priests of some little education for the parishes of the bishopric. Once York and later Canterbury, in England, had had teachers who attracted students from other bishoprics. Paris had for long been a famous center for the study of the Liberal Arts and of Theology. Saint Gall had become noted for its music. Theologians coming from Paris (1167−68) had given a new impetus to study among the monks at Oxford. A series of political events in northern Italy had given emphasis to the study of law in many cities, and the Moslems in Spain had stimulated the schools there and in southern France to a study of medicine and Aristotelian science. Rome was for long a noted center for study. Gradually these places came to be known as studia publica, or studia generalia, meaning by this a generally recognized place of study, where lectures were open to anyone, to students of all countries and of all conditions. Traveling students came to these places from afar to hear some noted teacher read and comment on the famous textbooks of the time.

From the first both teachers and students had been considered as members of the clergy, and hence had enjoyed the privileges and immunities extended to that class, but, now that the students were becoming so numerous and were traveling so far, some additional grant of protection was felt to be desirable. Accordingly, the Emperor Frederick Barbarossa, in 1158, issued a general proclamation of privileges and protection. In this he ordered those teachers and student traveling to the places in which the studies are carried on should be protected from unjust arrest, should be permitted to dwell in security, and in case of suit should be tried before their professors or the bishop of the city. This document marks the beginning of a long series of rights and privileges granted to the teachers and students of the universities now in process of evolution in Western Europe.

THE UNIVERSITY EVOLUTION:

The development of a university out of a cathedral or some other form of school represented, in the Middle Ages, a long local evolution. Universities were not founded then as they are to− day. A teacher of some reputation drew around him a constantly increasing body of students. Other teachers of ability, finding a student body already there, also set up their chairs and began to teach. Other teachers and more students came. In this way a studium was created. About these teachers in time collected other university servants bedells, librarians, lower officials, preparers of parchment, scribes, illuminators of parchment, and others who serve it, as Count Rupert enumerated them in the Charter of Foundation granted, in 1386, to Heidelberg. At Salerno, medical instruction arose around the work of Constantine of Carthage and the medicinal springs found in the vicinity. Students journeyed there from many lands, and licenses to practice the medical art were granted there as early as 1137. At Bologna, the work of Irnerius and Gratian early made this a great center for the study of civil and canon law, and their pupils spread the taste for these new subjects throughout Europe. Paris for two centuries had been a center for the study of the Arts and of Theology, and a succession of famous teachers William of Champeaux, Abelard, Peter the Lombard had taught there. So important was the theological teaching there that Paris has been termed the Sinai of instruction of the Middle Ages.

By the beginning of the thirteenth century both students and teachers had become so numerous, at a number of places in western Europe, that they began to adopt the favorite mediaeval practice and organized themselves into associations, or guilds, for further protection from extortion and oppression and for greater freedom from regulation by the Church. They now sought and obtained additional privileges for themselves, and, in particular, the great mediaeval document a charter of rights and privileges. As both teachers and students were for long regarded as clerici

the charters were usually sought from the Pope, but in some cases, they were obtained from the king. These associations of scholars, or teachers, or both, born of the need of companionship which men who cultivate their intelligence feel, sought to perform the same functions for those who studied and taught that the merchant and craft guilds were performing for their members. The ruling idea was association for protection, and to secure freedom for discussion and study; the obtaining of corporate rights and responsibilities; and the organization of a system of apprenticeship, based on study and developing through journeyman into mastership, as attested by an examination and the license to teach. In the rise of these teacher and student guilds we have the beginnings of the universities of western Europe, and their organization into chartered teaching groups was simply another phase of that great movement toward the association of like−minded men for worldly purposes which began to sweep over the rising cities in the eleventh and twelfth centuries.

The term universitas, or university, which came in time to be applied to these associations of masters and apprentices in study, was a general Roman legal term, practically equivalent to our modern word corporation. At first it was applied to any association, and when used with reference to teachers and scholars was so stated. Thus, in addressing the masters and students at Paris, Pope Innocent, in 1205, writes: Universis magistris et scholaribus Parisiensibus, that is, to the corporation of masters and scholars at Paris. Later the term university became restricted to the meaning which we give it today.

While the earlier universities gradually arose as the result of a long local evolution, it in time became common for others to be founded by a migration of professors from an older university to some cathedral city having a developing studium. In the days when a university consisted chiefly of master and students, when lectures could be held in any kind of a building or collection of buildings, and when there were no libraries, laboratories, campus,

or other university property to tie down an institution, it was easy to migrate. Thus, in 1209, the school at Cambridge was created a university by a secession of masters from Oxford, much as bees swarm from a hive. Sienna, Padua, Reggio, Vicenza, Arezzo resulted from swarming from Bologna; and Vercelli from Vicenza. In 1228, after a student riot at Paris which provoked reprisals from the city, many of the masters and students went to the studium towns of Angers, Orleans, and Rheims, and universities were established at the first two. Migrations from Prague helped establish many of the German universities. In this way the university organization was spread over Europe. In 1200 there were but six studia generalia which can be considered as having evolved into universities Salerno, Bologna, and Reggio, in Italy; Paris and Montpellier, in France; and Oxford, in England. By 1300 eight more had evolved in Italy, three more in France, Cambridge in England, and five in Spain and Portugal. By 1400 twenty−two additional universities had developed, five of which were in German lands and by 1500 thirty−five more had been founded, making a total of eighty. By 1600 the total had been raised to one hundred and eight (R. 100, for list by countries, dates, and method of founding). Some of these (approximately thirty) afterwards died, while in the following centuries additional ones were created.

PRIVILEGES AND IMMUNITIES GRANTED:

The grant of privileges to physicians and teachers made by the Emperor Constantine, in 333 A.D, and the privileges and immunities granted to the clergy (clerici) by the early Christian Roman Emperors , doubtless formed a basis for the many grants of special privileges made to the professors and students in the early universities. The document promulgated by Frederick Barbarossa, in 1158, began the granting of privileges to the studia generalia, and this was followed by numerous other grants. The grant to students of freedom from trial by the city authorities, and the obligation of every citizen of Paris to seize any one seen

striking a student, granted by Philip Augustus, in 1200, is another example, widely followed, of the bestowal of large privileges. Count Rupert I, in founding the University of Heidelberg, in 1386, granted many privileges, exempted the students from any duty, levy, imposts, tolls, excises, or other exactions whatever while coming to, studying at, or returning home from the university. The exemption from taxation became a matter of form, and was afterwards followed in the chartering of American colleges. Exemption from military service also was granted.

So valuable an asset was a university to a city, and so easy was it for a university to move almost overnight, that cities often, and at times even nations, encouraged not only the founding of universities, but also the migration of both faculties and students. An interesting case of a city bidding for the presence of a university is that of Vercelli, which made a binding agreement, as a part of the city charter, whereby the city agreed with a body of masters and students swarming from Padua to loan the students money at lower than the regular rates, to see that there was plenty of food in the markets at no increase in prices, and to protect the students from injustice. An instance of bidding by a State is the case of Cambridge, which obtained quite an addition by the coming of striking Paris masters and students in 1229, in response to the pledge of King Henry III, who humbly sympathized with them for their sufferings at Paris, and promised them that if they would come to our kingdom of England and remain there to study he would assign to them cities, boroughs, towns, whatsoever you may wish to select, and in every fitting way will cause you to rejoice in a state of liberty and tranquility.

One of the most important privileges which the universities early obtained, and a rather singular one at that, was the right of cessatio, which meant the right to stop lectures and go on a strike as a means of enforcing a redress of grievances against either town or church authority. This right was for long jealously guarded by the university, and frequently used to defend itself

from the smallest encroachments on its freedom to teach, study, and discipline the members of its guild as it saw fit, and often the right not to discipline them at all. Often the cessatio was invoked on very trivial grounds, as in the case of the Oxford cessatio of 1209, the Paris cessatio of 1229, and the numerous other cessationes which for two centuries repeatedly disturbed the continuity of instruction at Paris.

DEGREES IN THE GUILD:

The most important of the university rights, however, was the right to examine and license its own teachers, and to grant the license to teach. Founded as the universities were after the guild model, they were primarily places for the taking of apprentices in the Arts, developing them into journeymen and masters, and certifying to their proficiency in the teaching craft. Their purpose at first was to prepare teachers, and the giving of instruction to students for cultural ends, or a professional training for practical use aside from teaching the subject, was a later development.

Accordingly, it came about in time that, after a number of years of study in the Arts under some master, a student was permitted to present himself for a test as to his ability to define words, determine the meaning of phrases, and read the ordinary Latin texts in Grammar, Rhetoric, and Logic (the Trivium), to the satisfaction of other masters than his own. In England this test came to be known by the term determine. Its passage was equivalent to advancing from apprenticeship to the ranks of a journeyman, and the successful candidate might now be permitted to assist the master, or even give some elementary instruction himself while continuing his studies. He now became an assistant or companion, and by the fourteenth century was known as a baccalaureus, a term used in the Church, in chivalry, and in the guilds, and which meant a beginner. There was at first, though, no thought of establishing an examination and a new degree for the completion of this first step in studies. The bachelor's degree was a later development, sought at first by those

not intending to teach, and eventually erected into a separate degree.

When the student had finally heard a sufficient number of courses, as required by the statutes of his guild, he might present himself for examination for the teaching license. This was a public trial, and took the form of a public disputation on some stated thesis, in the presence of the masters, and against all comers. It was the student's masterpiece, analogous to the masterpiece of any other guild, and he submitted it to a jury of the masters of his craft. Upon his masterpiece being adjudged satisfactory, he also became a master in his craft, was now able to define and dispute, was formally admitted to the highest rank in the teaching guild, might have a seal, and was variously known as master, doctor, or professor, all of which were once synonymous terms. If he wished to prepare himself for teaching one of the professional subjects he studied still further, usually for a number of years, in one of the professional faculties, and in time he was declared to be a Doctor of Law, or Medicine, or of Theology.

THE TEACHING FACULTIES:

The students for a long time grouped themselves for better protection (and aggression) according to the nation from which they came, and each nation elected a councilor to look after the interests of its members. Between the different nations there were constant quarrels, insults were passed back and forth, and much bad blood engendered. On the side of the masters the organization was by teaching subjects, and into what came to be known as faculties. Thus, there came to be four faculties in a fully organized mediaeval university, representing the four great divisions of knowledge which had been evolved Arts, Law, Medicine, and Theology. Each faculty elected a dean, and the deans and councilors elected a rector, who was the head or president of the university. The chancellor, the successor of the cathedral school scholastics, was usually appointed by the Pope and represented

the Church, and a long struggle ensued between the rector and the chancellor to see who should be the chief authority in the university. The rector was ultimately victorious, and the position of chancellor became largely an honorary position of no real importance.

The Arts Faculty was the successor of the old cathedral−school instruction in the Seven Liberal Arts, and was found in practically all the universities. The Law Faculty embraced civil and canon law, as worked out at Bologna. The Medical Faculty taught the knowledge of the medical art, as worked out at Salerno and Montpellier. The Theological Faculty, the most important of the four, prepared learned men for the service of the Church, and was for some two centuries controlled by the scholastics. The Arts Faculty was preparatory to the other three. As Latin was the language of the classroom, and all the texts were Latin texts, a reading and speaking knowledge of Latin was necessary before coming to the university to study. This was obtained from a study of the first of the Seven Arts Grammar in some monastery, cathedral, or other type of school. Thus, a knowledge of Latin formed practically the sole requirement for admission to the mediaeval university, and continued to be the chief admission requirement in our universities up to the nineteenth century. In Europe it is still of great importance as a preparatory subject, but in South American countries it is not required at all.

Very few of the universities, in the beginning, had all four of these faculties. The very nature of the evolution of the earlier ones precluded this. Thus, Bologna had developed into a studium generale from its prominence in law, and was virtually constituted a university in 1158, but it did not add Medicine until 1316, or Theology until 1360. Paris began sometime before 1200 as an arts school, Theology with some instruction in Canon Law was added by1208, a Law Faculty in 1271, and a Medical Faculty in 1274. Montpellier began as a medical school sometime in the

twelfth century. Law followed a little later, a teacher from Bologna setting up his chair there. Arts were organized by 1242. A sort of theological school began in 1263, but it was not chartered as a faculty until 1421. So, it was with many of the early universities. These four traditional faculties were well established by the fourteenth century, and continued as the typical form of university organization until modern times. With the great university development and the great multiplication of subjects of study which characterized the nineteenth century, many new faculties and schools and colleges have had to be created, particularly in the United States, in response to new modern demands.

NATURE OF THE INSTRUCTION:

The teaching material in each faculty was much as we have already indicated. After the recovery of the works of Aristotle he came to dominate the instruction in the Faculty of Arts. The Statutes of Paris, in 1254, giving the books to be read for the A.B. and the A.M. degrees, show how fully Aristotle had been adopted there as the basis for instruction in Logic, Ethics, and Natural Philosophy by that time. The books required for these two degrees at Leipzig, in 1410, show a much better−balanced course of instruction, though the time requirements given for each subject show how largely Aristotle predominated there also. Oxford kept up better the traditions of the earlier Seven Liberal Arts in its requirements, and classified the new works of Aristotle in three additional philosophies natural, moral, and metaphysical. From four to seven years were required to complete the arts course, though the tendency was to reduce the length of the arts course as secondary schools below the university were evolved.

In the Law Faculty, after Theology the largest and most important of all the faculties in the mediaeval university, the Corpus Juris Civilis of Justinian and the Decretum of Gratian were the textbooks read, with perhaps a little more practical work in discussion than in Arts or Medicine. The Oxford course of

study in both Civil and Canon Law gives a good idea as to what was required for degrees in one of the best of the early law faculties.

In the Medical Faculty a variety of books translations of Hippocrates (p. 197), Galen (p. 198), Avicenna (p. 198), and the works of certain writers at Salerno and Jewish and Moslem writers in Spain were read and lectured on. The list of medical books used at Montpellier, in 1340, which at that time was the foremost place for medical instruction in western Europe, shows the book−nature and the extent of the instruction given at the leading school of medicine of the time. It was, moreover, customary at Montpellier for the senior students to spend a summer in visiting the sick and doing practical work. We have here the merest beginnings of clinical instruction and hospital service, and at this stage medical instruction remained until quite modern times. The medical courses at Paris and Oxford were less satisfactory, only book instruction being required. Both Law and Medicine were so dominated by the scholastic ideal and methods that neither accomplished what might have been possible in a freer atmosphere.

METHODS OF INSTRUCTION:

A very important reason why so long a period of study was required in each of the professional faculties, as well as in the Faculty of Arts, is to be found in the lack of textbooks and the methods of instruction followed. While the standard textbooks were becoming much more common, due to much copying and the long−continued use of the same texts, they were still expensive and not owned by many.

To provide a loan collection of theological books for poor students we find, in 1271, a gift by will to the University of Paris of a private library, containing twenty−seven books. Even if the students possessed books, the master read and commented from his gloss" at great length on the texts being studied. Besides the mere text each teacher had a gloss or commentary for it that is, a

mass of explanatory notes, summaries, cross−references, opinions by others, and objections to the statements of the text. The gloss was a book in Itself, often larger than the text, and these standard glosses, or commentaries, were used in the university instruction for centuries. In Theology and Canon Law, they were particularly extensive.

All instruction, too, was in Latin. The professor read from the Latin text and gloss, repeating as necessary, and to this the student listened. Sometimes he read so slowly that the text could be copied, but in 1355 this method was prohibited at Paris, and students who tried to force the masters to follow it by shouting or whistling or raising a din, or by throwing stones, were to be suspended for a year. The first step in the instruction was a minute and subtle analysis of the text itself, in which each line was dissected, analyzed, and paraphrased, and the comments on the text by various authors were set forth. Next all passages capable of two interpretations were thrown into the form of a question; pro and contra, after the manner of Abelard. The arguments on each side were advanced, and the lecturer's conclusion set forth and defended. The text was thus worked over day after day in minute detail. Having as yet but little to teach, the masters made the most of what they had. A good example of the mediaeval plan of university instruction is found in the announcement of Odofredus, a distinguished teacher of Law at Bologna, about the middle of the thirteenth century, which Rashdall thinks is equally applicable to methods in other subjects.

It will be seen that both students and professors were bound to the text, as were the teachers of the Seven Liberal Arts in the cathedral schools before them. There was no appeal to the imagination, still less to observation, experiment, or experience. Each generation taught what it had learned, except that from time to time some thinker made a new organization, or some new body of knowledge was unearthed and added.

Another method much used was the debate, or disputation, and participation in a number of these was required for degrees. These disputations were logical contests, not unlike a modern debate, in which the students took sides, cited authorities, and summarized arguments, all in Latin. Sometimes a student gave an exhibition in which he debated both sides of a question, and summarized the argument, after the manner of the professors. As a corrective to the memorization of lectures and texts, these disputations served a useful purpose in awakening intellectual vigor and logical keenness. They were very popular until into the sixteenth century, when new subject−matter and new ways of thinking offered new opportunities for the exercise of the intellect.

In teaching equipment there was almost nothing at first, and but little for centuries to come. Laboratories, workshops, gymnasia, good buildings and classrooms all alike were equally unknown. Time schedules of lectures came in but slowly, in such matters each professor being a free lance. Nor were there any libraries at first, though in time these developed. For a long time books were both expensive and scarce. After the invention of printing (first book printed in 1456), university libraries increased rapidly and soon became the chief feature of the university equipment.

VALUE OF THE TRAINING GIVEN:

Measured in terms of modern standards the instruction was undoubtedly poor, unnecessarily drawn out, and the educational value low. We could now teach as much information, and in a better manner, in but a fraction of the time then required. Viewed also by the standards of instruction in the higher schools of Greece and Rome the conditions were almost equally bad. Viewed, though, from the standpoint of what had prevailed in western Europe during the dark period of the early Middle Ages, it represented a marked advance in method and content except in pure literature, where there was an undoubted decline due to the

absorbing interest in Dialectic and it particularly marked a new spirit, as nearly critical as the times would allow. Despite the heterogeneous and but partially civilized student body, youthful and but poorly prepared for study, the drunkenness and fighting, the lack of books and equipment, the large classes and the poor teaching methods, and the small amount of knowledge which formed the grist for their mills and which they ground exceeding small, these new universities held within themselves, almost in embryo form, the largest promise for the intellectual future of western Europe which had appeared since the days of the old universities of the Hellenic world. In these new institutions knowledge was not only preserved and transmitted, but was in time to be tremendously advanced and extended. They were the first organizations to break the monopoly of the Church in learning and teaching; they were the centers to which all new knowledge gravitated; under their shadow thousands of young men found intellectual companionship and in their classrooms intellectual stimulation; and in encouraging laborious subtlety, heroic industry, and intense application", even though on very limited subject−matter, and in training men to think and work rather than to enjoy, they were preparing for the time when western Europe should awaken to the riches of Greece and Rome and to a new type of intellectual life of its own. From these beginnings the university organization has persisted and grown and expanded, and to−day stands, the Synagogue and the Catholic Church alone excepted, as the oldest organized institution of human society.

The manifest tendency of the universities toward speculation, though for long within limits approved by the Church, was ultimately to awaken inquiry, investigation, rational thinking, and to bring forth the modern spirit. The preservation and transmission of knowledge was by the university organization transferred from the monastery to the school, from monks to doctors, and from the Church to a body of logically trained men, only nominally members of the clerici. Their

successors would in time entirely break away from connections with either Church or State, and stand forth as the independent thinkers and scholars in the arts, sciences, professions, and even in Theology. University graduates in Medicine would in time wage a long struggle against bigotry to lay the foundations of modern medicine. Graduates in Law would contend with kings and feudal lords for larger privileges for the as yet lowly common man, and would help to usher in a period of greater political equality. The university schools of Theology were in time to send forth the keenest critics of the practices of the Church. Out of the university cloisters were to come the men Dante, Petrarch, Wycliffe, Huss, Luther, Calvin, Copernicus, Galileo, Newton who were to usher in the modern spirit.

The universities as a public force. Almost from the first the universities availed themselves of their privileges and proclaimed a bold independence. The freedom from arrest and trial by the civil authorities for petty offenses, or even for murder, and the right to go on a strike if in any way interfered with, were but beginnings in independence in an age when such independence seemed important. These rights were in time given up, and in their place the much more important rights of liberty to study as truth seemed to lead, freedom in teaching as the master saw the truth, and the right to express themselves as an institution on public questions which seemed to concern them, were slowly but definitely taken on in place of the earlier privileges. Virtually a new type of members of society a new Estate was evolved, ranking with Church, State, and nobility, and this new Estate soon began to express itself in no uncertain tones on matters which concerned both Church and State.

The universities were democratic in organization and became democratic in spirit, representing a heretofore unknown and unexpressed public opinion in western Europe. They did not wait to be asked; they gave their opinions unsolicited. The authority of the University of Paris, writes one contemporary, has

risen to such a height that it is necessary to satisfy it, no matter on what conditions. The university wanted to meddle with the government of the Pope, the King, and everything else, writes another. We find Paris intervening repeatedly in both church and state affairs, and representing French nationality before it had come into being, as the so− called Holy Roman Empire represented the Germans, and the Papacy represented the Italians. In Montpellier, professors of Law were considered as knights, and after twenty years of practice they became counts.

In an age of oppression these university organizations stood for freedom. In an age of force they began the substitution of reason. In the centuries from the end of the Dark Ages to the Reformation they were the homes of free thought. They early assumed national character and proclaimed a bold independence. Questions of State and Church they discussed with a freedom before unknown. They presented their grievances to both kings and popes, from both they obtained new privileges, to both they freely offered their advice, and sometimes both were forced to do their bidding.

On the masses of the people, of course, they had little or no influence, and could not have for centuries to come. Their greatest work, as has been the case with universities ever since their foundation, was that of drawing to their classrooms the brightest minds of the times, the most capable and the most industrious, and out of this young raw material training the leaders of the future in Church and State. Educationally, one of their most important services was in creating a surplus of teachers in the Arts who had to find a market for their abilities in the rising secondary schools. These developed rapidly after 1200, and to these we owe a somewhat more general diffusion of the little learning and the intellectual training of the time. In preparing future leaders for State and Church in law, theology, and teaching, the universities, though sometimes opposed and their opinions ignored, nevertheless contributed materially to the

making and moulding of national history. The first great result of their work in training leaders we see in the Renaissance movement of the fourteenth and fifteenth centuries, to which we next turn. In this movement for a revival of the ancient learning, and the subsequent movements for a purer and a better religious life, the men trained by the universities were the leaders.

THE RISE OF SCIENTIFIC INQUIRY

NEW ATTITUDES AFTER THE ELEVENTH CENTURY:

From the beginning of the twelfth century onward, as we have already noted, there had been a slow but gradual change in the character of human thinking, and a slow but certain disintegration of the Mediaeval System, with its repressive attitude toward all independent thinking. Many different influences and movements had contributed to this change the Moslem learning and civilization in Spain, the recovery of the old legal and medical knowledge, the revival of city life, the beginnings anew of commerce and industry, the evolution of the universities, the rise of a small scholarly class, the new consciousness of nationality, the evolution of the modern languages, the beginnings of a small but important vernacular literature, and the beginnings of travel and exploration following the Crusades all of which had tended to transform the mediaeval man and change his ways of thinking. New objects of interest slowly came to the front, and new standards of judgment gradually were applied. In consequence the mediaeval man, with his feeling of personal insignificance and lack of self–confidence, came to be replaced by a small but increasing number of men who were conscious of their powers, possessed a new self–confidence, and realized new possibilities of intellectual accomplishment.

The Revival of Learning, first in Italy and then elsewhere in western Europe, was the natural consequence of this

awakening of the modern spirit, and in the careful work done by the humanistic scholars of the Italian Renaissance in collecting, comparing, questioning, inferring, criticizing, and editing the texts, and in reconstructing the ancient life and history, we see the beginnings of the modern scientific spirit. It was this same critical, questioning spirit which, when applied later to geographical knowledge, led to the discovery of America and the circumnavigation of the globe; which, when applied to matters of Christian faith, brought on the Protestant Revolts; which, when applied to the problems of the universe, revealed the many wonderful fields of modern science; and which, when applied to government, led to a questioning of the divine right of kings and the rise of constitutional government. The awakening of scientific inquiry and the scientific spirit, and the attempt of a few thinkers to apply the new method to education, to which we now turn, may be regarded as only another phase of the awakening of the modern inquisitive spirit which found expression earlier in the rise of the universities, the recovery and reconstruction of the ancient learning, the awakening of geographical discovery and exploration, and the questioning of the doctrines and practices of the Mediaeval Church.

INSUFFICIENCY OF ANCIENT SCIENCE:

From the point of view of scientific inquiry, all ancient learning possessed certain marked fundamental defects. The Greeks had their time and age in world−civilization considered made many notable scientific observations and speculations, and had prepared the way for future advances. Thales (636?−546? B.C.), Xenophanes (628?−520? B.C.), Anaximenes (557−504 B.C.), Pythagoras (570− 500 B.C.), Heraclitus (c. 500 B.C.), Empedocles (460?−361? B.C.), and Aristotle (384−322 B.C.) had all made interesting speculations as to the nature of matter, Aristotle finally settling the question by naming the world−elements as earth, water, air, fire, and ether. Hippocrates (460−367? B.C.) had observed the sick and had recorded and

organized his observations in such a manner as to form the foundations upon which the science of medicine could be established. The Greek physician, Galen (130−200 A.D.) added to these observations, and their combined work formed the basis upon which modern medical science has slowly been built up.

On the other hand, some of what each wrote was mere speculation and error, and modern physicians were compelled to begin all over and along new lines before any real progress in medicine could be made. Aristotle had done a notable work in organizing and codifying Greek scientific knowledge, as the list of his many scientific treatises in use in Europe by 1300 will show, but his writings were the result of a mixture of keen observation and brilliant speculation, contained many inaccuracies, and in time, due to the reverence accorded him as an authority by the mediaeval scholars and the church authorities, proved serious obstacles to real scientific progress.

At Alexandria the most notable Greek scientific work had been done. Euclid (323−283 B.C.) in geometry; Aristarchus (third century B.C.), who explained the motion of the earth; Eratosthenes (270−196 B.C.), who measured the size of the earth; Archimedes (270?−212 B.C.), a pupil of Euclid's, who applied science in many ways and laid the foundations of dynamics; Hipparchus (160−125 B.C.), the father of astronomy, who studied the heavens and catalogued the stars, were among the more famous Greeks who studied and taught there in the days when Alexandria had succeeded Athens as the intellectual capital of the Greek world. Some remarkable advances also were made in the study of human anatomy and medicine by two Greeks, Herophilus (335−280 B.C.) and Erasistratus (d. 280 B.C.), who apparently did much dissecting.

But even at Alexandria the promise of Greek science was unfulfilled. Despite many notable speculations and scientific advances, the hopeful beginnings did not come to any large fruitage, and the great contribution made by the Greeks to world

civilization was less along scientific lines than along the lines of literature and philosophy. Their great strength lay in the direction of philosophic speculation, and this tendency to speculate, rather than to observe and test and measure and record, was the fundamental weakness of all Greek science. The Greeks never advanced in scientific work to the invention and perfection of instruments for the standardization of their observations. As a result they passed on to the mediaeval world an extensive book science and not a little keen observation, of which the works of Aristotle and the Alexandrian mathematicians and astronomers form the most conspicuous examples, but little scientific knowledge of which the modern world has been able to make much use. The book science of the Greeks, and especially that of Aristotle, was highly prized for centuries, but in time, due to the many inaccuracies, had to be discarded and done anew by modern scholars.

The Romans were essentially a practical people, good at getting the work of the world done, but not much given to theoretical discussion or scientific speculation. They were organizers, governors, engineers, executives, and literary workers rather than scientists. They executed many important undertakings of a practical character, such as the building of roads, bridges, aqueducts, and public buildings; organized government and commerce on a large scale; and have left us a literature and a legal system of importance, but they contributed little to the realm of pure science. The three great names in science in all their history are Strabo the geographer (63 B.C.−24 A.D.); Pliny the Elder (23−79 A.D.), who did notable work as an observer in natural history; and Galen (a Roman−Greek), in medicine. They, like the Greeks, were pervaded by the same fear that their science might prove useful, whereas they cultivated it largely as a mental exercise.

THE BEGINNINGS OF MODERN SCIENTIFIC METHOD:

One of the great problems which has always deeply interested thinking men in all lands is the nature and constitution of the material universe, and to this problem people in all stages of civilization have worked out for themselves some kind of an answer. It was one of the great speculations of the Greeks, and it was at Alexandria, in the period of its decadence, that the Egyptian geographer Ptolemy (138 A.D.) had offered an explanation which was accepted by Christian Europe and which dominated all thinking on the subject during the Middle Ages. He had concluded that the earth was located at the center of the visible universe, immovable, and that the heavenly bodies moved around the earth, in circular motion, fixed in crystalline spheres. This explanation accorded perfectly with Christian ideas as to creation, as well as with Christian conceptions as to the position and place of man and his relation to the heavens above and to a hell beneath. This theory was obviously simple and satisfactory, and became sanctified with time. As we see it now the wonder is that such an explanation could have been accepted for so long.

In 1543 a Bohemian church canon and physician by the name of Nicholas Copernicus published his De Revolutionibus Orbium Celestium, in which he set forth the explanation of the universe which we now know. He piously dedicated the work to Pope Paul III, and wisely refrained from publishing it until the year of his death. Anything so completely upsetting the Christian conception as to the place and position of man in the universe could hardly be expected to be accepted, particularly at the time of its publication, without long and bitter opposition.

In the dedicatory letter, Copernicus explains how, after feeling that the Ptolemaic explanation was wrong, he came to arrive at the conclusions he did. The steps he set forth form an excellent example of a method of thinking now common, but then almost unknown. They were:

١. Dissatisfaction with the old Ptolemaic explanation.

٢. A study of all known literature, to see if any better explanation had been offered.
٣. Careful thought on the subject, until his thinking took form in a definite theory.
٤. Long observation and testing out, to see if the observed facts would support his theory.
٥. The theory held to be correct, because it reduced all known facts to a systematic order and harmony.

This is as clear a case of inductive reasoning as was L. Valla's exposure of the forgery of the so−called Donation of Constantine, an example of deductive reasoning. Both used a new method the method of modern scholarship. In both cases the results were revolutionary. As Petrarch stands forth in history as the first modern classical scholar, so Copernicus stands forth as the first modern scientific thinker. The beginnings of all modern scientific investigation date from 1543.

THE NEW METHOD OF INQUIRY APPLIED BY OTHERS:

At first Copernicus' work attracted but little attention. An Italian Dominican by the name of Giordano Bruno (1548−1600), deeply impressed by the new theory, set forth in Latin and Italian the far−reaching and majestic implications of such a theory of creation, and was burned at the stake at Rome for his pains. A Dane, Tycho Brahe, after twenty−one years of careful observation of the heavens, during which time he collected a magnificent series of observations, far transcending in accuracy and extent anything that had been accomplished by his predecessors, showed Aristotle to be wrong in many particulars. His observations of the comet of 1577 led him to conclude that the theory of crystalline spheres was impossible, and that the common view of the time as to their nature was absurd. In1609 a German by the name of Johann Kepler (1571−1630), using the records of observations which Tycho Brahe had accumulated and applying them to the planet Mars, proved the truth of the

Copernican theory and framed his famous three laws for planetary motion.

Finally an Italian, Galileo Galilei, a professor at the University of Pisa, developing a telescope that would magnify to eight diameters, discovered Jupiter's satellites and Saturn's rings. The story of his discovery of the satellites of Jupiter is another interesting illustration of the careful scientific reasoning of these early workers (R. 206). Galileo also made a number of discoveries in physics, through the use of new scientific methods, which completely upset the teachings of the Aristotelians, and made the most notable advances in mechanics since the days of Archimedes. For his pronounced advocacy of the Copernican theory he was called to Rome (1615) by the Cardinals of the Inquisition, the Copernican theory was condemned as absurd in philosophy and as expressly contrary to Holy Scripture, and Galileo was compelled to recant (1616) his error. For daring later (1632) to assume that he might, under a new Pope, defend the Copernican theory, even in an indirect manner, he was again called before the inquisitorial body, compelled to recant and abjure his errors to escape the stake, and was then virtually made a prisoner of the Inquisition for the remainder of his life. So strongly had the forces of medievalism reasserted themselves after the Protestant Revolts!

Finally, the English scholar Newton (1642−1728), in his Principia (1687), settled permanently all discussions as to the Copernican theory by his wonderful mathematical studies. He demonstrated mathematically the motions of the planets and comets, proved Kepler's laws to be true, explained gravitation and the tides, made clear the nature of light, and reduced dynamics to a science.

THE NEW METHOD APPLIED IN OTHER FIELDS:

The new method of study was soon applied to other fields by scholars of the new type, here and there, and always with fruitful results. The Englishman, William Gilbert (1540−1603)

published, in 1600, his De Arte Magnetica, and laid the foundations of the modern study of electricity and magnetism. A German−Swiss by the name of Hohenheim, but who Latinized his name to Paracelsus (1493−1541), and who became a professor in the medical faculty at the University of Basle, in 1526 broke with mediaeval traditions by being one of the first university scholars to refuse to lecture in Latin. He ridiculed the medical theories of Hippocrates (p. 197) and Galen (p. 198), and, regarding the human body as a chemical compound, began to treat diseases by the administration of chemicals. A Saxon by the name of Landmann, who also Latinized his name to Agricola (1494−1555), applied chemistry to mining and metallurgy, and a French potter named Bernard Palissy (c. 1500− 88) applied chemistry to pottery and the arts. To Paracelsus, Agricola, and Palissy we are indebted for having laid, in the sixteenth century, the foundations of the study of modern chemistry.

A Belgian by the name of Vesalius (1514−64) was the first modern to dissect the human body, and for so doing was sentenced by the Inquisition to perform a penitential journey to Jerusalem. One of his disciples discovered the valves in the veins and was the teacher of the Englishman, William Harvey, who discovered the circulation of the blood and later (1628) dared to publish the fact to the world. These men established the modern studies of anatomy and physiology. Another early worker was a Swiss by the name of Conrad Gessner (1516−65), who observed and wrote extensively on plants and animals, and who stands as the first naturalist of modern times.

The sixteenth century thus marks the rise of modern scientific inquiry, and the beginnings of the study of modern science. The number of scholars engaged in the study was still painfully small, and the religious prejudice against which they worked was strong and powerful, but in the work of these few men we have not only the beginnings of the study of modern astronomy, physics, chemistry, metallurgy, medicine, anatomy,

physiology, and natural history, but also the beginnings of a group of men, destined in time to increase greatly in number, who could see straight, and who sought facts regardless of where they might lead and what preconceived ideas they might upset. How deeply the future of civilization is indebted to such men, men who braved social ostracism and often the wrath of the Church as well, for the, to them, precious privilege of seeing things as they are, we are not likely to over−estimate. In time their work was destined to reach the schools, and to materially modify the character of all education.

HUMAN REASON IN THE INVESTIGATION OF NATURE:

To the English statesman and philosopher, Francis Bacon, more than to anyone else, are we indebted for the proper formulation and statement of this new scientific method. Though not a scientist himself, he has often been termed the father of modern science. Seeing clearly the importance of the new knowledge, he broke entirely with the old scholastic deductive logic as expressed in the Organon, of Aristotle, and formulated and expressed the methods of inductive reasoning in his Novum Organum, published in 1620. In this he showed the insufficiency of the method of argumentation; analyzed and formulated the inductive method of reasoning, of which his study as to the nature of heat is a good example; and pointed out that knowledge is a process, and not an end in itself; and indicated the immense and fruitful field of science to which the method might be applied. By showing how to learn from nature herself he turned the Renaissance energy into a new direction, and made a revolutionary break with the disputations and deductive logic of the Aristotelian scholastics which had for so long dominated university instruction.

In formulating the new method, he first pointed out the defects of the learning of his time, which he classified under the head of distempers, three in number, and as follows:

١- Fantastic learning: Alchemy, magic, miracles, old−wives, tales, credulities, superstitions, pseudo−science, and impostures of all sorts inherited from an ignorant past, and now conserved as treasures of knowledge.

٢- Contentious learning: The endless disputations of the Scholastics about questions which had lost their significance, deductive in character, not based on any observation, not aimed primarily to arrive at truth, fruitful of controversy, and barren of effect.

٣- Delicate learning: The new learning of the humanistic Renaissance, verbal and not real, stylish and polished but not socially important, and leading to nothing except a mastery of itself.

As an escape from these three types of distempers, which well characterized the three great stages in human progress from the sixth to the fifteenth centuries, Bacon offered the inductive method, by means of which men would be able to distinguish true from false, learn to see straight, create useful knowledge, and fill in the great gaps in the learning of the time by actually working out new knowledge from the unknown. The collecting, organizing, comparing, questioning, and inferring spirit of the humanistic revival he now turned in a new direction by organizing and formulating for the work a new Organum to take the place of the old Organon of Aristotle. In Book 1 he sets forth some of the difficulties with which those who try new experiments or work out new methods of study have to contend from partisans of old ideas.

The Novum Organum showed the means of escape from the errors of two thousand years by means of a new method of thinking and work. Bacon did not invent the new method it had been used since man first began to reason about phenomena, and was the method by means of which Wycliffe, Luther, Magellan, Copernicus, Brahe, and Gilbert had worked but he was the first to formulate it clearly and to point out the vast field of new and

useful knowledge that might be opened up by applying human reason, along inductive lines, to the investigation of the phenomena of nature. His true service to science lay in the completeness of his analysis of the inductive process, and his declaration that those who wish to arrive at useful discoveries must travel by that road.

To stimulate men to the discovery of useful truth, to turn the energies of mankind even slowly from assumption and disputation to patient experimentation, and to give an impress to human thinking which it has retained for centuries, is, as Macaulay well says, the rare prerogative of a few imperial spirits. Macaulay's excellent summary of the importance of Bacon's work is well worth reading at this point.

THE NEW METHOD IN THE HANDS OF SUBSEQUENT WORKERS:

By the middle of the seventeenth century many important advances had been made in many different lines of scientific work. In the two centuries between 1450 and 1650, the foundations of modern mathematics and mechanics had been laid. At the beginning of the period Arabic notation and the early books of Euclid were about all that were taught; at its end the western world had worked out decimals, symbolic algebra, much of plane and spherical trigonometry, mechanics, logarithms (1614) and conic sections (1637), and was soon to add the calculus (1667−87). Mercator had published the map of the world (1569) which has ever since born his name, and the Gregorian calendar had been introduced (1572). The barometer, thermometer, air−pump, pendulum clock, and the telescope had come into use in the period. Alchemy had passed over into modern chemistry; and the astrologer was finding less and less to do as the astronomer took his place. The English Hippocrates, Thomas Sydenham (1624−89), during this period laid the foundations of modern medical study, and the microscope was applied to the study of organic forms. Modern ideas as to light

and optics and gases, and the theory of gravitation, were about to be set forth. All these advances had been made during the century following the epoch−making labors of Copernicus, the first modern scientific man to make an impression on the thinking of mankind.

Accompanying this new scientific work there arose, among a few men in each of the western European countries, an interest in scientific studies such as the world had not witnessed since the days of the Alexandrian Greek. This interest found expression in the organization of scientific societies, wholly outside the universities of the time, for the reporting of methods and results, and for the mingling together in sympathetic companionship of these seekers after new truth. The most important dates connected with the rise of these societies are:

١. 1603 The Lyncean Society at Rome.
٢. 1619 Jungius founded the Natural Science Association at Rostock.
٣. 1645 The Royal Society of London began to meet; constituted in 1660; chartered in 1662.
٤. 1657 The Academia del Cimento at Florence.
٥. 1662 The Imperial Academy of Germany.
٦. 1666 The Academy of Sciences in France.
٧. 1675 The National Observatory at Greenwich established.

After 1650 the advance of science was rapid. The spirit of modern inquiry, which in the sixteenth century had animated but a few minds, by the middle of the seventeenth had extended to all the principal countries of Europe. The striking results obtained during the seventeenth century revealed the vast field waiting to be explored, and filled many independent modern−type scholars with an enthusiasm for research in the new domain of science. By the close of the eighteenth century the main outlines of most of the modern sciences had been established.

LEADING THINKERS OUTSIDE THE UNIVERSITIES:

During the seventeenth century, and largely during the eighteenth as well, the extreme conservatism of the universities, their continued control by their theological faculties, and their continued devotion to theological controversy and the teachings of state orthodoxy rather than the advancement of knowledge, served to make of them such inhospitable places for the new scientific method that practically all the leading workers with it were found outside the universities. This was less true of England than other lands, but was in part true of English universities as well. As civil servants, court attachés, pensioners of royalty, or as private citizens of means they found, as independent scholars reporting to the recently formed scientific societies, a freedom for investigation and a tolerance of ideas then scarcely possible anywhere in the university world.

These scientific scholars of the first rank who remained outside the universities to obtain advantages and freedom not then to be found within their walls. Much these same conditions continued throughout most of the eighteenth century, during which many remarkable advances in all lines of pure science were made. By the close of this century the universities had been sufficiently modernized those scientific workers began to find in them an atmosphere conducive to scientific teaching and research; during the nineteenth century they became the homes of scientific progress and instruction; to−day they are deeply interested in the promotion of scientific research.

Chapter 4: The New Scientific Method and The Schools

The Rise of Realism in Education

As will be remembered from our study of the educational results of the Revival of Learning, the new schools established in the reaction against medievalism, to teach pure Latin and Greek, in time became formal and lifeless, and their aim came to be almost entirely that of imparting a mastery of the Ciceronian style, both in writing and in speech. This idea, first clearly inaugurated by Sturm at Strassburg, had now become fixed, and in its extreme is illustrated by the teachings of the Jesuit Campion at Prague. As a reaction against this extreme position of the humanistic scholars there arose, during the sixteenth century, and as a further expression of the new critical spirit awakened by the Revival of Learning, a demand for a type of education which would make truth rather than beauty, and the realities of the life of the time rather than the beauties of a life of Roman days, the aim and purpose of education. This new spirit became known as Realism, was contemporaneous with the rise of scientific inquiry, and was an expression of a similar dissatisfaction with the learning of the time. As applied to education this new spirit may be said to have manifested itself in three different stages, as follows:

١. Humanistic realism.
٢. Social realism.
٣. Sense realism.

We will explain each of these, briefly, in order.

I. HUMANISTIC REALISM

A NEW AIM IN INSTRUCTION:

Humanistic realism represents the beginning of the reaction against form and style and in favor of ideas and content. The humanistic realists were in agreement with the classical humanists that the old classical literatures and the Bible contained all that was important in the education of youth. The ancient literatures, they held, presented not only the widest product of human intelligence, but practically all that was worthy of man's

attention. The two groups differed, however, in that the classical humanists conceived the aim of education to be the mastery of the vocabulary and style of Cicero, and the production of a new race of Roman youths for a revived Latin scholarly world, while the new humanistic realists wanted to use the old literatures as a means to a new end that of teaching knowledge that would be useful in the world in which they lived. Monroe has so well expressed the humanistic−realist attitude that a passage from his history is worth quoting here. He says:

Not only did ancient philosophy contain the true philosophy of this life, but languages were the key to the real understanding of the Christian religion. Not only did mastery of these languages give power of speech, and hence influence over one's fellows; but, if military science was to be studied, it could in no place be better searched for than in Caesar and in Xenophon; was agriculture to be practiced, no better guide was to be found than Virgil or Columella; was architecture to be mastered, no better way existed than through Vitruvius; was geography to be considered, it must be through Mela or Solinus; was medicine to be understood, no better means than Celsus existed; was natural history to be appreciated, there was no more adequate source of information than Pliny and Seneca. Aristotle furnished the basis of all the sciences, Plato of all philosophy, Cicero of all institutional life, and the Church Fathers and the Scriptures of all religion.

EXPONENTS OF HUMANISTIC REALISM:

The Dutch international scholar Erasmus (1467−1536) (p. 274), the Frenchman Rabelais (1483−1553), and the English poet Milton (1608−74) stand as the clearest representatives of this new humanistic realism.

Erasmus had clearly distinguished between the education of words and the education of things, had pointed out the ease with which real truth is learned and retained, and had urged the study of the content rather than the form of the ancient authors.

The French non−conforming monk, curé, physician, and university scholar, François Rabelais, in his satirical Life of Gargantua (1535) and The Heroic Deeds of Pantagruel (1533) had set forth, even more clearly, the idea of obtaining from a study of the ancient authors knowledge that would be useful. Writing largely in the character of a clown and a fool, because such was a safer method, he protested against the formal, shallow, and insincere life of his age. He made as vigorous a protest against medievalism and formalism as he dared, for he lived in a time when new ideas were dangerous commodities for one to carry about or to try to express. He ridiculed the old scholastic learning, set forth the idea of using the old classics for realistic as well as humanistic ends, and also advocated physical, moral, social, and religious education in the spirit of the best writers and teachers of the Italian Renaissance. His book was extensively read and had some influence in shaping thinking, though Rabelais's importance in the history of education lies rather in his influence on later educational thinkers than on the life of his time.

Perhaps the clearest example of humanistic realism is found in the writings of the English poet and humanitarian, John Milton. His Tractate on Education (1644) was extensively read, and was influential in shaping educational practice in the non−conformist secondary academies which arose a little later in England. Still later his ideas indirectly somewhat influenced American development.

Milton first gives us an excellent statement of the new religious−civic aim of post−Reformation education and then points out the defects of the existing education, whereby boys spend seven or eight years merely in scraping together so much miserable Latine and Greek, as might be learnt otherwise easily and delightfully in one year. He then presents his plan for a complete and generous Education for noble and gentle youths, and tells how all this may be done between twelve and one and twenty, less time than is now bestowed in pure trifling at

Grammar and Sophistry. The course of study he outlines is enormous. The first year, that is beginning at twelve, the boy is to learn Latin grammar, arithmetic, and geometry, and to read simple Latin and Greek. During the next three or four years the pupil is to master Greek, and to study agriculture, geography, natural philosophy, physiology, mathematics, fortification, engineering, architecture, and natural history, all by reading the chief writings of the ancients, in prose and poetry, on these subjects. During the remaining years to twenty−one the pupil, similarly, is to obtain ethical instruction from the Greeks and the Bible; learn Hebrew, Greek, Roman, and Saxon law; learn Italian and Hebrew; and study economics, politics, history, logic, rhetoric, and poetry by reading selected ancient authors. What Rabelais suggested in jest for his giant, Milton adopted as a program for the school. In addition, in thoroughly characteristic modern English fashion, he makes careful provision for daily exercise and play. Aside, though, from its impossibility of accomplishment except by a superior few, Milton's plan is thoroughly representative of the new humanistic−realistic point of view−that is, that education should impart useful information, though the information as Milton conceived it was to be drawn almost entirely from the books of the ancients.

EDUCATIONAL RESULTS OF HUMANISTIC REALISM:

The importance of humanistic realism in the history of education lies largely in that it was the first of a series of reactions that led later to sense−realism that is, to the study of science and the application of scientific method in the schools.

In England it possesses still larger importance. Milton had called his institution an Academy. After the restoration of the Stuarts (Charles II, 1660), some two thousand non−conforming clergymen were dispossessed by the Act of Conformity (1662), and soon after this the children of Non−Conformists were excluded from the grammar schools and universities. Many of

these clergymen now turned to teaching as a means of earning a livelihood and serving their people, and the ideas of the non−conformist Milton were influential in turning the schools thus established even further toward the study of useful subjects. Many of the new schools offered instruction in the modern languages, logic, rhetoric, ethics, geography, astronomy, algebra, geometry, trigonometry, surveying, navigation, history, oratory, economics, and natural and moral philosophy, as well as the old classical subjects. All teaching, too, was done in English, and the study of English language and literature was emphasized. This made these non−conformist academies in many respects superior to the older Latin grammar schools. After the enactment of the Toleration Act, in 1689, these schools were allowed to incorporate and were gradually absorbed into the existing Latin grammar−school system of England, but unfortunately without producing much change in the character of these older institutions.

The idea of offering instruction in these new studies was in time carried to America, where better results were obtained. At first a few of the subjects, such as the mathematical studies, surveying, navigation, and English, were introduced into the existing Latin grammar or other schools of secondary grade. Especially was this true in the colonies south of New England. After 1751, and especially after about 1780, distinct Academies arose in the United States (chapter XVIII), whose purpose was to offer instruction in all these new subjects of study. From these our modern high schools have been derived.

II. SOCIAL REALISM: MONTAIGNE AND LOCKE:

Social realism represents a still further reaction away from the humanistic schools. It was the natural reaction of practical men of the new world against a type of education that tended to

perpetuate the pedantry of an earlier age, by devoting its energies to the production of the scholar and professional man to the neglect of the man of affairs. The social realists were small in number, but powerful because of their important social connections and wealth, and they were very determined to have an education suited to their needs, even if they had to create it themselves. The French nobleman, scholar, author, and civic officer, M. de Montaigne (1533−92), and the English philosopher, John Locke (1632−1704), were the clearest exponents of this new point of view, though it found expression in the writings of many others. Each declared for a practical, useful type of education for the young boy who was to live the life of a gentleman in the world of affairs.

Neither had any sympathy with the colleges and grammar schools of the time, and both rejected the school for the private tutor. This tutor must be selected with great care, and first of all must be a well−bred gentleman a man, as Montaigne says, who has rather a well−made than a well−filled head. Locke cautions that one fit to educate and form the Mind of a young Gentleman is not every where to be found, and of the common type of teacher he asks, When such an one has emptied out into his Pupil all the Latin and Logick he has brought from the University, will that Furniture make him a fine Gentleman? Both condemn the school training of their time, and both urge that the tutor train the judgment and the understanding rather than the memory. To impart good manners rather than mere information, and to train for life in the world rather than for the life of a scholar, seem to both of fundamental importance in the education of a boy. The great world, says Montaigne, is the mirror wherein we are to behold ourselves. In short, I would have this to be the book my young gentleman should study with the most attention. Latin and Learning, says Locke, make all the Noise; and the main Stress is laid upon Proficiency in Things a great Part whereof belong not to a Gentleman's Calling; which is to have the Knowledge of a Man of Business, a Carriage suitable to his Rank, and to be

eminent and useful to his Country, according to his Statio. Both emphasized the importance of travel abroad as an important factor in the education of a gentleman.

THEIR PLACE IN THE HISTORY OF EDUCATION:

Both Montaigne and Locke were concerned alone with the education of the sons of gentlemen, individuals now coming rapidly into prominence to dispute place in the world of affairs with the higher nobility on the one hand and the clergy on the other. With the education of any other class Montaigne never concerned himself. As for Locke, he was later appointed a King's Commissioner, with certain oversight of the poor, and for the education of the children of such he drew up a careful report which, in true English fashion, provided for their training in workhouses and their apprenticeship to a trade. He wrote nothing with regard to the education of the children of middle−class workers and tradesmen. Both authors also deal entirely with the work of a tutor, and not with the work of a teacher in a school. Neither deals specifically with elementary education, but rather with what, in Europe, would be called the secondary−school period in the education of a boy.

Locke was extensively read by the gentry of England, as expressive of the best current practice of their class, and his ideas as to education were also of some influence in shaping the instruction of the non−conformist teachers in the academies there. His place in the history of education is also of some importance, as we shall point out later, for the disciplinary theory of education which he set forth. Still more, Locke later exerted a deep influence on the writings of Rousseau, and hence helped materially to shape modern educational theory.

III. SENSE REALISM

THE NEW EDUCATIONAL AIMS OF THIS GROUP:

This represented a still further and more important step in advance than either of the preceding. In a very direct way sense

realism in education was an outgrowth of the organizing work of Francis Bacon. Its aim was:

(1) To apply the same inductive method formulated by Bacon for the sciences to the work of education, with a view to organizing a general method which would greatly simplify the instructional process, reduce educational work to an organized system, and in consequence effect a great saving of time; and

(2) To replace the instruction in Latin by instruction in the vernacular, and to substitute new scientific and social studies, deemed of greater value for a modern world, for the excessive devotion to linguistic studies.

The sixteenth century had been essentially a period of criticism in education, and the leading thinkers on education, as in other lines of intellectual activity, were not in the schools. In the seventeenth century we come to a new group of men who attempted to think out and work out in practice the ideas advanced by the critics of the preceding period. In the seventeenth century we have, in consequence, the first serious attempt to formulate an educational method since the days of the Athenian Greeks and the treatise of Quintilian.

The possibility of formulating an educational method that would simplify the educational process and save time in instruction, appealed to a number of thinkers, in different lands. This group of thinkers, due to their new methods of attack and thought, the German historian of education, Karl von Raumer, has called Innovators. The chief pedagogical ideas of the Innovators were:

١. That education should proceed from the simple to the complex, and the concrete to the abstract.
٢. That things should come before rules.
٣. That students should be taught to analyze, rather than to construct.

٤. That each student should be taught to investigate for himself, rather than to accept or depend upon authority.
٥. That only that should be memorized which is clearly understood and of real value.
٦. That restraint and coercion should be replaced by interest in the studies taught.
٧. That the vernacular should be used as the medium for all instruction.
٨. That the study of real things should precede the study of words about things.
٩. That the order and course of Nature be discovered, and that a method of teaching based on this then be worked out.
١. That physical education should be introduced for the sake of health, and not merely to teach gentlemanly sports.
٢. That all should be provided with the opportunity for an education in the elements of knowledge. This to be in the vernacular.
٣. That Latin and Greek be taught only to those likely to complete an education, and then through the medium of the mother tongue.
٤. That a uniform and scientific method of instruction could be worked out, which would reduce education to a science and serve as a guide for teachers everywhere.

The Englishman, Francis Bacon, whom we have previously considered; the German, Wolfgang Ratichius (or Ratke); and the Moravian bishop and teacher, Johann Amos Comenius, stand as perhaps the clearest examples of this organizing tendency in education. Ratke and Comenius will be considered here as types.

WOLFGANG RATKE:

Bacon had believed that the new scientific knowledge should be incorporated into the instruction of the schools, and had suggested, in his Advancement of Learning (1603−05), a broader course of study for them, and better facilities for scientific investigation and teaching. While Bacon was not a teacher and

did not write specifically on school instruction, his writings nevertheless deeply influenced many of those who followed his thinking.

The first writer to apply Bacon's ideas to education and to attempt to evolve a new method and a new course of instruction was a German, by the name of Wolfgang Ratke (1571−1635). While studying in England he had read Bacon's Advancement of Learning, and from Bacon's suggestions Ratke tried to work out a new method of instruction. This he offered, and with much secrecy, unsuccessfully for sale at various German courts. Finally he issued an Address to the princes of Germany, assembled at an Electoral Diet at Frankfurt−am−Main, in 1612. In this he told them of his new method, which followed Nature, and declared that it was fraught with momentous consequences for mankind. He claimed that he could:

١. By using the German language in the earlier years:

- Bring about the use of one common language among the German people, and thus lay the basis for unity in government and religion;
- Impart to children a knowledge of the useful arts and sciences.

٢. Teach Latin. Greek, and Hebrew better, and in far less time, than had previously been required for one language only.

This method he offered to sell to the princes, and he would impart it only on the promise that it be not revealed to others. Two professors were appointed to examine Ratke, and they reported very favorably on his plan.

In 1617 Ratke published, in Leipzig, his Methodus Nova, which was the pioneer work on school method, and is Ratke's chief claim to mention here. In this he laid down the fundamental rules for teaching, as he had thought them out. They were as follows:

١- The order of Nature was to be sought and followed.

٢- One thing at a time, and that mastered thoroughly.
٣- Much repetition to insure retention.
٤- Use of the mother tongue for all instruction, and the languages to be taught through it.
٥- Everything to be taught without constraint. The teacher to teach, and the scholars to keep order and discipline.
٦- No learning by heart. Much questioning and understanding.
٧- Uniformity in books and methods a necessity.
٨- Knowledge of things to precede words about things.
٩- Individual experience and contact and inquiry to replace authority.

We see here the essentials of the Baconian ideas, as well as the foreshadowings of many other subsequent reforms in teaching method.

During the next half−dozen years Ratke was a much interviewed person, as the idea of a more general education of the people, advanced by the Protestant reformers, had appealed strongly to the imagination of many of the German princes. Finally the necessary money was raised to establish an experimental school, printing presses were set up to print the necessary books, the people of the village of Köthen, in Anhalt, were ordered to send their children for instruction, and the school opened with Ratke in charge and amid great expectations and enthusiasm. A year and a half later the school had failed, through the bad management of Ratke and his inability to realize the extravagant hopes he had aroused, and he himself had been thrown into prison as an impostor by the princes. This ended Ratke's work. He is important chiefly for his pioneer work as the forerunner of the greatest educator of the seventeenth century.

JOHANN AMOS COMENIUS.:

We now reach not only the greatest representative of sense realism, both in theory and practice, before the latter part of the eighteenth century, but also one of the commanding figures in the history of education. Comenius was born at Nivnitz, in Moravia,

in 1592. As a member, pastor, and later bishop of the Moravian church, and as a follower of John Huss, he suffered greatly in the Catholic−Protestant warfare which raged over his native land during the period of the Thirty Years' War. His home twice plundered, his books and manuscripts twice burned, his wife and children murdered, and himself at times a fugitive and later an exile, Comenius gave his long life to the advancement of the interests of mankind through religion and learning. Driven from his home and country, he became a scholar of the world.

While a student at the University of Nassau, at the age of twenty, he read and was deeply impressed by the Address of Ratke. Bacon's Novum Organum, which appeared when he was twenty−eight, made a still deeper impression upon him. He seems to have been familiar also with the writings of the educational reformers of his time in all European lands. He traveled extensively, and maintained a large correspondence with the scholars of his time. He was master of a Latin school in Moravia from the age of twenty−two to twenty−four, when he was ordained as a pastor of the Moravian Church. Eight years later, in 1632, he was banished, with all Protestant ministers, from his native land, and while an exile for a time took charge of a school at Lissa, in Poland. Here he worked out, in practice, the great work on method which he later published. In 1638 he was invited to reform the schools of Sweden; in 1641 he visited England, in connection with a plan for the organization of all knowledge; he spent the next eight years working at school reform in Sweden; from 1650 to 1654 he was in charge of a school at Saros−Patak, in Hungary, where he worked out his famous textbooks for teaching language; he was consulted with reference to the presidency of Harvard College, in 1654; the same year he returned to Lissa, and once more lost his books and manuscripts and was made a homeless exile; and finally he found a patron and asylum in Amsterdam, where he died in 1671, at the age of seventy−nine. The verse beneath his portrait seems an especially appropriate commentary on his life.

COMENIUS AND EDUCATIONAL METHOD:

While teaching at Lissa, in Poland, Comenius had formulated for himself the principles underlying school instruction, as he saw it, in a lengthy book which he called The Great Didactic. The title page and the table of contents (R. 219) will give an idea as to its scope. In this work Comenius formulated and explained his two fundamental ideas, namely, that all instruction must be carefully graded and arranged to follow the order of nature, and that, in imparting knowledge to children, the teacher must make constant appeal through sense–perception to the understanding of the child. We have here the fundamental ideas of Bacon applied to the school, and Comenius stands as the clearest exponent of sense realism in teaching up to his time, and for more than a century afterward.

Deeply religious by nature and training, Comenius held the Holy Scriptures to contain the beginning and end of all learning; to know God aright he held to be the highest aim; and with true Protestant fervor he contended that the education of every human being was a necessity if mankind was to enter into its religious inheritance, and piety, virtue, and learning were to be brought to their fruition. Unlike those who were enthusiasts for religious education only, Comenius saw further, and held an ideal of service to the State and Church here below for which proper training was needed. Still more, he believed in the education of human beings simply because they were human beings, and not merely for salvation, as Luther had held.

Comenius was the first to formulate a practicable school method, working along the new lines marked out by Bacon. He had no psychology to guide him, and worked largely by analogies from nature. A great idea with him was that we should study and follow nature, and this led him to the conclusions that education should proceed from the easy to the difficult, the near to the remote, the general to the special, and the known to the unknown, and that the great business of the teacher was imparting and

guiding, and not storing the memory. These conclusions seem commonplaces to us of to−day, but what is commonplace today was genius three hundred years ago. To select the subject−matter of instruction carefully and on the basis of utility, to eliminate needless materials, not to attempt too much at a time, to use concrete examples, to have frequent repetitions to fix ideas, to advance by carefully graded steps, to tie new knowledge to old, to learn by observing and doing, and to learn by use rather than by precept were still other of the present−day commonplaces which Comenius worked out and formulated in his Didactica Magna. His plea for a mild and gentle discipline in place of the brutality of his time, his emphasis of the vernacular and the realities of life, his conception as to the importance of early education, his careful gradation of the school, and his ability to see the usefulness of Latin without over−emphasizing its importance all stamp him as a capable and practical schoolmaster who saw deeply into the nature of the educational process.

COMENIUS' IDEAS AS TO THE ORGANIZATION OF SCHOOLS:

In his Didactica Magna Comenius divided the school life of a child into four great divisions. The first concerned the period from infancy to the age of six, which he called The Mother School. For this period he wrote The School of Infancy (1628), a book intended primarily for parents, and one of such deep insight and fundamental importance that parents and teachers may still read it with interest and profit. In it he anticipated many of the ideas of the kindergarten of to−day. The next division was The Vernacular School, which covered the period from the ages of six to twelve. For this period six classes were to be provided, and the emphasis was to be on the mother tongue. This school was to be for all, of both sexes, and in it the basis of an education for life was to be given. It was to teach its pupils to read and write the mother tongue; enough arithmetic for the ordinary business of life, and the commonly used measures; to sing, and to know

certain songs by rote; to know about the real things of life; the Catechism and the Bible; a general knowledge of history, and especially the creation, fall, and redemption of man; the elements of geography and astronomy; and a knowledge of the trades and occupations of life; all of which, says Comenius, can be taught better through the mother tongue than through the medium of the Latin and Greek. In scope this school corresponds with the vernacular school of modern Europe.

The next school was The Latin School, covering the years from twelve to eighteen, and in this German, Latin, Greek, and Hebrew were to be taught, by improved methods, and with physics and mathematics added. This school he divided into six classes, named from the principal study in each, as follows: (1) Grammar, (2) Physics, (3) Mathematics, (4) Ethics, (5) Dialectics, (6) Rhetoric. He also later outlined a plan for a six−class Gymnasium for Saros−Patak, culminating in a seventh year for preparation for the ministry, which was an improvement on the Latin School and very modern in character. Had such a school become common, secondary education in Europe might have been a century in advance of where the nineteenth century found it. The Latin school was to be attended only by those of ability who were likely to enter the service of Church or State, or who intended to pass on to the University. This last was to cover the period from eighteen to twenty−four. Unlike all educational practice of his time and later, Comenius here provides for an educational ladder of the present−day American type, wholly unlike the European two−class school system which later evolved.

PLACE AND INFLUENCE OF COMENIUS:

Comenius stands in the history of education in a position of commanding importance. He introduces the whole modern conception of the educational process, and outlines many of the modern movements for the improvement of educational procedure. What Petrarch was to the revival of learning, what

Wycliffe was to religious thought, what Copernicus was to modern science, and what Bacon and Descartes were to modern philosophy, Comenius was to educational practice and thinking. The germ of almost all eighteenth−and nineteenth− century educational theory is to be found in his work, and he, more than any one before him and for at least two centuries after him, made an earnest effort to introduce the new science studies into the school. Far more liberal than his Lutheran or Calvinistic or Anglican or Catholic contemporaries, he planned his school for the education of youth in religion and learning and to fit them for the needs of a modern world. Unlike the textbooks of his time, and for more than a century afterward, his were free from either sectarian bigotry or the intense and gloomy atmosphere of the age.

Yet Comenius lived at an unfortunate period in the history of human progress. The early part of the seventeenth century was not a time when an enthusiastic and aggressive and liberal−minded reformer could expect much of a hearing anywhere in western Europe. The shock of the contest into which western Christendom had been plunged by the challenge of Luther had been felt in every corner of Europe, and the culmination of a century of warfare was then raging, with all the bitterness and brutality that a religious motive develops. Christian Europe was too filled with an atmosphere of suspicion and distrust and hatred to be in any mood to consider reforms for the improvement of the education of mankind. As a result the far−reaching changes in method formulated by Comenius made but slight impression on his contemporaries; his attempt to introduce scientific studies awakened suspicion, rather than interest; and the new method which he formulated in his Great Didactic was ignored and the book itself was forgotten for centuries. His great influence on educational progress was through the reform his textbooks worked in the teaching of Latin, and the slow infiltration into the schools of the scientific ideas they contained. As a result, many of the fundamentally sound

reforms for which he stood had to be worked out anew in the nineteenth century. It is sad to contemplate how far our western world might have been advanced in its educational organization and scientific progress, by the close of the eighteenth century, had it been in a mood to receive and utilize the reforms in aims and methods, and to accept the new scientific subject−matter, proposed and worked out by this far−sighted Moravian teacher. Religious bigotry has, in all lands and ages, proved itself one of the most serious of all obstacles in the path of human progress.

IV. REALISM AND THE SCHOOLS

THE VERNACULAR SCHOOLS:

The ideas for which the realists just described had stood were adopted in the people's schools but slowly, and came only after long waiting. The final incorporation of science instruction into elementary education did not come until the nineteenth century, and then was an outgrowth of the reform work of Pestalozzi on the one hand, and the new social, political, economic, and industrial forces of a modern world on the other.

The Peace of Westphalia (1648), which closed a century of bitter and vindictive religious warfare, was followed by another century of hatred, suspicion, and narrow religious intolerance and reaction. All parties now adopted an extremely conservative attitude in matters of religion and education, and the protection of orthodoxy became the chief purpose of the school. Reading, religion, a little counting and writing, and, in Teutonic lands, music, came to constitute the curriculum of such elementary vernacular schools as had come to exist, and the religious Primer and the Bible became the great school textbooks. The people were poor, much of Europe was impoverished and depopulated as a result of long−continued religious strife, the common people still occupied a very low social position, there were as yet no qualified teachers, and no need for general education aside from religion. Still more, during more than a thousand years the Church had established the tradition of providing free education,

and when the governing authorities of the States which turned to Protestantism had taken from the Church both the opportunity to continue the schools and the wealth with which to maintain them, they were seldom willing to tax themselves to set up institutions to continue the work formerly done gratis by the Church. In consequence, regardless of Protestant educational theory as to the need for general education, but little progress in providing vernacular schools was made during the whole of the seventeenth and eighteenth centuries.

Here and there in Teutonic lands, however, the new studies found an occasional patron. In 1619 schools were organized for the little Duchy of Weimar by a pupil of Ratke, and sense realism was given a place in them. The schoolmaster, Andreas Reyher, who in 1642 drew up the Schule Methodus the actual title of that book was 'Schulmethodus for Duke Ernest of Saxe−Gotha and Altenburg, was familiar with the work of both Ratke and Comenius, and made provision for instruction in the natural and useful sciences for Duke Ernest's children. Here and there a few other attempts to provide schools and add instruction in the new Realien were made. The number of such attempts was not large, but their work was influential, and as a result vernacular schools and science instruction finally became established among German−speaking peoples before they did in any other land.

THE SECONDARY SCHOOLS:

The influence of Milton's Tractate on the non− conformist Academies of England has been traced, and the transfer of the idea of instruction in the new mathematical, scientific, literary, historical, and political subjects to the new American Academies has been mentioned. That these new studies also entered into the education of a gentleman in England and France, under the private−tutor and the courtly− academy system, and were copied from the French and constituted a large part of the instruction organized for the Ritterakademieen of the numerous court cities in German lands, has also been mentioned. In both England and

France such private instruction exerted but little influence on the existing Latin grammar schools, and in consequence the schools of both countries remained largely unchanged in direction and purpose until the second half of the nineteenth century. In German lands the Ritterakademieen idea experienced a further development, which proved to be of large importance for the future of German education.

FRANCKE'S INSTITUTIONS:

With the introduction of French ideas and training into the German courts, French skepticism in matters of religion developed in the court circles. Under the influence of a pious Lutheran clergyman, Philip Spener (1635−1705), who tried to emphasize religion as an affair of the heart rather than the head; and especially as a result of the work of his spiritual successor, Augustus Hermann Francke, a movement arose in German lands, during the closing years of the seventeenth century, which became known as Pietism. [10] Disgusted with the lifeless and insincere religion of the time, these two strove to substitute a religion of both head and heart. In 1695, moved by pity for the poor, Francke established at Halle the first of his famous Institutions, a school for poor children. A pay school for the well−to−do was soon added, and soon another school for the children of nobility. An orphan school also was in time provided. The school for the poor developed into a vernacular or Burgher (volks; peoples) school; the school for the pay pupils into a Latin School, or Gymnasium; and the school for nobles into a higher scientific school, or Pädagogium as it was called. At first Francke encountered some theological opposition, but the Institutions" prospered, and at the time of his death contained over 2200 pupils, and over 300 teachers, workers, and attendants.

The interesting thing about Francke's work was the courses of instruction he provided for his schools. In the Burgher School he gave the children instruction in history, geography, and animal life, in addition to the reading, writing, counting, music, and

religion of the usual German vernacular school. Into the Gymnasium he introduced instruction in history, geography, music, science, and mathematics, in addition to the usual Latin, Greek, and Hebrew. He also changed the purpose of the language instruction. Greek was studied to be able to read the New Testament in the original, and Hebrew better to understand the Old. The Pädagogium was provided with a botanical garden, a cabinet of natural history, physical apparatus, a laboratory for the study of chemistry and anatomy, and a workshop for turning and glass−cutting. Independent of the work of Comenius, but as an outgrowth of the new movement for the study of science now beginning to influence educational thought, we have here the most important attempt at the introduction into the school of sense realism, or Realien, as the Germans say, that the modern world had so far witnessed. In 1697 Francke added a Seminarium Praeceptorium, to train teachers in his new ideas. This was the first teachers' training− school in German lands, and the teachers he trained served to scatter his educational ideas over the German States.

THE FIRST REALSCHULE.:

Associated with Francke as a teacher was one Christopher Semler (1669−1740), who became deeply interested in the new studies of the secondary school. In 1706 Semler had submitted a plan to the government of Magdeburg for the teaching of the practical studies. This was referred to the Berlin Society of Sciences, which approved the plan, and later elected Semler to membership in the Society. For years Semler continued as a teacher at Halle, but without carrying the idea far enough to create a new type of school. In 1739 Semler published a paper Upon the Mathematical, Mechanical, and Agricultural Real School in the City of Halle, in which he described the instruction given there. This was probably the first use of the term real school" (Realschule). The important subjects described as taught, aside

from religion, were the useful and in daily life wholly indispensable sciences, such as mathematics, drawing, geography, history, natural history, agriculture, and economics, with much emphasis on observation by the pupils.

The work at Halle soon stimulated complaints as to the existing Latin schools, where children, destined for business or the service of the State, were kept trying to learn Latin, to the neglect of more practical and more useful studies. The usefulness of the new real studies now began to be more correctly estimated, and the conviction gradually grew that those boys who were destined for trade now a rapidly increasing number should not be obliged to follow the same course as those destined to be scholars. In 1720 Rector Gesner, of the gymnasium at Rotenburg, wrote, rather sarcastically:

The one class, who will not study, but will become tradesmen, merchants, or soldiers, must be instructed in writing, arithmetic, writing letters, geography, description of the world, and history. The other class may be trained for studying.

In 1742 the Rector at Dresden, Schöttgen, issued a Humble proposal for the special class in public city schools to provide for those children who are to remain without (that is, cannot learn) Latin. Instead of forcing them to attempt to learn Donatus, which he said was useless for them, he urged that a special class (school) be organized to train them to become useful merchants, artists, and mechanics. In 1751 Rector Henzky, of Prenzlau, issued a treatise to show that Real schools can and must become common. In 1756 Gesner, professor at the new University of Göttingen, in a pamphlet On the organization of a gymnasium, urged that there were three classes of youths for whom schools should be provided, one of which needed the Realschule.

In 1747 a clergyman by the name of Julius Hecker (1707−1768), who had been a pupil in, and later had taught in Francke's 'Institutions, went to Berlin and opened there the first distinct German Realschule. In this school Hecker provided

instruction in religion, ethics, German, French, Latin, mathematics, drawing, history, geography, mechanics, architecture, and a knowledge of nature and of the human body. Classes were organized in architecture, agriculture, bookkeeping, manufacturing, and mining. The school prospered from the first, and in time became the Royal Realschule of Berlin. In answer to a growing demand for advanced education for that constantly increasing number of youths destined for the trades or a mercantile career, the realschule idea was copied in a number of the important cities of Germany. Thus early a century in advance of other nations, and a century and a quarter ahead of the United States did Prussia lay the foundations of that scientific and technical education which, later on, did so much toward creating modern industrial Germany.

THE UNIVERSITIES AND THE NEW SCIENTIFIC LEARNING.

Though the theological persecution of scientific workers largely died out after about the middle of the seventeenth century, and was never much of a factor in lands which had embraced some form of Protestantism, the new sciences nevertheless made but little headway in the universities until after the beginning of the eighteenth century. Up to the close of the seventeenth century the universities in all lands continued to be dominated by their theological faculties, and instruction still remained largely encompassed by mediaevalism. England represents perhaps the most notable exception to this statement, scientific studies having been received with greater tolerance by the universities there than in other lands. In both Catholic and Protestant lands the need was felt for orthodox training, through fear of further heresy, and many petty restrictions were thrown about study and teaching which were stifling to free thinking and investigation. Each little Kingdom or State now took over the supervision of some old university within its borders, or established a new one, that it

might more completely control orthodoxy and prepare its own civil servants. Of the seventeenth century, Paulsen well says:

It was essentially the period of the territorial−confessional university, and is characterized by a preponderance of theological− confessional interest.... Many new foundations, both Catholic and Protestant, now appeared. The chief impetus leading to these numerous foundations was the accentuation of the principle of territorial sovereignty, from the ecclesiastical as well as the political point of view. The consequence was that the universities began to be instrumentia denominationis of the government as professional schools for its ecclesiastical and secular officials. Each individual government endeavored to secure its own university in order (1) to make sure of wholesome instruction, which meant, of course, instruction in harmony with the confessional standards of its established church; (2) to retain training of its secular officials in its own hands; and finally (3) render attendance at foreign universities unnecessary on the part of its subjects, and thus keep the money in the country.

Large amounts of money were not needed to establish a new university. A few thousand guilders or thalers sufficed for the salaries of ten or fifteen professors, a couple of preachers and physicians would undertake the theological and medical lectures, and some old monastery would supply the needed buildings.

After the Reformation the law faculty increased to the place of first importance in Protestant lands, because the Reformation had created a new demand for judges and higher court officials to replace the rule of the clergy. The medical faculty continued to be, as in the mediaeval universities, the smallest of all the faculties and amounted to little before the nineteenth century. The arts faculty, or philosophical as it came to be termed in German lands, offered lectures in Latin, Greek, and Hebrew, and a general course in philosophy, but the Aristotelian texts and to some extent mediaeval methods in instruction continued to be used until the beginning of the eighteenth century.

Here and there some professor read on mathematics, and in Protestant lands on the new astronomy, and the study of botany began as the study of herbs in the medical faculty, but during the sixteenth and seventeenth centuries few professors or students were interested in the scientific subjects. By 1675 Bacon's Novum Organum had begun to be taught at both Oxford and Cambridge, and by 1700 the Newtonian physics had begun to displace Aristotle at Oxford. By 1740 it was well established there. At first instruction in the new subjects was offered as an extra and for a fee by men not having professional rank, and later the instruction was given full recognition by the university. By 1700 Cambridge had become a center for mathematical study, and with the growth in popularity of the Newtonian philosophy, mathematical studies there took the place held by logic in the mediaeval university. Cambridge has ever since remained a center for mathematical and, since the beginning of the nineteenth century, for scientific studies as well. Between 1680 and 1700 the University of Paris was reformed, and the mathematical and philosophical studies of Descartes began to be taught there. The universities of the Netherlands began to teach the new mathematical and scientific studies even earlier.

Aside from the above described Realschule development, the new scientific movement for a time largely passed over German lands, and in consequence the German universities remained unreformed until the eighteenth century. During the seventeenth century they sank to their lowest intellectual level. In 1694, largely in protest against the narrowness of the old universities, the new University of Halle was founded. It received into its faculty certain forward−looking men who had been driven from the old universities, and is generally considered as the first modern university. The new scientific and mathematical subjects and a reformed philosophy were introduced; the instruction in Greek and Latin was reformed; German was made the medium of classroom instruction; and a scientific magazine in German was begun. In 1737 the University of Göttingen became a second

center of modern influence, and from these two institutions the new scientific spirit gradually spread to all the Protestant universities of German lands. A century later they were the leading universities of the world.

Chapter 5: Theory and Practice by the Middle of the Eighteenth Century.

We have now reached, in our history of the transition age which began with the Revival of Learning the great events of which were the recovery of the ancient learning, the rediscovery of the historic past, the reawakening of scholarship, and the rise of religious and scientific inquiry the end of the transition period, and we are now ready to pass to a study of the development and progress of education in modern times. Before doing so, however, we desire to gather up and state the progress in both educational theory and practice which had been attained by the end of this transition period, and to present, as it were, a cross−section of education at about the middle of the eighteenth century. To do this, then, before passing to a consideration of educational development in modern times, will be the purpose of this chapter. We shall first review the progress made in evolving a theory as to the educational purpose, and then present a cross−section view of the schools of the time under consideration.

I. PRE−EIGHTEENTH−CENTURY EDUCATIONAL THEORIES

EARLY UNSUCCESSFUL EDUCATIONAL REFORMERS:

Pre-eighteenth century educational theories

Back in the seventeenth century, as we have pointed out in the preceding chapter, a very earnest effort was made by Ratke and Comenius to introduce a larger conception of the educational process into the elementary vernacular school, to eliminate the gloomy religious material from the textbooks, to substitute a human− welfare purpose for the exclusively life−beyond view, and to transform the school into an institution for imparting both learning and religion. Comenius in particular hoped to make of the new elementary religious school a potent instrument for human progress by introducing new subject− matter, and by

formulating laws and developing methods for its work which would be in harmony with the new scientific procedure so well stated by Francis Bacon. Comenius stands as the commanding figure in seventeenth− century pedagogical thought. He reasoned out and introduced us to the whole modern conception of the educational process and purpose, and gave to the school of the people a solid theoretical and practical basis. Living, though, at an unfortunate period in human history, he was able to awaken little interest either in rational teaching−method or in reforms looking to the advancement of the welfare of mankind. Instead, he roused suspicion and distrust by the innovations and progressive reforms he proposed; his now−celebrated book on teaching method was not at the time understood and was for long forgotten, while the fundamentally sound ideas and pedagogical reforms which he proposed and introduced were lost amid the hatreds of his time, and had to be worked out again and reestablished in a later and a more tolerant age.

Another unsuccessful reformer of some importance, and one whose work antedated that of both Ratke and Comenius, was the London schoolmaster, Richard Mulcaster (1531−1611), for twenty−five years headmaster of the famous Merchant Taylors' School, and later Master of Saint Paul's School. In 1581 he issued his Positions, a pedagogical work so far in advance of his time, and written in such a heavy and affected style, that it passed almost unnoticed in England, and did not become known at all in other lands. Yet the things he stood for became the fundamental ideas of nineteenth−century educational thought. These were:

١- That the end and aim of education is to develop the body and the faculties of the mind, and to help nature to perfection.

٢- That all teaching processes should be adapted to the pupil taught.

٣- That the first stage in learning is of large importance, and requires high skill on the part of the teacher.

٤- That the thing to be learned is of less importance than the pupil learning.
٥- That proper brain development demands that pressure and one−sided education alike be avoided.
٦- That the mother tongue should be taught first and well, and should be the language of the school from six to twelve.
٧- That music and drawing should be taught.
٨- That reading and writing at least should be the common right of all, and that girls should be given equal opportunity with boys.
٩- That training colleges for teachers should be established and maintained.

It would have been a vast gain to all Europe if Mulcaster had been followed instead of Sturm. He was one of the earliest advocates of the use of the vernacular instead of Latin, and good reading and writing in English were to be secured before Latin was begun. His elementary course included five things: English reading, English writing, drawing, singing, playing a musical instrument. If this were made to occupy the school time up to twelve, Mulcaster held that more would be done between twelve and sixteen than between seven and seventeen in the ordinary (Latin grammar school) way. There would be a further gain in that the children would not be set against learning.

John Locke, and the disciplinary theory of education.
Another commanding figure in seventeenth−century pedagogical thought was the English scholar, philosopher, teacher, physician, and political writer, John Locke (1632− 1704). In the preceding chapter we pointed out the place of Locke as a writer on the education of the sons of the English gentry, and illustrated by an extract from his Thoughts the importance he placed on such a practical type of education as would prepare a gentleman's son for the social and political demands of a world fast becoming modern. Locke's place in the history of education, though, is of much more importance than was there (p. 402) indicated. Locke

was essentially the founder of modern psychology, based on the application of the methods of modern scientific investigation to a study of the mind, and he is also of importance in the history of educational thought as having set forth, at some length and with much detail, the disciplinary conception of the educational process.

Locke had served as a tutor in an English nobleman's family, had worked out his educational theories in practice and thought them through as mind processes, and had become thoroughly convinced that it was the process of learning that was important, rather than the thing learned. Education to him was a process of disciplining the body, fixing good habits, training the youth in moral situations, and training the mind through work with studies selected because of their disciplinary value. This conception of education he sets forth well in the following paragraph, taken from his Thoughts:

The great Work of the Governor is to fashion the Carriage and form the Mind; to settle in his Pupils good Habits and the Principles of Virtue and Wisdom; to give him by little and little a View of Mankind, and work him into a Love and Imitation of what is excellent and praiseworthy; and in the Prosecution of it, to give him Vigor, Activity, and Industry. The Studies which he sets him upon, are but as it were the Exercise of his Faculties, and Employment of his Time, to keep him from Sauntering and Idleness, to teach him Application, and accustom him to take Pains, and to give him some little Taste of what his own Industry must perfect. In his Thoughts Locke first sets forth at length the necessity for disciplining the body by means of diet, exercise ,and the hardening process. A sound mind in a sound body he conceives to be a short but full description of a happy state in this world, and a fundamental basis for morality and learning. The formation of good habits and manners through proper training, and the proper adjustment of punishments and rewards next occupies his attention, and he then explains his theory as to

making all punishments the natural consequences of acts. Similarly the mind, as the body, must be disciplined to virtue by training the child to deny, subordinate desires, and apply reason to acts. The formation of good habits and the disciplining of the desires Locke regards as the foundations of virtue.

Similarly, in intellectual education, good thinking and the employment of reason is the aim, and these, too, must be attained through the proper discipline of the mind. Good intellectual education does not consist merely in studying and learning, he contends, as was the common practice in the grammar schools of his time, but must be achieved by a proper drilling of the powers of the mind through the use of selected studies. The purpose of education, he holds, is above all else to make man a reasoning creature. Nothing, in his judgment, trains to reason closely so well as the study of mathematics, though Locke would have his boy look into all sorts of knowledge, and train his understanding with a wide variety of exercises. In the education given in the grammar schools of his time he found much that seemed to him wasteful of time and thoroughly bad in principle, and he used much space to point out defects and describe better methods of teaching and management, giving in some detail reasons therefor. His ideas as to needed reforms in the teaching of Latin are illustrative.

LOCKE ON ELEMENTARY EDUCATION:

For the beginnings of education, and for elementary education in general, Locke sticks close to the prevailing religious conception of his time. As for the education of the common people, he writes:

The knowledge of the Bible and the business of his own calling is enough for the ordinary man; a Gentleman ought to go further.

Continuing regarding the beginnings of education and the studies and textbooks of his day, he says: The Lord's Prayer, the

Creeds, and the Ten Commandments, 'it is necessary he should learn perfectly by heart.... What other Books there are in English of the Kind of those above−mentioned (besides the Primer) fit to engage the Liking of Children, and tempt them to read, I do not know;... and nothing that I know has been considered of this Kind out of the ordinary Road of the Horn Book, Primer, Psalter, Testament, and Bible.

Locke does, however, give some very sensible suggestions as to the reading of the Bible, the imparting of religious ideas to children, and the desirability of transforming instruction so as to make it pleasant and agreeable, with plenty of natural playful activity. On this point he writes:

He that has found a Way how to keep up a Child's Spirit easy, active, and free, and yet at the same time to restrain him from many Things he has a Mind to, and to draw him to Things that are uneasy to him; he, I say, that knows how to reconcile these seeming Contradictions, has, in my Opinion, got the true Secret of Education.

INFLUENCE OF LOCKE'S THOUGHTS:

The volume by Locke contains much that is sensible in the matter of educating a boy. The emphasis on habit formation, reasoning, physical activities and play, the individuality of children, and a reformed method in teaching are its strong points. The thoroughly modern character of the book, in most respects, is one of its marked characteristics. The volume seems to have been much read by middle and upper−class Englishmen, and copies of it have been found in so many old colonial collections that it was probably well known among early eighteenth−century American colonists. That the book had an important influence on the attitude of the higher social classes of England toward the education of their sons and, consciously or unconsciously, in time helped to redirect the teaching in that most characteristic of English educational institutions, the English Public (Latin Grammar) School, seems to be fairly clear. On elementary

religious and charity−school education it had practically no influence.

Locke's great influence on educational thought did not come, though, for nearly three quarters of a century afterward, and it came then through the popularization of his best ideas by Rousseau. Karl Schmidt well says of his work:

Locke is a thorough Englishman, and the principle underlying his education is the principle according to which the English people have developed. Hence his theory of education has in the history of pedagogy the same value that the English nation has in the history of the world. He stood in strong opposition to the scholastic and formalized education current in his time, a living protest against the prevailing pedantry; in the universal development of pedagogy he gives impulse to the movement which grounds education upon sound psychological principles, and lays stress upon breeding and the formation of character.

Restating and expanding the leading ideas of Locke in his Emile, and putting them into far more attractive literary form, Rousseau scattered Locke's ideas as to educational reform over Europe. In particular Rousseau popularized Locke's ideas as to the replacement of authority by reason and investigation, his emphasis on physical activity and health, his contention that the education of children should be along lines that were natural and normal for children, and above all Locke's plea for education through the senses rather than the memory. In so popularizing Locke's ideas, and at a time when all the political tendencies of the period were in the direction of the rejection of authority and the emphasis of the individual, those educational reformers who were inspired by the writings of Rousseau created and applied, largely on the foundations laid down by John Locke, a new theory as to educational aims and procedure which dominated all early nineteenth−century instruction.

It was at this point that the educational problem stood, in so far as a theory as to educational aims and the educational process was concerned, when Rousseau took it up (1762). Before passing to a consideration of his work, though, and the work of those inspired by him and by the French revolutionary writers and statesmen, let us close this third part of our history by a brief survey of the development so far attained, the purpose, character, aims, and nature of instruction in the schools, and their means of support and control at about the middle of the century in which Rousseau wrote, and before the philosophical and political revolutions of the latter half of the eighteenth century had begun to influence educational aims and procedure and control.

II.MID−EIGHTEENTH−CENTURY EDUCATIONAL CONDITIONS

METHODS OF INSTRUCTION:

Throughout the eighteenth century the method of instruction commonly employed in the vernacular schools was what was known as the individual method. This was wasteful of both time and effort, and unpedagogical to a high degree. Everywhere the teacher was engaged chiefly in hearing recitations, testing memory, and keeping order. The pupils came to the master's desk, one by one, and recited what they had memorized. Aside from imposing discipline, teaching was an easy task. The pupils learned the assigned lessons and recited what they had learned. Such a thing as methodology technique of instruction was unknown. The dominance of the religious motive, too, precluded any liberal attitude in school instruction, the individual method was time− consuming, school buildings often were lacking, and in general there was an almost complete lack of any teaching equipment, books, or supplies. Viewed from any modern standpoint the schools of the eighteenth century attained to but a low degree of efficiency. The school hours were long, the schoolmaster's residence or place of work or business was

commonly used as a schoolroom, and such regular schoolrooms as did exist were dirty and noisy and but poorly suited to school purposes. Schools everywhere, too, were ungraded, the school of one teacher being like that of any other teacher of that class.

So wasteful of time and effort was the individual method of instruction that children might attend school for years and get only a mere start in reading and writing. Paulsen, [22] writing of schools in German lands at an even later date, says that even in the better type of vernacular schools many children never achieved anything beyond a little reading and knowing a few things by heart.... The instruction in reading was never anything else but a torture, protracted through years, from saying the alphabet and formation of syllables to the deciphering of complete words, without any real success in the end, while writing was nothing but a wearisome tracing of the letters, the net result of all the toil being the gabbling of the Catechism and a few Bible texts and hymns, learned over and over again.

The imparting of information by the teacher to a class, or a class discussion of a topic, were almost unknown. Hearing lessons, assigning new tasks, setting copies, making quill pens, dictating sums, and imposing order completely absorbed the time and the attention of the teacher.

SCHOOL DISCIPLINE:

The discipline everywhere was severe. A boy has a back; when you hit it he understands, was a favorite pedagogical maxim of the time. Whipping−posts were sometimes set up in the schoolroom, and practically all pictures of the schoolmasters of the time show a bundle of switches near at hand. Boys in the Latin grammar schools were flogged for petty offenses. The ability to impose order on a poorly taught and, in consequence, an unruly school was always an important requisite of the schoolmaster. A Swabian schoolmaster, Häuberle by name, with characteristic Teutonic attention to details, has left on record that, in the course of his fifty−one years and seven months as a teacher he had, by a

moderate computation, given 911,527 blows with a cane, 124,010 blows with a rod, 20,989 blows and raps with a ruler, 136,715 blows with the hand, 10,235 blows over the mouth, 7,905 boxes on the ear, 1,115,800 raps on the head, and 22,763 notabenes with the Bible, Catechism, singing book, and grammar. He had 777 times made boys kneel on peas, 613 times on a triangular piece of wood, had made 3001 wear the jackass, and 1707 hold the rod up, not to mention various more unusual punishments he had contrived on the spur of the occasion. Of the blows with the cane, 800,000 were for Latin words; of the rod 76,000 were for texts from the Bible or verses from the singing book. He also had about 3000 expressions to scold with, two thirds of which were native to the German tongue and the remainder his invention.

Another illustration of German school discipline, of many that might be cited, was the reform work of Johann Ernest Christian Haun, who was appointed, in 1783, as inspector of schools in the once famous Gotha (p. 317). Due to warfare and neglect the schools there had fallen into disrepute. Haun drove the incapable teachers from the work, and for a time restored the schools to something of their earlier importance. Among other reforms it is recorded that he forbade teachers to put irons around the boys' necks, to cover them with mud, to make them kneel on peas, or to brutally beat them. Diesterweg describes similar punishments as characteristic of eighteenth−century German schools. The eighteenth− century German schoolmaster was probably a good sample of his class.

Pedagogical writers of the time uniformly complain of the severe discipline of the schools, and the literature of the period abounds in allusions to the prevailing harshness of the school discipline. A few writers condemn, but most approve heartily of the use of the rod. Spare the rod and spoil the child had for long been a well−grounded pedagogical doctrine. Among many literary extracts that might be cited illustrating this belief, the following poem by the English poet Crabbe (1754−1832) is

interesting. He puts the following words into the mouth of his early schoolmaster:

Students like horses on the road, Must be well lashed before they take the load; They may be willing for a time to run, But you must whip them ere the work be done; To tell a boy, that if he will improve, His friends will praise him, and his parents love, Is doing nothing he has not a doubt But they will love him, nay, applaud without; Let no fond sire a boy's ambition trust, To make him study, let him learn he must.

SCHOOL SUPPORT:

No uniform plan, in any country, had as yet been evolved for even the meager support which the schools of the time received. The Latin grammar schools were in nearly all cases supported by the income from old foundations and from students' fees, with here and there some state aid. The new elementary vernacular schools, though, had had assigned to them few old foundations upon which to draw for maintenance, and in consequence support for elementary schools had to be built up from new sources, and this required time.

In England the Act of Conformity of 1662, it will be remembered (p. 324), had laid a heavy hand on the schools by driving all Dissenters from positions in them, and the Five Mile Act of 1665 had borne even more severely on the teachers in the schools of the Dissenters. Fortunately for elementary education in England, however, the English courts, in 1670, had decided in a test case that the teacher in an elementary school could not be deprived of his position by failure of the bishop to license him, if he were a nominee of the founder or the lay patron of the school. The result of this decision was that, between 1660 and 1730, 905 endowed elementary schools were founded in England, and 72 others previously founded had their endowments increased. The number continued to increase throughout the eighteenth century, and by 1842 had reached a total of 2194. These new foundations probably gave the best schooling of the time, and tended to stir

the Established Church to action. Accordingly we find that during the eighteenth century the vestries of the different church parishes began the creation of parish elementary schools for the children of the poor of the parish, supporting a teacher for them out of the parish rates, and without specific legal authorization to do so. These new parish schools also contributed somewhat to the provision of elementary education, and mark the beginning of the church voluntary schools" which were such a characteristic feature of nineteenth−century English education. We thus have, in England, endowed elementary schools, parish schools, dame schools, private−adventure schools of many types, and charity−schools, all existing side by side, and drawing such support as they could from endowment funds, parish rates, church tithes, subscriptions, and tuition fees. The support of schools by subscription lists was a very common proceeding. Education in England, more than in any other Protestant land, early came to be regarded as a benevolence which the State was under no obligation to support. Only workhouse schools were provided for by the general taxation of all property.

In the Netherlands and in German lands church funds, town funds, and tuition fees were the chief means of support, though here and there some prince had provided for something approaching state support for the schools of his little principality. Frederick the Great had ordered schools established generally (1763) and had decreed the compulsory attendance of children, but he had depended largely on church funds and tuition fees (§7) for maintenance, with a proviso that the tuition of poor and orphaned children should be paid from any funds of the church or town, that the schoolmaster may get his income (§8). In Scotland the church parish school was the prevailing type. In France the religious societies (p. 345) provided nearly all the elementary vernacular religious education that was obtainable.

In the Dutch Provinces, in the New England Colonies, and in some of the minor German States, we find the clearest

examples of the beginnings of state control and maintenance of elementary schools something destined to grow rapidly and in the nineteenth century take over the school from the Church and maintain it as a function of the State. The Prussian kings early made grants of land and money for endowment funds and support, and state aid was ordered granted by Maria Theresa for Austria , in 1774. In the New England Colonies the separation of the school from the Church, and the beginnings of state support and control of education, found perhaps their earliest and clearest exemplification. In the other Colonies the lottery was much used to raise funds for schools, while church tithes, subscription lists, and school societies after the English pattern also helped in many places to start and support a school or schools.

Only by some such means was it possible in the eighteenth century that the children of the poor could ever enjoy any opportunities for education. The parents of the poor children, themselves uneducated, could hardly be expected to provide what they had never come to appreciate themselves. On the other hand, few of the well−to−do classes felt under any obligation to provide education for children not their own. There was as yet no realization that the diffusion of education contributed to the welfare of the State, or that the ignorance of the masses might be in any way a public peril. This attitude is well shown for England by the fact that not a single law relating to the education of the people, aside from workhouse schools, was enacted by Parliament during the whole of the eighteenth century. The same was true of France until the coming of the Revolution. It is to a few of the German States and to the American Colonies that we must turn for the beginnings of legislation directing school support. This we shall describe more in detail in later chapters.

THE LATIN SECONDARY SCHOOL:

The great progress made in education during the eighteenth century, nevertheless, was in elementary education. Concerning the secondary schools and the universities there is little to add to

what has previously been said. During this century the secondary school, outside of German lands, remained largely stationary. Having become formal and lifeless in its teaching (p. 283), and in England and France crushed by religious−uniformity legislation, the Latin grammar school of England and the surviving colleges in France practically ceased to exert any influence on the national life. The Jesuit schools, which once had afforded the best secondary education in Europe, had so declined in usefulness everywhere that they were about to be driven from all lands. The Act of Conformity of 1662 had dealt the grammar schools of England a heavy blow, and the eighteenth century found them in a most wretched condition, with few scholars, and their endowments shamefully abused. The Law of 1662, says Montmorency, involved such a peering into the lives of schoolmasters, such a course of inquisitorial folly, that the position became intolerable. Men would not become schoolmasters.... Education had no meaning when none but political and religious hypocrites were allowed to teach.... National education was destroyed. and the grammar schools of England were practically withdrawn during more than two centuries (1662−1870) from the national life.

In German lands the old Latin schools continued largely unchanged until near the middle of the eighteenth century, with Latin, taught as it had been for a century or more, as the chief subject of study. Shortly after the coming of Frederick the Great to the throne (1740) the Latin schools of Prussia, and after them the Latin schools in other German States, were reorganized and given a new life. The influence of Francke's school at Halle, and the new types of teaching developed there and by his followers elsewhere, began to be felt. German, French, and mathematics were given recognition, and some science work was here and there introduced. Above all, though, Greek now attained to the place of first importance in the reorganized Latin schools.

It was not until after 1740 that the German people awakened to the possibility of an independent national life. Then, under the new impulse toward nationality, French influence and manners were thrown off, German literature attained its Golden Age, the Ritterakademieen (p. 405) were discarded, and a number of the German Principalities and States revised their school regulations and erected, out of the old Latin schools, a series of humanistic gymnasia in which the study of Greek life and culture occupied the foremost place. New methods in classical study were thought out and applied, and a new pedagogical purpose culture and discipline was given to the regenerated Latin schools. A new Renaissance, in a way, took place in German lands, and a knowledge of Greek was proclaimed by German university and gymnasial teachers as indispensable to a liberal education with an earnestness of conviction not exceeded by Battista Guarino (p. 268) four centuries before. To know Greek and to have some familiarity with Greek literature and history now came to be regarded as necessary to the highest culture, and a pedagogical theory for such study was erected, based on the discipline of the mind, which dominated the German classical school throughout the entire nineteenth century. It was in the eighteenth century also that the German States began the development of the scientific secondary school (Realschule),

THE UNIVERSITIES:

The condition of the universities by the middle of the eighteenth century we traced in the preceding chapter. They had lost their earlier importance as institutions of learning, but in a few places the sciences were slowly gaining a foothold, and in German lands we noted the appearance of the first two modern universities institutions destined deeply to influence subsequent university development.

END OF THE TRANSITION PERIOD:

We have now reached, in our study of the history of educational progress, the end of the transition period which

marked the change in thinking from mediaeval to modern attitudes. The period was ushered in with the beginnings of the Revival of Learning in Italy in the fourteenth century, and it may fittingly close about the middle of the eighteenth.

We now stand on the threshold of a new era in world history. The same questioning spirit that animated the scholars of the Revival of Learning, now full−grown and become bold and self−confident, is about to be applied to affairs of politics and government, and we are soon to see absolutism and mediaeval attitudes in both Church and State questioned and overthrown. New political theories are to be advanced, and the divine right of the people is to be asserted and established in England, the American Colonies, and in France, and ultimately, early in the twentieth century, we are to witness the final overthrow of the divine−right−of− kings idea and a world−wide sweep of the democratic spirit. A new human and political theory as to education is to be evolved; the school is to be taken over from the Church, vastly expanded in scope, and made a constructive instrument of the State; and the wonderful nineteenth century is to witness a degree of human, scientific, political, and educational progress not seen before in all the days from the time of the Crusades to the opening of the nineteenth century. It is to this wonderful new era in world history that we now turn.

Assessment

١. **Compare male and female education in ancient Egypt.**
٢. **What are main purposes of education in ancient Egypt.**
٣. **Compare aspects of education within Spartian and Athenian contexts.**
٤. **Discuss class education in old Greek.**
٥. **Describe types of realism and their effects on education after the rise of scientific method.**
٦. **Summarize the main aspects of Education During the Early Middle Ages.**
٧. **Summarize the fundamental ideas of nineteenth−century educational thoughts.**

Videos and websites

Education in ancient Egypt

https://www.youtube.com/watch?v=VK6Q4hUro6Q
https://www.youtube.com/watch?v=r5FSQGEc4_A
https://www.youtube.com/watch?v=5FbXi3iO1CY

The Old Greek Education

https://www.youtube.com/watch?v=Kd0fYbXT9YU
https://www.youtube.com/watch?v=uef3EA40aZY
https://www.youtube.com/watch?v=J3i8vEW_tjE
https://www.youtube.com/watch?v=PZT-RJGkfQ4
https://www.youtube.com/watch?v=0HsUYGO7tFs
https://www.youtube.com/watch?v=4Hd09QFMTMs

Education During the Early Middle Ages

https://www.youtube.com/watch?v=-d1swH_DFmM

https://www.youtube.com/watch?v=PBlLG_BLtgY

https://www.youtube.com/watch?v=Jb8OnGIlzkw

https://www.youtube.com/watch?v=Ly9BPvFJfqo

The New Scientific Method and The Schools

https://www.youtube.com/watch?v=qQBZbinoOrI

https://www.youtube.com/watch?v=xuTQCVgKdJ4

https://www.youtube.com/watch?v=O7GvWSSMkis

https://www.youtube.com/watch?v=cJCJ1-pOZoQ

https://www.youtube.com/watch?v=2RQRds-GU2o

https://www.youtube.com/watch?v=-RDGPulBwkI

Theory and Practice by the Middle of the Eighteenth Century

https://www.youtube.com/watch?v=Xu2h8Xqabb4

https://www.youtube.com/watch?v=T7-Abmn9lZY

https://www.youtube.com/watch?v=i-a4ueSsa3Y

https://www.youtube.com/watch?v=A_gTxt4slcE

https://www.youtube.com/watch?v=CM2VHOgb_HA

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