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9.0 OBJECTIVES

In this unit, we shall

- read and discuss excerpts from the address (speech) delivered by Thomas Henry Huxley on “Science and Culture”
- Discuss the importance of learning physical science

After completing the unit, you should be able to

- Acquaint with Thomas Henry Huxley
- Understand Huxley’s ideas on science and culture through education
- Use exemplary features of speech

9.1 INTRODUCTION

English literature has been enriched by various non-fiction genres such as diary, biography, memoirs, speeches, etc. While learning English language, it is very important to study some of the best forms of expressions in these genres because they provide more space for language and subjectivity. English literature has documented some of the great speeches like Queen Elizabeth’s “Speech to Troops” (1588), Martin Luther King Jr.’s “I Have a Dream” (1963), Fredrick Douglass’ “The Destiny of Colored Americans”, George Orwell’s “Why are Baggers Despised?” etc. As the students of literature, we can study such speeches to understand the use of language to convey our ideas. In this unit, we are going to study a speech delivered by Thomas Henry Huxley called “Science and Culture”.

9.2 WHAT IS A SPEECH?

According to Dictionary, a speech is “a formal address or discourse delivered to an audience.” It presents the speaker ideas and perspectives on a topic to a given audience. There is always a specific context and purpose of the speech which the orator has to keep in mind while delivering the speech. Audience, too, mostly knows the larger theme of the speech in advance. It becomes important for the speaker to know some background of the audience such as their culture, age group, professions etc., either before the speech or during the speech. It gives the speaker an idea about the basic nature of the people and can give examples from their context.

A good speaker always substantiate his/her ideas with solid examples and a bit of historical data. Even in the most serious of the topics, the audience always enjoy a bit of humour. After sharing the information about the topic, a speaker needs to talk about various other aspects of the topic such as future implications, philosophical meanings, human development etc. These features allow audience to relate themselves with the speaker and the speech. Confidence, clarity and correctness are some of the qualities of the good speakers.

- **Check Your Progress 1**

1. What is a speech?

2. What are the three main qualities of a good speaker?

3. Why should the speaker know the background of the audience?

9.3 THOMAS HENRY HUXLEY: LIFE AND WORKS

Thomas Henry Huxley (1825-1895) was an English Biologist. He is best known as “Darwin’s Bulldog” as he researched on the Darwinian idea of evolution. He played an instrumental role in spreading scientific education in Britain by fighting intellectual debates with the proponents of the religious education.

Huxley was born in Middlesex and he was the youngest of the eight children of George Huxley. His father was a Mathematics teacher in the village school until it was closed down. This ceased Thomas Henry’s education at the age of 10. He was one of those nineteenth century ‘self-taught’ scholars who learnt Latin, Greek, German, etc. This habit of self-learning made him learn invertebrates and vertebrates as a young adult. He became famous for his writings on science and religion. Thus, a school dropout boy became one of the most knowledgeable men in England. Then he was taught by Thomas Wharton Jones, Professor of Ophthalmic Medicine and Surgery at University College, London. At the age of 20, Huxley passed his M.B. examination at the University of London wherein he won Gold Medal in Anatomy and Physiology though he did not appear for the final M.B. examination. Consequently, he did not qualify for the same. Huxley had eight children, five daughters and three sons.

After serving Navy for some time, in 1854 he became professor of Natural History at the Royal School of mines and naturalist to the Geological Survey of Britain. In 1885, Huxley retired because of depressive illness. He moved to Eastbourne where he edited nine volumes

of *Collected Essays*. In the field of literature and education, he is best known for his collection of essays and speeches entitled “Science and Culture: And Other Essays” (1882). He received many awards and recognitions such as the Royal Medal (1852), Wollaston Medal (1876), the Copley Medal (1888), Linnen Medal (1890), and Charles Darwin Medal (1894). He died of heart attack in 1895.

- **Check Your Progress – 2**

Find out whether the following statements are true or false:

1. Thomas Henry Huxley completed his high school.
2. He learnt Greek by himself.
3. He is against the spread of scientific education in England.
4. Huxley passed the first year of M.B. examination.
5. He became professor of Natural History
6. In last period of his life, Huxley moved to USA.
7. Huxley served in Air Force in 1854.
8. He was awarded with the Royal Medal in 1886.
9. *Collected Essays* was first published in 1885.
10. Huxley died of cancer in 1895.

9.4 EXCERPTS FROM HUXLEY’S SPEECH

This was an address delivered in 1880, at the opening of Mason College, Birmingham, England, now and the University of Birmingham. It has been published in the collection entitled *Science and Culture: And Other Essays*.

9.4.1 Text – “Science and Culture”:

In the last century, the combatants were the champions of ancient literature, on the one side, and those of modern literature on the other, but, some thirty years ago, the contest became complicated by the appearance of a third army, ranged round the banner of physical science.	6
From the time that the first suggestion to introduce physical science into ordinary education was timidly whispered, until now, the advocates of scientific education have met with opposition of two kinds. On the one hand, they have been pooh-poohed by the men of business who pride themselves on being the representatives of practicality; while, on the other hand, they have been excommunicated by the classical scholars, in their capacity of Levites in charge of the ark of culture and monopolists of liberal education.	8
The practical men believed that the idol whom they worship—rule of thumb—has been the source of the past prosperity, and will suffice for the future welfare of the arts and manufactures. They were of	9

opinion that science is speculative rubbish ; that theory and practice have nothing to do with one another; and that the scientific habit of mind is an impediment , rather than an aid, in the conduct of ordinary affairs.	
The only question worth discussion is, whether the conditions, under which the work of the college is to be carried out, are such as to give it the best possible chance of achieving permanent success.	16
For I hold very strongly by two convictions . The first is, that neither the discipline nor the subject-matter of classical education is of such direct value to the student of physical science as to justify the expenditure of valuable time upon either; and the second is, that for the purpose of attaining real culture, an exclusively scientific education is at least as effectual as an exclusively literary education.	23
I need hardly point out to you that these opinions, especially the latter, are diametrically opposed to those of the great majority of educated Englishmen, influenced as they are by school and university traditions. In their belief, culture is obtainable only by a liberal education; and a liberal education is synonymous, not merely with education and instruction in literature, but in one particular form of literature, namely, that of Greek and Roman antiquity . They hold that the man who has learned Latin and Greek, however little, is educated; while he who is versed in other branches of knowledge, however deeply, is a more or less respectable specialist, not admissible into cultured caste. The stamp of the educated man, the university degree, is not for him.	24
I am too well acquainted with the generous catholicity of spirit, the true sympathy with scientific thought, which pervades the writings of our chief apostle of culture to identify him with these opinions; and yet one may call from one and another of those epistles to the Philistines , which so much delight all who do not answer to that name, sentences which lend them some support.	25
Mr. Arnold tells us that the meaning of culture is “to know the best that has been thought and said in the world.” It is the criticism of life contained in literature. That criticism regards “Europe as being, for intellectual and spiritual purposes, one great confederation , bound to a joint action and working to a common result; and whose members have, for their common outfit, a knowledge of Greek, Roman, and Eastern antiquity, and of one another. Special, local, and temporary advantages being put out of account, that modern nation will in the intellectual and spiritual sphere make most progress, which most thoroughly carries out this programme. And what is that but saying that we too, all of us, as individuals, the more thoroughly we carry it out, shall make the more progress?”	26
We have here to deal with two distinct propositions. The first that a criticism of life is the essence of culture; the second, that literature	27

contains the materials which suffice for the construction of such a criticism.	
I think that we must all assent to the first proposition . For culture certainly means something quite different from learning or technical skill. It implies the possession of an ideal, and the habit of critically estimating the value of things by comparison with a theoretic standard. Perfect culture should apply a complete theory of life, based upon a clear knowledge alike of its possibilities and of its limitations.	28
But we may agree to all this, and yet strongly dissent from the assumption that literature alone is competent to supply this knowledge. After having learnt all that Greek, Roman, and Eastern antiquity have thought and said, and all that modern literatures have to tell us, it is not self-evident that we have laid a sufficiently broad and deep foundation for the criticism of life which constitutes culture.	29
Indeed, to any one acquainted with the scope of physical science, it is not at all evident. Considering progress only in the “intellectual and spiritual sphere,” I find myself wholly unable to admit that either nations or individuals will really advance, if their common outfit draws nothing from the stores of physical science. I should say that an army, without weapons of precision , and with no particular base of operations, might more hopefully enter upon a campaign on the Rhine, than a man, devoid of a knowledge of what physical science has done in the last century, upon a criticism of life.	30
It is, happily, no new thing that Englishmen should employ their wealth in building and endowing institutions for educational purposes. But, five or six hundred years ago, deeds of foundation expressed or implied conditions as nearly as possible contrary to those which have been thought expedient by Sir Josiah Mason . That is to say, physical science was practically ignored, while a certain literary training was enjoined as a means to the acquirement of knowledge which was essentially theological .	32
Theological dicta were, to the thinkers of those days, that which the axioms and definitions of Euclid are to the geometers of these. The business of the philosophers of the Middle Ages was to deduce from the data furnished by the theologians, conclusions in accordance with ecclesiastical decrees . They were allowed the high privilege of showing, by logical process, how and why that which the Church said was true, must be true. And if their demonstrations fell short of or exceeded this limit, the Church was maternally ready to check their aberrations , if need be, by the help of the secular arm.	35
Between the two, our ancestors were furnished with a compact and complete criticism of life. They were told how the world began, and how it would end; they learned that all material existence was but a base and insignificant blot upon the fair face of the spiritual world, and that nature was, to all intents and purposes, the playground of the	36

<p>devil; they learned that the earth is the center of the visible universe, and that man is the cynosure of things terrestrial; and more especially is it inculcated that the course of nature had no fixed order, but that it could be, and constantly was, altered by the agency of innumerable spiritual beings, good and bad, according as they were moved by the deeds and prayers of men. The sum and substance of the whole doctrine was to produce the conviction that the only thing really worth knowing in this world was how to secure that place in a better, which, under certain conditions, the Church promised.</p>	
<p>Our ancestors had a living belief in this theory of life, and acted upon it in their dealings with education, as in all other matters. Culture meant saintliness—after the fashion of the saints of those days; the education that led to it was, of necessity, theological; and the way to theology lay through Latin.</p>	37
<p>That the study of nature—further than was requisite for the satisfaction of everyday wants—should have any bearing on human life was far from the thoughts of men thus trained. Indeed, as nature had been cursed for man’s sake, it was an obvious conclusion that those who meddled with nature were likely to come into pretty close contact with Satan. And, if any born scientific investigator followed his instincts, he might safely reckon upon earning the reputation, and probably upon suffering the fate, of a sorcerer.</p>	38
<p>This distinctive character of our own times lies in the vast and constantly increasing part which is played by natural knowledge. Not only is our daily life shaped by it, not only does the prosperity of millions of men depend upon it, but our whole theory of life has long been influenced, consciously or unconsciously, by the general conceptions of the universe, which have been forced upon us by physical science.</p>	45
<p>In fact, the most elementary acquaintance with the results of scientific investigation shows us that they offer a broad and striking contradiction to the opinions so implicitly credited and taught in the Middle Ages.</p>	46
<p>The notions of the beginning and the end of the world entertained by our forefathers are no longer credible. It is very certain that the earth is not the chief body in the material universe, and that the world is not subordinated to man’s use. It is even more certain that nature is the expression of a definite order with which nothing interferes, and that the chief business of mankind is to learn that order and govern themselves accordingly. Moreover this scientific “criticism of life” presents itself to us with different credentials from any other. It appeals not to authority, nor to what anybody may have thought or said, but to nature. It admits that all our interpretations of natural fact are more or less imperfect and symbolic, and bids the learner seek for truth not among words but among things. It warns us that the</p>	47

assertion which outstrips evidence is not only a blunder but a crime.	
In fact, the few and scattered students of nature of that day picked up the clew to her secrets exactly as it fell from the hands of the Greeks a thousand years before. The foundations of mathematics were so well laid by them that our children learn their geometry from a book written for the schools of Alexandria two thousand years ago. Modern astronomy is the natural continuation and development of the work of Hipparchus and of Ptolemy; modern physics of that of Democritus and of Archimedes; it was long before modern biological science outgrew the knowledge bequeathed to us by Aristotle, by Theophrastus, and by Galen.	51
Thus I venture to think that the pretensions of our modern humanists to the possession of the monopoly of culture and to the exclusive inheritance of the spirit of antiquity must be abated , if not abandoned . But I should be very sorry that anything I have said should be taken to imply a desire on my part to depreciate the value of classical education, as it might be and as it sometimes is. The native capacities of mankind vary no less than their opportunities; and while culture is one, the road by which one man may best reach it is widely different from that which is most advantageous to another. Again, while scientific education is yet inchoate and tentative, classical education is thoroughly well organized upon the practical experience of generations of teachers. So that, given ample time for learning and destination for ordinary life, or for a literary career, I do not think that a young Englishman in search of culture can do better than follow the course usually marked out for him, supplementing its deficiencies by his own efforts.	53
But for those who mean to make science their serious occupation; or who intend to follow the profession of medicine; or who have to enter early upon the business of life; for all these, in my opinion, classical education is a mistake; and it is for this reason that I am glad to see “mere literary education and instruction” shut out from the curriculum of Sir Josiah Mason’s college, seeing that its inclusion would probably lead to the introduction of the ordinary smattering of Latin and Greek.	54
Nevertheless, I am the last person to question the importance of genuine literary education, or to suppose that intellectual culture can be complete without it. An exclusively scientific training will bring about a mental twist as surely as an exclusive literary training. The value of the cargo does not compensate for a ship’s being out of trim; and I should be very sorry to think that the Scientific College would turn out none but lop-sided men.	55
There is no need, however, that such a catastrophe should happen. Instruction in English, French, and German is provided, and thus the	56

three greatest literatures of the modern world are made accessible to the student.	
Thus, since the constitution of the college makes sufficient provision for literary as well as for scientific education, and since artistic instruction is also contemplated , it seems to me that a fairly complete culture is offered to all who are willing to take advantage of it.	58
But I am not sure that at this point the “practical” man, scotched but not slain, may ask what all this talk about culture has to do with an institution, the object of which is defined to be “to promote the prosperity of the manufactures and the industry of the country.” He may suggest that what is wanted for this end is not culture, nor even a purely scientific discipline, but simply a knowledge of applied science.	59
I often wish that this phrase, “applied science,” had never been invented. For it suggests that there is a sort of scientific knowledge of direct practical use, which can be studied apart from another sort of scientific knowledge, which is of no practical utility, and which is termed “pure science.” But there is no more complete fallacy than this. What people call applied science is nothing but the application of pure science to particular classes of problems. It consists of deductions from those general principles, established by reasoning and observation, which constitute pure science. No one can safely make these deductions until he has a firm grasp of the principles; and he can obtain that grasp only by personal experience of the operations of observation and of reasoning on which they are founded.	60
And, as to the desirableness of a wider culture than that yielded by science alone, it is to be recollected that the improvement of manufacturing processes is only one of the conditions which contribute to the prosperity of industry. Industry is a means and not an end; and mankind work only to get something which they want. What that something is depends partly on their innate, and partly on their acquired, desires.	62
If the wealth resulting from prosperous industry is to be spent upon the gratification of unworthy desires, if the increasing perfection of manufacturing processes is to be accompanied by an increasing debasement of those who carry them on, I do not see the good of industry and prosperity.	63
Now it is perfectly true that men’s views of what is desirable depend upon their characters; and that the innate proclivities to which we give that name are not touched by any amount of instruction. But it does not follow that even mere intellectual education may not, to an indefinite extent, modify the practical manifestation of the characters of men in their actions, by supplying them with motives unknown to the ignorant. A pleasure-loving character will have pleasure of some	64

<p>sort; but if you give him the choice, he may prefer pleasures which do not degrade him to those which do. And this choice is offered to every man who possesses in literary or artistic culture a never-failing source of pleasures, which are neither withered by age, nor staled by custom, nor embittered in the recollection by the pangs of self-reproach.</p>	
<p>If the institution opened to-day fulfils the intention of its founder, the picked intelligences among all classes of the population of this district will pass through it. No child born in Birmingham, henceforward, if he have the capacity to profit by the opportunities offered to him, first in the primary and other schools, and afterward in the Scientific College, need fail to obtain, not merely the instruction, but the culture most appropriate to the conditions of his life.</p>	65
<p>Within these walls the future employer and the future artisan may sojourn together for a while, and carry, through all their lives, the stamp of the influences then brought to bear upon them. Hence, it is not beside the mark to remind you that the prosperity of industry depends not merely upon the improvement of manufacturing processes, not merely upon the ennobling of the individual character, but upon a third condition, namely, a clear understanding of the conditions of social life on the part of both the capitalist and the operative, and their agreement upon common principles of social action. They must learn that social phenomena are as much the expression of natural laws as any others; that no social arrangements can be permanent unless they harmonize with the requirements of social statics and dynamics; and that, in the nature of things, there is an arbiter whose decisions execute themselves.</p>	66
<p>But this knowledge is only to be obtained by the application of the methods of investigation adopted in physical researches to the investigation of the phenomena of society. Hence, I confess I should like to see one addition made to the excellent scheme of education propounded for the college, in the shape of provision for the teaching of sociology. For though we are all agreed that party politics are to have no place in the instruction of the college; yet in this country, practically governed as it is now universal suffrage, every man who does his duty must exercise political functions. And, if the evils which are inseparable from the good of political liberty are to be checked, if the perpetual oscillation of nations between anarchy and despotism is to be replaced by the steady march of self-restraining freedom; it will be because men will gradually bring themselves to deal with political, as they now deal with scientific questions; to be as ashamed of undue haste and partisan prejudice in the one case as in the other; and to believe that the machinery of society is at least as delicate as that of a spinning-jenny, and as little likely to be improved by the meddling of those who have not taken the trouble to</p>	67

master the principles of its action.	
In conclusion, I am sure that I make myself the mouthpiece of all present in offering to the venerable founder of the institution, which now commences its beneficent career, our congratulations on the completion of his work; and in expressing the conviction that the remotest posterity will point to it as a crucial instance of the wisdom which natural piety leads all men to ascribe to their ancestors.	

9.4.2 Glossary

Combatant	A fighter
Timidly	Cowardly
Pooh-poohed	Dismiss an idea for being stupid
Excommunicated	Officially exclude (someone) from participation in the sacraments and services of the Christian Church.
Levites	A member of the Hebrew tribe of Levi, especially of that part of it which provided assistants to the priests in the worship in the Jewish temple.
Monopolists	A person or a group that has a monopoly
Speculative rubbish	Something that is true only in imagination and not worthy in reality
Impediment	A hindrance or obstruction in doing something.
Conviction	A firmly held belief or opinion
Diametrically	Completely
Antiquity	The ancient past, especially the period of classical and other human civilizations before the Middle Ages
Acquainted	Familiar
Catholicity	The condition or quality of being catholic
Apostle	Each of the twelve chief disciples of Jesus Christ
Epistle	A poem or other literary work in the form of a letter or series of letters
Philistines	A person deficient in liberal culture and enlightenment, whose interests are chiefly bounded by material and commonplace things.
Confederation	An organization which consists of a number of parties or groups united in an alliance or league
Criticism	Analysis and interpretation
Proposition	A statement or assertion that expresses a judgment or opinion
Draw	Take something from
Precision	Perfection of minute things
Endowing	Give an income or property
Sir Josiah Mason	He began as a hawker and in 1829 began to make pens and "soon became the greatest pen-maker in the world." Mason was not only in the pen

	business; but, also, in the smelting of various ores; and, went into partnership with the Elkingtons who founded the first establishment in Breton, for carrying out the processes of electroplating. Mason made a fortune. In his later years he turned to philanthropy. He was to give a gift of £180,000 for the founding of Mason University (now Birmingham University).
Theological	Relating to the study of the nature of God and religious belief.
Dicta	Formal pronouncements from an authoritative source
Euclid	Third century BC. Greek mathematician who applied the deductive principles of logic to geometry, thereby deriving statements from clearly defined axioms
Axioms	A statement or proposition which is regarded as being established, accepted, or self-evidently true
Deduce	Arrive at (a fact or a conclusion) by reasoning; draw as a logical conclusion
Ecclesiastical decrees	An official order that has the force of law relating to the Christian Church or its clergy.
Exceeded	Cross over
Aberration	A departure from what is normal, usual, or expected, typically one that is unwelcome.
Secular	Not connected with religious or spiritual matters.
Cynosure	A person or thing that is the center of attention or admiration.
Terrestrial	On or relating to the earth.
Doctrine	A belief or set of beliefs held and taught by a Church, political party, or other group.
Saintliness	The quality or state of being saintly; holiness.
Requisite	Made necessary by particular circumstances or regulations.
Satan	The name used by Christians and Jews for the Devil
Reckon	Be of the opinion
Sorcerer	A person who perform witchcraft or black magic
Conceptions	Ideas
Acquaintance	Knowledge or experience of something
Implicitly	Indirectly expressed
Notions	Ideas that are yet to be proven
Credentials	A qualification, achievement, quality, or aspect of a person's background, especially when used to indicate their suitability for something.
Interpretations	The action of explaining the meaning of something.

Bids	offer (a certain price) for something, especially at an auction
Assertion	A confident and forceful statement of fact or belief.
Outgrow	Grow too big for.
Pretension	A claim or assertion of a claim to something.
Abate	(Of something unpleasant or severe) become less intense or widespread.
Abandon	Cease to support or look after (someone); desert.
Smattering	A slight superficial knowledge of a language or subject.
Lop-sided	With one side lower or smaller than the other
Catastrophe	An event causing great and usually sudden damage or suffering; a disaster.
Contemplate	To think
Deductions	The action of deducting or subtracting something
Desirableness	Worth having or seeking, as by being useful, advantageous, or pleasing
Yield	Produce or provide
Gratification	Pleasure, especially when gained from the satisfaction of a desire
Debasement	To reduce the quality or value of something
Manifestation	An event, action, or object that clearly shows or embodies something abstract or theoretical.
Staled	No longer fresh and pleasant to eat; hard, musty, or dry
Pangs	A sudden sharp pain or painful emotion
Self-reproach	Blame directed at oneself
Harmonize	To stabilize something from disturbance
Statics	Concerned with bodies at rest and forces in equilibrium
Arbiter	A person who settles a dispute or has ultimate authority in a matter
Propound	Put forward (an idea or theory) for consideration by others
Universal Suffrage	The right of almost all adults to vote in political elections.
Oscillation	Movement back and forth in a regular rhythm.
Anarchy	Disorderly state of something
Despotism	The exercise of absolute power, especially in a cruel and oppressive way.
Partisan	A strong supporter of a party, cause, or person.
Spinning-jenny	An early machine that could spin many threads of wool at the same time.
Meddling	Interfere in something that is not one's concern
Mouthpiece	Spokesperson
Venerable	Accorded a great deal of respect, especially

because of age, wisdom, or character

• **Check Your Progress 3**

1. Why do the practice men reject science?

2. What was the belief about an educated Englishman in the past?

3. What was the main business of the philosophers of the middle ages?

4. What does Huxley think about “applied science”?

5. What are the possible misuse of the wealth earned through prosperity of industry?

9.5 DISCUSSION

Huxley's speech on "Science and Culture" argues a specific case for imparting the education of physical science. It was a larger mission of Huxley to spread scientific education in the nineteenth century England.

In the beginning of the speech, he talks about the three major combatant groups namely the champions of ancient literature, the proponents of modern literature and thirdly, the newly emerged advocates of physical science. He talks in detail how some intellectual groups opposed introduction of physical science education in colleges. There are businessmen who oppose it because they believe that the source of past prosperity was sufficient and it will be in future so there is no need to learn science. Besides, they believe that science is just a "speculative rubbish" and there is no connection between scientific theories and their practical implications. They went to extent of saying that the scientific knowledge rather an obstacle than an aid in our daily life.

Huxley argues, "Scientific education is an absolutely essential condition of industrial progress". He describes the popular attitude of people by discussing their belief that "physical science is incompetent to confer culture; that it touches none of the higher problems of life; and, what is worse, that the continual devotion to scientific studies tends to generate a narrow and bigoted belief in the applicability of scientific methods to the search after truth of all kinds. People of nineteenth century believed that it is better to provide literary education to people so that we can preserve our culture. It was believed in England that a person who has studied Greek is educated and a person who studies any other branch of knowledge is less respected specialist and does not have cultured taste. While contesting such claims, Huxley argues that for the purpose attaining real culture, an exclusive scientific education is as important as literary education.

Huxley also refers to Mathew Arnold popular essay on "What is culture?" and considers it as a criticism of life. Huxley says that though it has been argued that the knowledge of Greek, Roman and Eastern antiquity is the most significant aspect any nation's progress, one cannot omit scientific education. According to Arnold, the criticism of life is the essence of culture and literature has sufficient materials to formulate such criticism. On the other hand, Huxley opines that "a perfect culture should apply a complete theory of life, based upon clear knowledge alike of its possibilities and its limitations." Additionally, he says despite having gained sufficient knowledge of Humanism, we still have not learnt how to cope up with the issues of modern life. He strongly believes that no nation or individual will ever really advance if they do not get sufficient knowledge of physical science.

It was before five to six hundred years ago that the knowledge of physical science was completely ignored and only theological and literary training

was given to people. Huxley criticizes the middle age philosophers by saying that they all justified theological beliefs and conclusions. Their main business was to logically prove how the Church said was true. They propagated that material world is big blot upon the face of spiritual world. The only thing we need to do is to secure a place considered better by the Church. One the very problematic belief made popular by the theological education, tells Huxley is, “nature had been cursed for man’s sake and it was an obvious conclusion that those who meddled with nature were likely to come into pretty close contact with Satan.” If any person which natural urge for scientific investigation would be considered a wizard. Thus, there was no freed to use reason as a means of knowledge.

Quiet firmly, Huxley explains that since the world of nature is disorderly, it is the chief job of mankind is to learn that order and govern themselves accordingly. Scientific knowledge does not care for anybody’s beliefs. It shows that all the interpretations of natural fact are imperfect and symbolic. The learner of the physical science searches the truth in the things and not in words. Any assertion without evidence in science is not only a blunder but a crime. Of course, from many ancient scholars laid the foundations of the study of nature like Aristotle, Hipparchus, Ptolemy, Democritus, Archimedes, and Theophrastus. Further, Huxley thinks that the pretensions of the modern humanists should be debated if not banned. He advises that a person who wants to study medicine should not select the study of classics.

Interestingly, Huxley is more open that he appears about his insistence on physical education. For, he says that teaching of only physical science will not prepare good intellectual culture. We should also teach literature. The students should be provided the exposure of the best literature of the world like French and German in English. He anticipates an argument saying that some people might think that what is the place of culture in a college that is focusing in prosperity through industry? Some people might say that we need to focus more on “applied science.” It is here that Huxley argues that it is misleading to separate “applied science” from “pure science” because no one can safely make practical deductions without grasping the theoretical principles of pure science.

On the final accounts, Huxley presents the need of desirableness of culture through physical science. He says that industry is a means to get something that mankind want. That “something” depends on people’s “innate, acquired, desires.” He accepts that if the prosperity of industry makes people desire for something that is not good for them, there is no point in having good industry and prosperity. People’s views on deciding what is desirable depends on their characters. Character building is possible through literary and artistic education because it gives never-failing pleasure. He wishes that the Scientific College should not only provide merely instruction but a culture that is appropriate for the right conditions of the student’s life. Apart from developing good industries and characters of the students, we must teacher sociology too for the

larger harmony. Moreover, he suggests that for such a study one must adopt scientific methods to investigate social phenomena.

- **Check Your Progress 4**

1. What were major combatant groups?

2. Why does Huxley consider scientific education be necessary?

3. What is Huxley's idea of a perfect culture?

4. What according to Huxley is the chief job of mankind?

5. What are the major features of scientific knowledge?

6. Which is the third thing that Huxley wants the students to learn in the new college? How should one study it?

9.5.1. Summary

The in his address on “Science and Culture”, Thomas Henry Huxley argues for spreading teaching of science all over. He says that people had a misbelief about science under the dominance of religious and literary training. Further, he presents advantages of scientific knowledge by saying that it will increase manufacturing and industries will flourish. Apart from teaching literature of French, German and English, we must teach our children character building as well because it is the character that can differentiate between the right and wrong of the wealth. Lastly, he suggests to teach sociology in the new college so that the students can understand the social conditions of life.

9.5.2 Features of Huxley’s Speech

Conversational Style:

Of course, since “science and culture” is a speech, it has a very good conversational style. Huxley makes sure that his audience at Birmingham gets his argument for the use of physical science. Therefore, in the very beginning he makes it very clear that he would talk within the context of the opening of the new college especially the vision of the founders. He draws examples from the various fields of society such as education, religion, science, culture, entertainment, to name a few. One of the key features of his conversational style is his focus on the future of the people because everyone in the 19th century was expecting a lot from the industrialization.

Rhetoric:

Rhetoric means art and science of persuasion. When a person wants to convince someone or argue a case, one uses various rhetorical devices. For example, Huxley uses a fable (story) to emphasize his point on the use of physical science in life. For, stories are the most powerful devices to convince masses. Besides, he is using a lot of examples because examples and illustrations are unfailing tools in argumentation. For instance, while talking about the history of the study of natural sciences, he says, “The foundations of mathematics were so well laid by them that our children learn their geometry from a book written for the schools of Alexandria two thousand years ago. Modern astronomy is the natural continuation and development of the work of Hipparchus and of Ptolemy; modern physics of that of Democritus and of Archimedes; it was long before modern biological science outgrew the knowledge bequeathed to

us by Aristotle, by Theophrastus, and by Galen.” Moreover, he cites examples from prevalent debates on the topic of literature and culture such as the case of Mathew Arnold.

Conviction:

It is very important for a speaker or an author to speak/write with conviction because when a person speaks with a strong belief in his/her content, audience trusts the speaker. Huxley spent his whole life on working on science. Hence, when he talked about teaching physical science in the college, he seems to be more convincing at that time. Here in an example of what he believed to be the impact of physical science when he said, “the desirableness of a wider culture than that yielded by science alone, it is to be recollected that the improvement of manufacturing processes is only one of the conditions which contribute to the prosperity of industry.” Not only that, to prove his conviction, he refutes some of the established ideas of the Church. For instance, while explaining how philosophers did a disservice to the society, he said, “The business of the philosophers of the Middle Ages was to deduce from the data furnished by the theologians, conclusions in accordance with ecclesiastical decrees. They were allowed the high privilege of showing, by logical process, how and why that which the Church said was true, must be true. And if their demonstrations fell short of or exceeded this limit, the Church was maternally ready to check their aberrations, if need be, by the help of the secular arm.”

- **Check Your Progress 5**

Match the examples with the features of speech:

1. Conversational Style	A. The desirableness of a wider culture than that yielded by science alone.
2. Rhetoric	B. Use of a story.
3. Conviction	C. The foundation of biology was laid by Aristotle.

9.6 LET US SUM UP

In this unit, you have learnt

- Life and works Thomas Henry Huxley
- Understand Huxley’s ideas on science and culture through education
- Features of speech

9.7 SUGGESTED READING

- 1) Thomas Henry Huxley “*Science and Culture: And Other Essays*”
- 2) Mathew Arnold “*Culture and Anarchy*”
- 3) John Henry Newman “*The Idea of a University*”

- **Answers**

Check Your Progress 1

1. According to Dictionary, a speech is “a formal address or discourse delivered to an audience.” It presents the speaker ideas and perspectives on a topic to a given audience
2. The three main qualities of a good speaker are: 1) confidence, 2)clarity and 3) correctness
3. Because if the speaker knows context of the audience, he/she can give the speaker an idea about the basic nature of the people and can give examples from their context.

Check Your Progress 2

1. False
2. True
3. False
4. True
5. True
6. False
7. False
8. False
9. True
10. False

Check Your Progress 3

1. The practical men reject physical science because they considered it as a “speculative rubbish” and thinks that there is no connection between the theory and practice in science.
2. In the past, it was believed a person who has studied Latin and Greek was educated even if that person does not know anything. No matter how deeply the person knows about the other branches of knowledge, he was considered less respected specialist.
3. The business of the philosophers of the Middle Ages was to prove the beliefs of the religious institutions. They were allowed the high privilege of showing, by logical process, how and why that which the Church said was true, must be true.
4. According to Huxley, “applied science” is a wrong word because what people call applied science is nothing but the application of pure science to particular classes of problems.
5. People may use wealth earned by industry in fulfilling unworthy desires and debasement of society might increase.

Check Your Progress 4

1. There were three major combatant groups:
 - 1) Proponents of ancient literature
 - 2) Followers of modern literature
 - 3) Advocates of physical science
2. According to Huxley, scientific education is a necessary condition for the development of the industries. Besides, he believes that no

individual or nation can progress without getting the necessary knowledge of science.

3. As per Huxley, “a perfect culture should apply a complete theory of life, based upon clear knowledge alike of its possibilities and its limitations.” It means that apart from learning spirituality, a culture should also get the knowledge of the world by learning physical science.
4. Huxley explains that since the world of nature is disorderly, it is the chief job of mankind is to learn that order and govern themselves accordingly. We can do that by learning science.
5. Scientific knowledge does not care for anybody’s beliefs. It shows that all the interpretations of natural fact are imperfect and symbolic. The learner of the physical science searches the truth in the things and not in words. Any assertion without evidence in science is not only a blunder but a crime.
6. Apart from developing good industries and characters of the students, the students must learn sociology. According to Huxley, for studying sociology, one must adopt scientific methods to investigate social phenomena.

Check Your Progress 5

1. Conversational Style	B. Use of a story.
2. Rhetoric	C. The foundation of biology was laid by Aristotle.
3. Conviction	A. The desirableness of a wider culture than that yielded by science alone.