A Study of Techno-Pedagogic Analysis of selected Media Programs of Science at Secondary Level Produced by CIET

# A Research Report

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### **ICT INITIATIVE**

### Curricula for Information and Communication Technology (ICT) in Education for School System



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We would like to acknowledge the educators, students, and experts who generously shared their time and insights with us. Your invaluable perspectives, feedback, and cooperation during interviews, surveys, and classroom observations were indispensable in shaping the depth and quality of our analysis.

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With profound gratitude,

**Prof. Rajendra Pal** Programme Coordinator

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### PREFACE

In the rapidly evolving landscape of education, the integration of technology and pedagogy has become paramount to ensuring the effective dissemination of knowledge and fostering critical thinking skills among students. As the boundaries of traditional classrooms blur, the significance of multimedia programs in education cannot be overstated. Techno-pedagogy, a crucial element in modern education, involves the seamless integration of technology, content, and teaching methodologies to create effective learning experiences. This research study, "A Study of Techno-Pedagogic Analysis of Selected Media Programs of Science at the Secondary Level Produced by CIET," was conducted to understand the necessity of developing techno-pedagogical competencies among educators, enabling them to effectively use digital tools for instruction.

Over the years, the Central Institute of Educational Technology (CIET), NCERT, has played a pivotal role in developing educational resources that align with the changing educational paradigms. These programs offer an innovative approach to teaching and learning, leveraging multimedia elements to enhance engagement and comprehension. This study is a meticulous exploration of the science-oriented media programs developed by CIET, with a focus on their technological underpinnings and pedagogical strategies.

We delve deep into the nuances of these programs, dissecting their design, content, and delivery mechanisms to evaluate their effectiveness as educational tools at the secondary level. This research is dedicated to evaluating the influence of gender, class, and other factors on students' reactions to videobased educational programs in Biology, Chemistry, and Physics. It also explores the efficacy of different types of video programs—those dominated by theoretical explanations versus those emphasizing demonstrations. The study aims to assess the compatibility of these educational broadcasts with the learning expectations of students and teachers while identifying areas for enhancement.

By providing insights into the effectiveness of educational broadcasts, this research seeks to aid planners, producers, educators, and policymakers in enhancing the quality and impact of e-learning initiatives. It is hoped that the outcomes of this study will pave the way for improved instructional strategies, fostering an enriched learning environment that caters to the evolving needs of 21st-century learners.

I extend my sincere appreciation to Prof. Rajendra Pal, Principal Investigator, and the entire research team for their dedicated efforts in conducting this study. Their work will serve as a valuable resource for shaping the future of e-learning initiatives in India.

(Amrendra P. Behra) Joint Director, CIET, NCERT

### **Chapter I : Introduction**

#### **1.0 Introduction**

Lenges such as impoverished infrastructure of ICT; scarce competence in the English language and online content; calamity; lack of incentives and awareness of teachers; evils on research and development; hitch of using software; limited techno-pedagogical resources; lack of coordination among the departments; and frequent power outages and fluctuations. These challenges can be wayout by the bumping of infrastructure, enhancing competence on the English language and online content, dissolving the crisis of teachers, comprising of incentives of teachers, resolution on research and development, encompassing of awareness of existing techno-pedagogical services, using of licensed software, eternal techno-pedagogy supportive resources, improving coordination among the departments, removing of frequent power outages and fluctuations, developing e-Content and web page for techno-pedagogical skills, developing Computer Based Learning Resources Management Systems, increase publicity about existing ICT service.

Since the last few decades, emphasis has been given to the media inputs in education. This may be in the form of audio, video, multimedia, or even recently on AR/VR. Many attempts were made to provide such non-print content through non-telecast as well as telecast mode. Initially, provisions were made for educational slots on TV channels. Later on, separate educational channels were launched.

To reflect on the fast changes in the technology, teachers ought to modify their method of teaching by integrating pedagogic information with technological information. Acquiring techno-pedagogical proficiency can make teaching and learning an enjoyable exercise because it would reduce the pressure on the academics and alter the scholars to develop a deeper domain of data. The educational system is now witnessing a shift from the traditional teaching-learning process to a techno-pedagogical approach.

The techno-pedagogy contains three areas of knowledge. They are content knowledge, pedagogical knowledge, and technological knowledge. Content knowledge means the knowledge about the subject matter that is to be taught. Pedagogical knowledge is the knowledge about the strategies or methodologies that are to be followed in the teaching-learning process and the technology knowledge comprises modern technologies that are to be integrated to make the teaching-learning process more effective.

Technological pedagogical knowledge helps to understand how technology can change the effectiveness of teaching teaching-learning process. This makes it possible to understand how technology can be used for certain pedagogies to make teaching and learning more fruitful.

One of the major functions of the Central Institute of Educational Technology (CIET) is to produce educational media programs for the students and teachers at the school level. This is mainly disseminated to the beneficiaries through broadcast mode. Recently MHRD has initiated a project Swayam Prabha to run 32 DTH channels that would telecast high-quality educational programs on 24 x 7 basis. NCERT is one of the national coordinators for one (1) such channel. CIET, NCERT has planned to disseminate a curriculum-based educational TV program for classes IX - X and XI-XII through the DTH TV transmission.

The quality of such programs is going to be monitored throughout the design, development, and delivery cycle of the DTH-TV. The overall monitoring will be done by a 4-tire structure put in place by the MHRD viz., Operations and monitoring group, Technical Committee, and National Coordinators. The Subject Committee and Review Committee will ensure that quality content is produced.

But such programs need techno-pedagogic analysis. At present, this exercise is not being done for the programs produced for the DTH-TV. This exercise will help producers for selection of suitable media

and their appropriate use of the content. Ultimately the audience (students and teachers) is going to benefit from the media programs.

The term Techno-Pedagogy refers to electronically mediated courses that integrate sound pedagogic principles of teaching or learning with the use of technology.

This study course represents the media programs produced for the SWAYAM PRABHA channel by CIET.

Examples of some of the Techno-pedagogic Skills are Media message compatibility, Contiguity of various message forms (Spatially and temporally), Message media suitability (self-control Interactivity, talkback, etc), Message sensibilities and communication control, Message credibility and media fidelity, Media message integration etc.

The integration of digital pedagogy into contemporary education is revolutionising instructional methodologies and learning paradigms. The National Education Policy (NEP) 2020 highlights the transformative role of technology in fostering dynamic, learner-centric environments that enhance accessibility, engagement, and academic excellence. In alignment with this vision, CIET-NCERT is leading initiatives to equip learners, educators, administrators, and all stakeholders with innovative digital strategies that enrich the teaching-learning process.

Advancements in instructional technology, including AI-powered learning platforms, virtual classrooms, and interactive multimedia content, are reshaping conventional pedagogical approaches. These digital tools enable educators to design adaptive and differentiated instruction, promote cognitive development, and cultivate analytical reasoning among learners. The transition towards blended learning ecosystems and personalised digital experiences ensures that students receive meaningful, context-driven education tailored to diverse learning needs.

Several nationwide digital education programmes have been developed to strengthen instructional effectiveness and bridge learning disparities. Initiatives such as DIKSHA provide structured pedagogical resources that facilitate competency-based learning, digital assessment models, and datadriven instructional planning. These initiatives empower educators to integrate contemporary digital methodologies, fostering inclusive, skill-oriented, and immersive learning environments.

#### 1.1 Need and Significance of the Study

The Central Institute of Educational Technology (CIET) plays a crucial role in creating educational media programs for students and teachers at the school level, distributed primarily through broadcast channels. The Ministry of Human Resource Development (MHRD) has initiated the Swayam Prabha project, aiming to run 32 Direct-to-Home (DTH) channels to broadcast continuous high-quality educational content. NCERT is a national coordinator for one of these channels, focusing on disseminating curriculum-based educational TV programs for classes IX-X and XI-XII.

To ensure the quality of these programs throughout the design, development, and delivery stages of DTH-TV, a comprehensive 4-tier monitoring structure has been established by the MHRD. This structure includes the Operations and Monitoring Group, Technical Committee, National Coordinators, Subject Committee, and Review Committee, collectively ensuring the production of high-quality content.

Despite these measures, there is currently a lack of techno-pedagogic analysis for the programs produced for DTH-TV. Conducting such an analysis is crucial, as it aids producers in selecting appropriate media and utilizing content effectively. This exercise involves evaluating techno-pedagogic skills, such as media message compatibilities, contiguity of various message forms (spatially and temporally), message media suitability (self-control interactivity, talk back, etc.), message sensibilities

and communication control, message credibility and media fidelity, and media message integration. By conducting a thorough techno-pedagogic analysis of the educational media programs transmitted through the Swayam Prabha project's DTH channels, the stakeholders, including students and teachers, stand to gain significant advantages. This meticulous evaluation ensures that the content aligns with sound pedagogic principles and effectively integrates technology for an enhanced learning experience.

### **1.2 Objectives of the study**

- To study the influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reactions towards video programs of Biology.
- To study the influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reactions towards video programs of Chemistry.
- To study the influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reactions towards video programs of Physics.
- To compare the mean scores of Reaction towards Biology Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Chemistry Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Biology Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To study the Statement-wise association between Gender and Reaction towards Video programs of Class IX and X separately.
- To study the compatibility of the DTH programs in terms of the reflections of the teachers and students.

### **1.3 Hypothesis of the study**

The following were the Hypotheses:

- There is no significant influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Biology.
- There is no significant influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reactions toward video programs of Chemistry.
- There is no significant influence of Gender, Class, and their interaction on students' overall as well as dimension-wise Reactions toward video programs of Physics.
- There is no significant difference in mean scores of Reaction towards Biology Theory dominated

- Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Chemistry Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Biology Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant Statement-wise association between Gender and Reaction towards Video programs of Class IX and X separately. As the 21st century approaches, there is an increasing trend toward digitalization and computer technology to access and retrieve information. The education system is now witnessing a paradigm shift from the traditional chalk-and-board teaching methodology to digitizing the pedagogical approach through technical devices. A transformation would not only increase the capability of the teachers but would also widen the knowledge of students to make them competitive in the international arena. The technology orientation needs to improve to equip teachers and educators to face the students who belong to the digital era and also to face the challenges in the modern classroom. Today techno-pedagogical competence is very much needed for teachers in the teaching and learning process, as it facilitates effective teaching and learning. The techno-pedagogical competency is nothing but the ability of the teachers to make use of technology effectively in teaching. The teachers develop techno-pedagogical competencies and should make use of it in teaching which in turn make the learning process simple and effective.
- Techno-pedagogy decides whether an educational media product is successful or not. The word 'Techno' is derived from the Latin word 'Texere' which means 'weave or construct' and Pedagogy refers to the 'Science and Art of teaching'. Thus, Techno-Pedagogy refers to weaving the techniques of teaching into the learning environment.

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Education Technology provides designing learning situations keeping the objectives of the teaching and learning in mind and thus brings the best practices/means of instruction which have a positive significant effect on learning.

- 1. In techno-pedagogy, there are three areas of knowledge, namely: content, pedagogy, and technology.
- 2. Content is the subject matter that is to be taught.

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- 3. Pedagogy describes the collected practices, processes, strategies, procedures, and methods of teachingand learning. It also includes knowledge about the aims of instruction, assessment, and student learning.
- 4. Technology encompasses modern technologies such as computers, the internet, digital audio-video,

and related other technologies including overhead projectors, smart boards, e-books, etc.

The NCF (2005), and XII five-year plan (2011), emphasized providing connectivity, valuable content, and low-cost computing devices to all the institutions of higher learning in the country. This hybrid skill facilitates enhancing linguistic abilities, sketching specific pedagogy with advanced study materials, and designing multigrade instruction.

### 1.4 Scope of the study

The development of the teaching and learning process in the education system has been rapid by the revolutions within the field of information technology. In particular, the last decade has seen an outburst in a variety of pedagogical innovations like resource-based learning, e-learning, virtual learning, etc. The analysis of the programs in terms of techno-pedagogical skills will help planners and producers to improve upon the quality by integrating content, pedagogy, and technology. The school teachers will be better equipped with the techno-pedagogic skills. Through this, the learning outcome is likely to be enhanced.

As a whole, this research is likely to improve upon the perception of the planners, producers, teachers, and learners towards designing, producing, transaction, and consuming e-programs. It will develop a congenial media culture.

### **Chapter II : Review of Literature**

#### **2.1 Introduction**

The previous chapter introduced the study's rationale, objectives and hypotheses. This chapter focuses on reviewing related literature for "A Study of Techno-Pedagogic Analysis of Selected Media Programs of Science at the Secondary Level Produced by CIET." It delves into the effectiveness of media programs in science education, exploring pedagogical practices, and technology's impact on teaching and learning. The review integrates recent findings and emerging trends to establish a concise theoretical foundation, aligning the study with current discourse in educational technology and science education.

#### 2.2 Review of related Research Articles

Beaudin & Hadden (2004) conducted a study on developing Techno-pedagogical Skills in Pre-service Teachers and revealed in their study that techno-pedagogical skills foster the students for further development, attainment of learning outcomes and maintain the context of designing classroom-based resources through the use of ICT by the teachers. Therefore, the techno-pedagogy method was a necessary component of teacher education.

**Koehler & Mishra (2005)** conducted a study on Teachers Learning Technology by Design and found in their study that good teaching was not simply adding technology rather the introduction of technology causes the representation of new concepts and requires developing sensitivity to the dynamic, transactional relationship among technology, pedagogy, content and knowledge, thus, have offered the idea of Learning by Design- whereby teachers learn about educational technology by engaging in authentic design tasks in small collaborative groups that goes beyond the simple acquisition of skill related to technology. Finally, argued that understanding the role of technology in pedagogy is more than the accumulation of technology skills and that skillful teaching is more than finding and applying the right tool.

**Harris et. al (2009)** conducted a study on Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types: Curriculum-Based Technology Integration. They found that by critically analyzing extant approaches to technology integration in teaching, arguing that many current methods are technology-centric, often omitting sufficient consideration of the dynamic and complex relationships among content, technology, pedagogy, and context. It also recommends using the technology, pedagogy, and content knowledge (TPACK) framework as a way to think about effective technology integration, recognizing technology, pedagogy, content, and context as interdependent aspects of teachers' knowledge necessary to teach content-based curricula effectively with educational technologies.

Lee & Tsai (2010) conducted a study on Facilitating pre-service teachers' development of technological, pedagogical, and content knowledge (TPACK) and found that meaningful use of ICT in the classroom requires the teachers to integrate technological affordances with pedagogical approaches for the specific subject matter to be taught.

**Sahin et al. (2013)** conducted a study on the Analysis of Relationships between Technological Pedagogical Content Knowledge and Educational Internet Use. This study analyzes the relationships between pre-service teachers' technological pedagogical content knowledge (TPACK) and their self-efficacy beliefs in educational Internet use. Findings show statistically significant relationships among the knowledge domains in technology, pedagogy, content, and their intersections. Also, results from the canonical correlation analysis show that a statistically significant and strong relationship exists between the knowledge dimensions in the TPACK model and the self-efficacy beliefs in educational

Internet use. Specifically, technology, content, and technological content knowledge domains are statistically significant predictors of pre-service teachers' self-efficacy beliefs in educational Internet use.

**Sathiyaraj & Rajasekar (2013)** conducted a study on the relationship between the techno-pedagogical competency of higher secondary school teachers and their anxiety towards the use of instructional aids in teaching. Normative survey type and random sampling technique have been used for the drawing sample from 627 higher secondary school teachers situated in Tiruvannamalai District, Tamil Nadu, India. The findings of the study show that the majority of the higher secondary school teachers had an average level of perceived techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. Also, it is found that there is a significant difference between the (i) male and female teachers and (ii) urban and rural school teachers in respect of their perceived techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. The results revealed that there is a significant negative relationship between techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. The results revealed that there is a significant negative relationship between techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. The results revealed that there is a significant negative relationship between techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. The results revealed that there is a significant negative relationship between techno-pedagogical competency and anxiety towards the use of instructional aids in teaching. The results revealed that there is a significant negative relationship between techno-pedagogical competency and anxiety towards the use of instructional aids in teaching and found in their study that the techno-pedagogical competency needs to be improved in order to equip teachers to face the students belong to the digital era and also to face the challenges in the modern classroom.

Almada et. al (2014) conducted a study on the application and validation of a techno-pedagogical lecturer training model using a virtual learning environment. With the help of their study, they have presented a techno-pedagogical lecturer training model that was validated in an intensive hybrid-mode workshop/course for lecturers. The aim of the course was to train lecturers how to use Moodle virtual learning environment (VLE) as a didactic support in their classrooms. A research-action method was applied to the study, and the instruments used were interviews, questionnaires, blogs, and opinion surveys, together with the planning and development of an online course by each participant as the end product. The course was then analyzed to see how each of the 16 participants had gradually appropriated the technology, without overlooking the pedagogical aspects. Some progressed from beginner to intermediate level and others from intermediate to advanced level, while those already at advanced level developed sophisticated courses and sought ways of improving them on their own. In addition, the researchers found that the role of the university institution had been fundamental to the proper running of the course and that constant communication between the facilitator and the lecturers/ learners had been important.

**Ipek et. al (2014)** conducted a study on the Inspection of Techno-pedagogical Educational Qualifications of Mathematics Teacher Candidates and found that participants who received computer training had a more positive attitude toward applying techno-pedagogic knowledge in their lessons than those who did not receive computer training. At the same time, it is observed that the participants who are more interested in computer use have a more positive attitude towards applying techno-pedagogic knowledge in their lessons than those who are less interested in using computers.

**Monsiváis, McAnally & Lavigne (2014)** conducted a study on the application and validation of a techno-pedagogical lecturer training model using a virtual learning environment and revealed in their study that the integration of ICTs in the classroom depends on the teachers' ability to scaffold the learning environment by using effective ICT-based pedagogies.

**Yurdakul et. al (2014)** conducted a study on Modeling pre-service teachers' TPACK competencies based on ICT usage. The purpose of this study was to build a model that predicts the relationships between the Technological Pedagogical Content Knowledge (TPACK) competencies and information and communication technology (ICT) usages. Data was collected from 3105 Turkish pre-service teachers. The TPACK Deep Scale, ICT usage phase survey and the ICT usage level survey were used to collect the research data. The structural regression model was conducted to test the model regarding the fact that ICT usage phases and ICT usage levels were predictors of TPACK competencies. The

found that ICT use based on ICT usage phase and level and technology use knowledge and skills also influence overall TPACK competencies when ICT usage phases and/or ICT usage levels are increased with the help of ICT training, it could be stated that TPACK competencies might be influenced; however, certain sub dimensions might be influenced more, and some dimensions might be influenced less.

**Harbeck (2015)** highlights the importance of educational technology in science teaching and how it can contribute to the professionalization of science teaching which is significant because professionalism advocates the idea that the professional teacher must seek to minimize the failure. This article explains that the technological approach offers hope of accommodating teachers with the feedback information which will provide them with the opportunity of making and adjusting instructional decisions. When teachers become involved, they must become skilled, to some level which is crucial because a key goal of educational technology is to assign students realistic goals and to provide teachers with tested options, or methods of instruction that can be based on needs, learning styles, and environmental circumstances of the individual learner.

**Olmanson et. al. (2015)** conducted a study on the Techno-pedagogical Pivot: Designing and Implementing a Digital Writing Tool. They outlined the design and use of a tool for supporting the between-drafts mapping of academic writing in the study and explored how a subtle pivot in pedagogical thinking led to innovative education technology and thought about how pathways to innovation can emerge from pivots, namely a leveraging of longstanding practices in novel ways has the potential to cultivate new opportunities for learning and suggested that students approached writing and revising in several ways and with different levels of dedication and interest.

**Thakur (2015)** conducted a study on the implementation of techno-pedagogical skills, its challenges, and its role in release at higher levels of education and found that the use of techno-pedagogical skills requires skilled instructors to guide teacher-educators to achieve good results.

**Özdemir (2016)** conducted a study on an Examination of the Techno-pedagogical Education Competencies (TPACK) of Pre-service Elementary School and Preschool Teachers. The fundamental problem of the study consists of the investigation of teachers' TPACK by their year of study and fields. They found that the means of junior (third year) and senior (fourth year) pre-service teachers in the departments of elementary school teaching and preschool teaching were high. Their means were also high in the sub-dimensions of TPACK competence. The TPACK means of senior preservice elementary school teachers were determined to differ from those of junior preservice preschool teachers. It can be stated that this difference resulted from technology and material development courses taken by the pre-service teachers in different semesters. Their pre-service education had positive effects on their TPACK.

**Tiede (2016)** undertook a study on Media Pedagogy in German and U.S. Teacher Education Various research works and practitioners conclude that media pedagogy should be integrated in teacher education to enable future teachers to use media for their lessons effectively and successfully. However, this realization is not necessarily reflected in actual university curricula, as pre-service teachers in some places can still finish their studies without ever dealing with media pedagogical issues. To understand, assess, and eventually improve the status of media pedagogical teacher education, comprehensive research is required. Against this background, the following article seeks to present a theory-based and empirical overview of the status quo of pre-service teachers' pedagogical media competencies focusing on Germany and the USA exemplarily To form a basis, different models of pedagogical media competencies have become part of teacher education programs and related studies will be summarized. Afterward, the method and selected results of a study will be described where the skills in question were measured with students from both countries, based on a comprehensive model of pedagogical media competencies

that connects German and international research in this field and they debated more on curricula and comparative evaluation, by integrating media pedagogy with teacher education. They found that there are differences in the pedagogical media competencies of German and US pre-service teachers, resulting from differences in the role, shape, and focus of media pedagogy in the respective teacher education programs but media pedagogy is not a mandatory part of teacher education in either country, both the USA and Germany are facing similar challenges and potentials for systemic improvement.

**Bala & Tao (2018)** undertook a study on an examination of techno-pedagogical competence and anxiety towards the use of instructional aids in teaching among senior secondary school teachers which was conducted on different senior secondary school teachers of Phagwara. The sample consisted of 100 senior secondary school teachers of Phagwara both from private and government schools by using a stratified random sampling technique to collect the data from different senior secondary schools of Phagwara. They revealed that the majority of the senior secondary school teachers have a high level of Techno-Pedagogical Competence which is required effectively in the 21st century. Teachers should be encouraged to adapt and explore modern educational technologies to continue with the same trend. The majority of senior secondary school teachers show a low level of anxiety toward the use of Instructional aids in teaching.

**Gloria & Benjamin (2018)** conducted a study on the "Attitude of Teachers towards Techno-Pedagogy" and revealed that the successful implementation of educational technologies depends largely on the attitudes of the educators by explaining that using technology in education is considered a relatively new pedagogy to integrate technology into curricula. Teachers, who become the main focus during the process of integrating these technologies into the curriculum, face several obstacles when trying to integrate technology into their curricula. Many school districts are pushing technologies across all levels of education.

**Kumar (2018)** conducted a Study of Techno-pedagogical skills of Secondary school Hindi teachers working in Kerala. They found that the Techno-pedagogical skills of secondary school Hindi teachers are satisfactory. Secondary school teachers who are handling Hindi have good knowledge regarding techno-pedagogical skills and male teachers have more techno-pedagogical skills than female teachers as they lag in the competency in utilizing the web facilities, confidence in using the IT devices effectively in the classroom, competency in inquiry-based on-line learning and competency to develop the needed C.D's and other particulars thereby stresses the importance of female teachers to improve their technopedagogical skills and concluded that computer literacy is a must for successful teaching is prevalent among Hindi teachers and education department of Kerala is taking possible steps to provide teachers information regarding the implication e-learning and web-based learning.

#### **2.2 Sum Up**

The collection of studies underscores the critical significance of techno-pedagogical skills in contemporary education. These researchers provide a comprehensive insight into the multifaceted nature of techno-pedagogical skills, highlighting their far-reaching implications in education. The studies demonstrate the complex relationships between content, pedagogy, and technology, encapsulated in models like TPACK (Technology, Pedagogy, and Content Knowledge). They underscore that effective technology integration demands more than just the acquisition of technical skills; it necessitates a profound understanding of how technology, pedagogy, and content interact. Developing these skills is essential for fostering student development, achieving learning outcomes, and equipping teachers to navigate the challenges of modern education effectively. Moreover, these researches highlight that teacher education must incorporate authentic engagement with educational technology, often referred to as "Learning by Design." The impact of technology integration hinges on the ability of teachers to skillfully scaffold the learning environment, and pre-service teachers' attitudes and competencies significantly affect the successful incorporation of techno-pedagogical knowledge into teaching.

Ultimately, the successful implementation of educational technologies hinges on educators' attitudes and competencies. Therefore, embracing technology in education is more than just a new pedagogy; it requires educators to adapt, explore, and continuously improve their skills to meet the demands of 21st-century learning environments.

These findings emphasize that successful teacher education programs should not only equip future educators with technological skills but also engage them in authentic design tasks, creating an environment where they learn to integrate technology effectively into their teaching. This learning process is dynamic and collaborative, as teachers explore new ways to represent content and adapt to the evolving educational landscape.

Furthermore, the studies reveal that pre-service teachers' attitudes, interests, and experiences with technology significantly influence their readiness to apply techno-pedagogical knowledge in their classrooms. The role of technology in teaching is not just about introducing new tools; it's about adapting to students' needs, learning styles, and the ever-evolving educational context. Technology can help teachers minimize failure by providing valuable feedback, individualized learning opportunities, and instructional strategies tailored to the diverse needs of students.

Overall, these articles collectively stress the importance of techno-pedagogical skills in modern education, calling for a holistic understanding of how technology, pedagogy, content, and context interact. They assert that teacher education should foster a deeper engagement with educational technology through authentic design tasks and collaborative learning, ensuring that teachers are equipped to effectively navigate the challenges of contemporary educational environments and provide students with rich and dynamic learning experiences.

### **Chapter III : Methodology**

### **3.1 Research Design**

The experimental method was used to conduct the study, focusing specifically on a Techno-Pedagogic Analysis to assess the implementation and effectiveness of video programs in educational settings.

### **3.2 Population**

All the students of IX and X of the CBSE board of Delhi NCR will be considered for recording the reactions of students against video programs. Science teachers of IX and X classes will be considered for recording the reaction of teachers against the telecasted video programs produced by CIET.

### **3.3 Sample Size**

- For studying the reaction of students, one section of IX and one section of X from three schools of the Delhi NCR were selected based on access.
- For studying the reaction of 30 teachers standards were selected from Delhi NCR

### **3.4 Tools and Techniques**

The tools used for the present study are

#### 1. Reaction Scale for Teachers : Reaction Towards Video Programme Scale for Teachers

The purpose of this reaction scale is to assess various aspects of video-based educational programs created by CIET, NCERT and to gather detailed feedback from teachers regarding the quality and effectiveness of these video programs. By collecting responses, it aims to evaluate the overall impact of the videos on teaching and learning. The tool consists of a total of 40 items, which are organized into several key themes, including content quality, audio-visual quality, teaching aids, presenter's performance, student engagement, pedagogical approach, and respondent alertness. The responses are gathered using a five-point Likert scale ranging from Strongly Agree (SA) to Strongly Disagree (SD), allowing for a nuanced understanding of students' perceptions and learning experiences.

#### 2. Reaction Scale for Students : Reaction Towards Video Programme Scale for Students

The purpose of this reaction scale is to assess students' responses towards the various aspects of science video programs produced by NCERT for secondary-level students. It evaluates the effectiveness of video programs based on various techno-pedagogic dimensions such as content quality, audio-visual effectiveness, teaching aids, presenter's performance, student engagement, pedagogical approach, and respondent alertness. The responses are gathered using a five-point Likert scale ranging from Strongly Agree (SA) to Strongly Disagree (SD), allowing for a nuanced understanding of students' perceptions and learning experiences.

#### 3. Observation Schedule :

The observational schedule is a comprehensive, experience-based tool for researchers to assess various aspects of video programs. It consists of 14 items, each categorized based on specific aspects of the teaching learning environment, such as content relevance, audio-visual quality, classroom management, students' interaction and retention, and feedback from both teachers and students on the program's effectiveness.

The purpose of this observation Schedule is to assess and evaluate the teaching and learning environment in classroom settings, aiming to collect both qualitative and quantitative primary data, thus offering a broader range of insights. The schedule employs a straightforward Yes/No/Undecided format, enabling observers to efficiently and clearly indicate whether the evaluated elements meet the expected criteria. Additionally, it includes space for comments, allowing evaluators to provide qualitative feedback on their observations.

#### **3.5 Procedure of Data Collection**

After coordinating with the Principal/Teacher In-charge of each school for data collection, the research team visited the schools in person. The efficiency of the video programs was evaluated using the observational schedule. The researchers observed the classroom environment while the program was being shown to students. Reaction scales were distributed to both teachers and students to collect their feedback on the Video program. Each item on the scale was read and explained by the researcher to the respondents. Data was collected from students of classes IX and X, as well as teachers from three schools. Reactions were recorded from students and teachers during the telecast of the video programs.

#### **3.6 Statistical Techniques Used for Data Analysis**

- i) Frequency
- ii) Percentage Analysis
- iii) Content Analysis

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### **Chapter IV : Results and Interpretation**

#### 4.1. Introduction

The Methodology followed in conducting this study has been given in detail in the previous chapter. In the same chapter, the Statistical Techniques used for analyzing the data have been given. The Objective-wise Results and Interpretation have been given in the following captions.

# 4.2. Influence of gender, class & their interaction on student's overall as well as dimension-wise reaction towards video programs of biology

The first objective was to study the influence of Gender, Class and their interaction on students' Overall as well as dimension-wise Reaction towards Video Programs of Biology. There were seven dimensions of Video Programs towards which the Reaction of students were taken. The seven dimensions were Content, Presentation, Audio, Student's Engagement, Demonstration, Videography and Information Graphics. The data were analyzed overall as well as dimension-wise and the results are given separately in the following captions.

### 4.2.1 Influence of Gender, Class and their Interaction on students' Overall Reaction towards Video Programs of Biology

The objective was to study the influence of Gender, Class and their interaction on students' Overall Reaction towards Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus, the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.1.

**Table 4.1:** Summary of 2 X 2 Factorial Design ANOVA of Overall Reaction towards Video Programs of Biology students

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	1318.92	1318.92	8.23	p<0.01
Class (B)	1	2875.77	2875.77	17.94	p<0.01
AXB	1	254.61	254.61	1.59	
Error	943	151155.62	160.29		
Total	946				

# 4.2.1.1 Influence of Gender on students' Overall Reaction towards Video Programs of Biology

From Table 4.1, it can be seen that the F-Value for Gender is 8.23 which is significant at 0.01 level with df =1/943. It indicates that the mean scores of Overall Reaction towards Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Overall Reaction towards Video Programs of Biology. Thus the Null Hypothesis that there is no significant influence of Gender on Overall Reaction towards Video Programs of Biology is rejected. Further, the mean score of Overall Reaction towards Video Programs of Biology of Males is 97.40 which is significantly higher than that of Females whose mean score of Overall Reaction towards Video Programs of Biology is 95.01. It may be said that overall Male students liked Video Programs of Biology than Female students.

# 4.2.1.2 Influence of Class on Students' Overall Reaction towards Video Program of Biology

The F-Value for Class is 17.94 which is significant at 0.01 level with df=1/943 (Vide Table 4.1). It indicates that the mean scores of Overall Reaction towards Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Overall Reaction towards Video Programs of Biology. Thus the Null Hypothesis that there is no significant influence of Class on Overall Reaction towards Video Programs of Biology is rejected. Further, the mean score of Overall Reaction towards Video Programs of Biology of Class IX students is 94.44 which is significantly lower than those of Class X students whose mean score of Overall Reaction towards Video Programs of Biology is 97.97. It may, therefore, be said that on the whole Class X students liked Video Programs of Biology than Class IX students.

### 4.2.1.3 Influence of Interaction between Gender and Class on Students' Overall Reaction towards Video Program of Biology

The F-value for interaction between Gender and Class is 1.59 which is not significant (Vide Table 4.1). It reflects that there is no significant difference in mean scores of Overall Reaction towards Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Overall Reaction towards Video Programs of Biology on students. Thus the null hypothesis that there is no significant influence of the interaction of Gender and Class on Overall Reaction toward Video Programs of Biology is not rejected. It may, therefore, be said that Overall Reaction towards Video Programs of Biology was found to be independent of interaction between Gender and Class of students. Thus Males and Females of Classes IX and X liked the whole Video Programs of Biology to the same extent.

### **4.2.2 Influence of Gender, Class and their Interaction on Students' Reaction towards Content of Video Programs of Biology**

The objective was to study the influence of Gender, Class and their Interaction on students' Reaction towards the Content of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus, the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.2.

**Table 4.2:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Content of

 Video Programs of Biology

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	76.48	76.48	5.48	p<0.05
Class (B)	1	149.60	149.60	10.72	p<0.01
AXB	1	3.20	3.20	0.23	
Error	943	13161.05	13.96		
Total	946				

### **4.2.2.1 Influence of Gender on students' Reaction towards Content of Video Program of Biology**

From Table 4.2, it can be seen that the F-Value for Gender is 5.48 which is significant at 0.05 level with df=1/943. It indicates that the mean scores of Reaction towards Content of Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards the Content of Video Programs of Biology, of students. Thus the Null Hypothesis that there is no significant influence of Gender on Reaction towards the Content of Video Programs for Biology, of students is rejected. Further, the mean score of Reaction towards Content of Video Programs of Biology of Males is 18.76 which is significantly higher than those of Females whose mean score of Reaction towards Content of Video Programs of Biology is 18.18. It may, therefore, be said that Male students liked the Content of Video Programs of Biology more than Female students.

# 4.2.2.2 Influence of Class on Students' Reaction towards Content of Video Program of Biology

The F-Value for Class is 10.72 which is significant at 0.01 level with df =1/943 (Vide Table 4.2). It indicates that the mean scores of Reaction towards the Content of Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards the Content of Video Programs of Biology students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Content of Video Programs of Biology of Class IX students is 18.07 which is significantly lower than those of Class X students whose mean score of Reaction towards Content of Video Programs of Biology of Class IX students is 18.07 which is significantly lower than those of Class X students whose mean score of Reaction towards Content of Video Programs of Biology is 18.87. It may, therefore, be said that Class X students liked the Content of Video Programs of Biology than those of Class IX students.

### **4.2.2.3 Influence of Interaction between Gender and Class on Students' Reaction towards Content of Video Program of Biology**

The F-value for interaction between Gender and Class is 0.23 which is not significant (Vide Table 4.2). It reflects that there is no significant difference in mean scores of Reaction towards Content of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards Content of Video Programs of Biology students. Thus the null hypothesis that there is no significant influence of the interaction of Gender and Class on Reaction towards the Content of Video Programs for Biology of Students is not rejected. It may, therefore, be said that Reaction towards the Content of Video Programs of Biology was found to be independent of the interaction between Gender and Class of students. Thus Males and Females of Classes IX and X liked the Content of Video Programs of Biology to the same extent.

### **4.2.3 Influence of Gender, Class and their Interaction on Students' Reaction towards Presentation of Content of Video Programs of Biology**

The objective was to study the influence of Gender, Class and their Interaction on students' Reaction towards the Presentation of Content of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.3.

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	52.86	52.86	1.77	ns
Class (B)	1	274.92	274.92	9.22	p<0.01
AXB	1	162.01	162.01	5.43	p<0.05
Error	943	28114.11	29.81		
Total	946				

**Table 4.3:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Content of Video Programs of Biology

ns: Not Significant

# **4.2.3.1 Influence of Gender on students' Reaction towards Presentation of Content of Video Program of Biology**

From Table 4.3, it can be seen that the F-Value for Gender is 1.77 which is not significant. It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Biology of Male and Female students did not differ significantly. So there was no significant influence of Gender on Reaction towards the Presentation of Content of Video Programs for Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards the Presentation of Students is not rejected. It may, therefore, be said that both Male and Female students liked the Presentation of the Content of Video Programs of Biology.

# **4.2.3.2 Influence of Class on Students' Reaction towards Presentation of Content of Video Program of Biology**

The F-Value for Class is 9.22 which is significant at 0.05 level with df=1/943 (Vide Table 4.3). It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards the Presentation of Content of Video Programs for Biology of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Presentation of Students is rejected. Further, the mean score of Reaction towards Presentation of Content of Video Programs of Biology of Class IX students is 29.75 which is significantly lower than those of Class X students whose mean score of Reaction towards Presentation of Content of Video Programs of Biology is 30.84. It may, therefore, be said that Class X students liked the Presentation of the Content of Video Programs of Biology more than Class IX students.

### **4.2.3.3 Influence of Interaction between Gender and Class on Students' Reaction Towards Presentation of Content of Video Program of Biology**

The F-Value for interaction between Gender and Class is 5.43 which is significant at 0.05 level with df = 1/943 (Vide Table 4.3). It reflects that there is a significant difference in mean scores of Reaction towards Presentation of Content of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on Reaction towards Presentation of Content of Video Programs of Biology of students. Thus the null hypothesis that there is no significant influence of the interaction of Gender and Class on Reaction towards the Presentation of Content of Video Programs for Biology of students is rejected. In order to know the trend of influence of interaction between Gender and Class on Reaction towards the Presentation of Content of Students of Biology of students is rejected. In order to know the trend of influence of interaction between Gender and Class on Reaction towards the Presentation of Content of Biology of students, Graph 4.1 has been plotted.

**Graph 4.1:** Influence of Interaction between Gender and Class on Reaction towards Presentation of Content of Video Programs of Biology of students



From Graph 4.1, it can be seen that in the case of Males, there is a sharp increase in Reaction toward the Presentation of Content of Video Programs of Biology as the Class changes from IX to X but in case of Females there is a slight increase in Reaction towards Presentation of Content of Video Programs of Biology. Irrespective of Gender, Class X students had better Reactions toward the Presentation of Content of Video Programs of Biology than that of Class IX students. It may be said that Male students from Class X liked the Presentation of the Content of Video Programs of Biology more than those of Females of the same class and Males as well as Females of Class IX.

# **4.2.4 Influence of Gender, Class and their Interaction on Students' Reaction towards Audio aspect of Video Programs of Biology**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards the Audio aspect of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.4.

**Table 4.4:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Audio aspect

 of Video Programs of Biology

Source of variance	df	SS	MSS	<b>F-value</b>	Remark
Gender (A)	1	35.27	35.27	5.46	p<0.05
Class (B)	1	103.47	103.47	16.01	p<0.01
AXB	1	1.03	1.03	0.16	ns
Error	943	28114.11	29.81		
Total	946				

ns: Not Significant

# 4.2.4.1 Influence of Gender on students' Reaction towards Audio aspect of Video Programs of Biology

From Table 4.4, it can be seen that the F-Value for Gender is 5.46 which is significant at 0.05 level with df=1/943. It indicates that the mean scores of Reaction towards Audio aspect of Video Programs

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of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards the Audio aspect of Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Audio aspect of Video Programs of Biology of students is rejected. Further the mean score of Reaction towards Audio aspect of Video Programs of Biology of Male students 10.20 which is significantly higher than that of Female students whose mean score of Reaction towards Audio aspect of Video Programs of Biology is 9.81. It may, therefore, be said that Male students liked the Audio aspect of Video Programs of Biology more than those of Female students.

# **4.2.4.2 Influence of Class on students' Reaction towards Audio aspect of Video Program of Biology**

The F-Value for Class is 16.01 which is significant at 0.01 level with df=1/943 (Vide Table 4.4). It indicates that the mean scores of Reaction towards Audio aspect of Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards the Audio aspect of Video Programs of Biology students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Audio aspect of Video Programs of Biology of students is rejected. Further, the mean score of Reaction towards Audio aspect of Video Programs of Biology of Class IX students is 9.67 which is significantly lower than those of Class X students whose mean score of Reaction towards Audio aspect of Video Programs of Biology is 10.57. It may, therefore, be said that Class X students liked the Audio aspect of Video Programs of Biology more than those of Class IX students.

# **4.2.4.3 Influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Program of Biology**

The F-Value for interaction between Gender and Class is 0.16 which is not significant. (Vide Table 4.4). It reflects that there is no significant difference in mean scores of Reaction towards Audio aspect of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards the Audio aspect of Video Programs of Biology students. Thus the null hypothesis that there is no significant influence of interaction of Gender and Class on Reaction towards Audio aspect of Video Programs of Biology students. Thus the null hypothesis that there is no significant influence of interaction of Gender and Class on Reaction towards Audio aspect of Video Programs of Biology students was found to be independent of influence of interaction between Gender and Class IX and Class X liked the Audio aspect of Video Programs of Biology students was found to be independent of influence of interaction between Gender and Class IX and Class X liked the Audio aspect of Video Programs of Biology to the same extent.

### 4.2.5 Influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Biology

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus, the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.5.



**Table 4.5:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Students'

 Engagement during Video Programs of Biology

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	78.58	78.58	22.44	p<0.01
Class (B)	1	16.75	16.75	4.78	p<0.05
AXB	1	22.88	22.88	6.53	p<0.01
Error	943	3302.58	3.50		
Total	946				

# 4.2.5.1 Influence of Gender on students' Reaction towards Student's Engagement during Video Programs of Biology

From Table 4.5, it can be seen that the F-Value for Gender is 22.44 which is significant at 0.01 level with df=1/943. It indicates that the mean scores of Reactions towards Students' Engagement during Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards Students' Engagement during Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Students of Biology of students is rejected. Further the mean score of Reaction towards Students' Engagement during Video Programs of Biology of Male students 6.80 which is significantly higher than that of Female students whose mean score of Reaction towards Students' Engagement during Video Programs of Biology is 6.22. It may, therefore, be said that Male students' Engagement during Video Programs of Biology was more than those Female students.

# 4.2.5.2 Influence of Class on students' Reaction towards Students' Engagement during Video Program of Biology

The F-Value for Class is 4.78 which is significant at 0.05 level with df =1/943 (Vide Table 4.5). It indicates that the mean scores of Reactions towards Students' Engagement during Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards Students' Engagement during Video Programs of Biology of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Students' Engagement during Video Programs of Biology of students' Engagement during Video Programs of Biology of students is rejected. Further, the mean score of Reaction towards Students' Engagement during Video Programs of Biology of Class IX students is 6.37 which is significantly lower than those of Class X students whose mean score of Reaction towards Students' Engagement during Video Programs of Biology is 6.64. It may, therefore, be said that Class X students liked Students' Engagement during Video Programs of Biology more than those of Class IX students.

# **4.2.5.3 Influence of interaction between Gender and Class on Reaction towards Students' Engagement during Video Program of Biology of students**

The F-Value for interaction between Gender and Class is 6.53 which is significant at 0.01 with df=1/943 (Vide Table 4.5). It reflects that there is a significant difference in mean scores of Reaction towards Students' Engagement during Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on Reaction towards Students' Engagement during Video Programs of Biology of Students. Thus the null hypothesis that there is no significant influence of interaction of Gender and Class on Reaction towards

Students' Engagement during Video Programs of Biology of students is rejected. In order to know which Gender belonging to which Class had a significantly higher mean scores of Reaction towards Students' Engagement during Video Programs of Biology of students, Graph 4.2 has been plotted.

**Graph 4.2:** Influence of interaction between Gender and Class on Students' Reaction towards Students' Engagement during Video Programs of Biology



#### From Graph 4.2, it can be seen that with the change of Class from IX to X, there is a sharp improvement in Males' Reaction towards Students' Engagement during Video Programs of Biology but there is practically no change in Females' Reaction towards Students' Engagement during Video Programs of Biology. Thus, Male students of Class X engaged more during Video Programs of Biology than those of Class IX students but Female students of both Classes IX and X engaged to the same extent during Video Programs of Biology.

#### 4.2.6 Influence of Gender, Class and their interaction on students' Reaction towards Demonstration of Video Programs of Biology

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Demonstration of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.6.

**Table 4.6:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Demonstration of Video Programs of Biology

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	25.33	25.33	3.72	p<0.05
Class (B)	1	207.94	207.9	30.57	p<0.05
AXB	1	0.06	4	0.01	ns
Error	943	6413.70	0.06		
Total	946		6.80		

ns: Not Significant

### **4.2.6.1 Influence of Gender on students' Reaction towards Demonstration of Video Programs of Biology**

From Table 4.6, it can be seen that the F-Value for Gender is 3.72 which is significant at 0.05 level with df=1/943. It indicates that the mean scores of Reaction towards Demonstration of Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards Demonstration of Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Demonstration of Video Programs of Biology of students is rejected. Further the mean score of Reaction towards Demonstration towards Demonstration of Video Programs of Biology of Students is 9.88 which is significantly lower than that of Female students whose mean score of Reaction towards Demonstration of Video Programs of Biology is 10.22. It may, therefore, be said that Female students liked Demonstration of Video Programs of Biology more than those of Male students.

### **4.2.6.2 Influence of Class on Students' Reaction towards Demonstration of Video Program of Biology**

The F-Value for Class is 30.57 which is significant at 0.01 level with df=1/943 (Vide Table 4.6). It indicates that the mean scores of Reaction towards Demonstration of Video Programs of Biology of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards Demonstration of Video Programs of Biology of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Demonstration of Video Programs of Biology of students is rejected. Further, the mean score of Reaction towards Demonstration of Video Programs of Biology of Students is rejected. Further, the mean score of Reaction towards Demonstration of Class X students whose mean score of Reaction towards Demonstration of Video Programs of Biology is 10.53. It may, therefore, be said that Class X students liked Demonstration of Video Programs of Biology more than those of Class IX students.

### **4.2.6.3 Influence of interaction between Gender and Class on Students' Reaction towards Demonstration of Video Program of Biology**

The F-Value for interaction between Gender and Class is 0.01 which is not significant (Vide Table 4.6). It reflects that there is no significant difference in mean scores of Reaction towards Demonstration of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards Demonstration of Video Programs of Biology of students. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on Reaction towards Demonstration of Video Programs of Biology of students and Class on Reaction towards Demonstration of Video Programs of Biology of students is rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Demonstration of Video Programs of Biology to the same extent.

#### 4.2.7 Influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Biology

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.7

**Table 4.7:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Videography

 of Video Programs of Biology

Source of variance	df	SS	MSS	<b>F-value</b>	Remark
Gender (A)	1	53.08	53.08	6.25	p<0.05
Class (B)	1	0.06	0.06	0.01	ns
AXB	1	0.27	0.27	0.03	ns
Error	943	8009.70	8.49		
Total	946				

ns: Not Significant

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### **4.2.7.1 Influence of Gender on Students' Reaction towards Videography of Video Programs of Biology**

From Table 4.7, it can be seen that the F-Value for Gender is 6.25 which is significant at 0.05 level with df =1/943. It indicates that the mean scores of Reaction towards Videography of Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards Videography of Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Videography of Video Programs of Biology of students is rejected. Further the mean score of Reaction towards Videography of Video Programs of Biology of Students is 15.88 which is significantly higher than that of Female students whose mean score of Reaction towards Videography of Video Programs of Biology is 15.40. It may, therefore, be said that Male students liked Videography of Video Programs of Biology more than those of Female students.

# **4.2.7.2 Influence of Class on students' Reaction towards Videography of Video Program of Biology**

The F-Value for Class is 0.01 which is not significant (Vide Table 4.7). It indicates that the mean scores of Reaction towards Videography of Video Programs of Biology of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on Reaction towards Videography of Video Programs of Biology of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Videography of Video Programs of Biology of students is not rejected. It may, therefore, be said that both Class IX and Class X students were found to like Videography of Video Programs of Biology to the same extent.

### **4.2.7.3 Influence of interaction between Gender and Class on students' Reaction towards Videography of Video Program of Biology**

The F-value for interaction between Gender and Class is 0.03 which is not significant (Vide Table 4.7). It reflects that there is no significant difference in mean scores of Reaction towards Videography of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards Videography of Video Programs of Biology of students. Thus the null hypothesis that there is no significant influence of interaction of Gender and Class on students' Reaction towards Videography of Video Programs of Biology is rejected. It may, therefore, be said that Males and Females studying in Classes IX and X liked Videography of Video Programs of Biology to the same extent.

#### 4.2.8 Influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Biology

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Biology. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.8.

**Table 4.8:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Information Graphics of Video Programs of Biology

Source of variance	Df	SS	MSS	F-value	Remark
Gender (A)	1	14.12	14.12	5.69	p<0.05
Class (B)	1	0.36	0.36	0.15	ns
AXB	1	1.03	1.03	0.41	ns
Error	943	2340.81	2.48		
Total	946				

ns: Not Significant

# **4.2.8.1 Influence of Gender on students' Reaction towards Information Graphics of Video Programs of Biology**

From Table 4.8, it can be seen that the F-Value for Gender is 5.69 which is significant at 0.05 level with df=1/943. It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of Biology of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards Information Graphics of Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Information Graphics of Video Programs of Biology of students is rejected. Further the mean score of Reaction towards Information Graphics of Video Programs of Biology of Students is 5.26 which is significantly higher than that of Female students whose mean score of Reaction towards Information Graphics of Video Programs of Biology is 5.01. It may, therefore, be said that Male students liked Information Graphics of Video Programs of Biology more than Female students.

# **4.2.8.2 Influence of Class on students' Reaction towards Information Graphics of Video Program of Biology**

The F-Value for Class is 0.70 which is not significant (Vide Table 4.8). It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of Biology of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on Reaction towards Information Graphics of Video Programs of Biology of students. Thus, the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Information Graphics of Video Programs of Biology is not rejected. It may, therefore, be said that both Class IX and Class X students liked Information Graphics of Video Programs of Biology to the same extent.

# **4.2.8.3 Influence of Interaction between Gender and Class on Students' Reaction towards Information Graphics of Video Program of Biology**

The F-value for interaction between Gender and Class is 0.41 which is not significant (Vide Table 4.8). It reflects that there is no significant difference in mean scores of Reaction towards Information Graphics of Video Programs of Biology of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards Information Graphics of Video Programs of Biology of students. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Biology is not rejected. It may, therefore, be said that Males and Females from Classes IX and X liked Information Graphics of Video Programs of Biology to the same extent.

### 4.3.0 Influence of gender, class & their interaction on student's overall as well as dimension-wise reaction towards video programs of chemistry

The second objective was to study the influence of Gender, Class and their interaction on students' Overall as well as dimension-wise Reaction towards Video programs of Chemistry. There were seven dimensions of Video Programs towards which the Reaction of students were taken. The seven dimensions were Content, Presentation, Audio, Student's Engagement, Demonstration, Videography and Information Graphics. The data were analyzed overall as well as dimension-wise and the results are given separately in the following captions.

### 4.3.1 Influence of Gender, Class and their Interaction on students' Overall Reaction towards Video Programs of Chemistry

The objective was to study the influence of Gender, Class and their interaction on students' Overall Reaction towards Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.9.

**Table 4.9:** Summary of 2 X 2 Factorial Design ANOVA of Overall students' Reaction towards Video

 Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	1048.37	1048.37	6.11	p<0.05
Class (B)	1	4913.69	4913.69	28.64	p<0.01
AXB	1	2239.34	2239.34	13.05	p<0.01
Error	249				
Total	252				

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# 4.3.1.1 Influence of Gender on Overall Students' Reaction towards Video Program of Chemistry

From Table 4.9, it can be seen that the F-Value for Gender is 6.11 which is significant at 0.05 level with df=1/249. It indicates that the mean scores of Overall Reactions towards Video Programs of Chemistry of Male and Female students differ significantly. So there was a significant influence of Gender on Overall Reaction towards Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Gender on Overall Reaction towards Video Programs of Chemistry of students is rejected. Further, the mean score of Overall Reaction towards Video Programs of Chemistry of Males is 93.63 which is significantly higher than those of Females whose mean score of Overall Reaction towards Video Programs of Chemistry is 89.43. It may, therefore, be said that on the whole Male students liked Video Programs of Chemistry more than Female students.

### **4.3.1.2 Influence of Class on Overall students' Reaction towards Video Program of Chemistry**

The F-Value for Class is 28.64 which is significant at 0.01 level with df =1/249 (Vide Table 4.9). It indicates that the mean scores of Overall Reaction towards Video Programs of Chemistry of Class IX and Class X students differ significantly. So there was a significant influence of Class on Overall Reaction towards Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Class on Overall Reaction towards Video Programs of Chemistry of students is rejected. Further, the mean score of Overall Reaction towards Video Programs of Chemistry of Class IX students is 86.99 which is significantly lower than those of Class X students whose mean score of Overall Reaction towards Video Programs of Chemistry of Students is 86.99 which is significantly lower than those of Class X students whose mean score of Overall Reaction towards Video Programs of Chemistry is 96.08. It may, therefore, be said that on the whole, Class X students liked Video Programs of Chemistry more than those of Class IX students.

#### **4.3.1.3 Influence of interaction between Gender and Class on Overall Students' Reaction towards Video Program of Chemistry**

The F-Value for interaction between Gender and Class is 13.05 which is significant at 0.01 level with df=1/249 (Vide Table 4.9). It reflects that there is a significant difference in mean scores of Overall Reaction towards Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on Overall students' Reaction towards Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on Overall students' Reaction towards Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on Overall students' Reaction towards Video Programs of Chemistry is rejected. In order to know which Gender belonging to which Class had a significantly higher mean score of Overall Reaction towards Video Programs of Chemistry of students, Graph 4.3 has been plotted.

**Graph 4.3:** Influence of interaction between Gender and Class on Overall students' Reaction towards Video Programs of Chemistry



#### Estimated Marginal Means of Total\_Score

From Graph 4.3, it can be seen that with a change in Class from IX to X, there is a sharp improvement in Females' Overall Reaction towards Video Programs of Chemistry but there is a slight improvement in Males' Overall Reaction towards Video Programs of Chemistry. There is a vast difference in Overall Reaction towards Video Programs of Chemistry of Males and Females belonging to Class IX. Males of Class IX liked Overall Video Programs of Chemistry more than those of Females. Thus, irrespective of Gender, on the whole, Class X students liked Video Programs of Chemistry more than those of Class IX students. In the case of Class IX students, on the whole, Male students liked Video Programs of Chemistry more than Female students.

#### **4.3.2 Influence of Gender, Class and their interaction on students' Reaction towards Content of Video Programs of Chemistry**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Content of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.10.

**Table 4.10:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Content of

 Video Programs of Chemistry

Source of variance	df	SS	MSS	<b>F-value</b>	Remark
Gender (A)	1	69.87	69.87	5.14	p<0.05
Class (B)	1	138.97	138.97	10.23	p<0.01
AXB	1	178.96	178.96	13.18	p<0.01
Error	249	3381.71	13.58		
Total	252				

### **4.3.2.1 Influence of Gender on students' Reaction towards Content of Video Program of Chemistry**

From Table 4.10, it can be seen that the F-Value for Gender is 5.14 which is significant at 0.05 level with df = 1/249. It indicates that the mean scores of Reaction towards Content of Video Programs of Chemistry of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards Content of Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Gender on Reaction towards Content of Video Programs of Chemistry of students is rejected. Further, the mean score of Reaction towards Content of Video Programs of Chemistry of Males is 18.03 which is significantly higher than those of Females whose mean score of Reaction towards Content of Video Programs of Chemistry is 16.95. It may, therefore, be said that Male students liked Content of Video Programs of Chemistry more than those of Female students.

#### **4.3.2.2 Influence of Class on students' Reaction towards Content of Video Program of Chemistry**

The F-Value for Class is 10.23 which is significant at 0.01 level with df =1/249 (Vide Table 4.10). It indicates that the mean scores of Reaction towards Content of Video Programs of Chemistry of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards Content of Video Programs of Chemistry of students. Thus, the Null Hypothesis that there is no significant influence of Class on Reaction towards Content of Video Programs of Chemistry of students is rejected. Further, the mean score of Reaction towards Content of Video Programs of Chemistry of Class IX students is 16.74 which is significantly lower than those of Class X students whose mean score of Reaction towards Content of Video Programs of Students whose mean score of Reaction towards Content of Video Programs of Class X students whose mean score of Reaction towards Content of Video Programs of Class X students is 16.74 which is significantly lower than those of Class X students whose mean score of Reaction towards Content of Video Programs of Class IX students liked Content of Video Programs of Chemistry more than those of Class IX students.

#### **4.3.2.3 Influence of interaction between Gender and Class on students' Reaction towards Content of Video Program of Chemistry**

The F-Value for interaction between Gender and Class is 13.18 which is significant at 0.01 level with df=1/249 (Vide Table 4.10). It reflects that there is a significant difference in mean scores of Reaction towards Content of Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on students' Reaction towards Content of Video Programs of Chemistry. Thus, the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Content of Video Programs of Chemistry. Thus, the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Content of Video Programs of Chemistry is rejected. In order to know which Gender belonging to which Class had a significantly higher mean scores of students' Reaction towards Content of Video Programs of Chemistry, Graph 4.4 has been plotted.

**Graph 4.4:** Influence of interaction between Gender and Class on students' Reaction towards Content of Video Programs of Chemistry



Estimated Marginal Means of Content

From Graph 4.4, it can be seen that there is a sharp improvement in Female students' Reaction towards Content of Video Programs of Chemistry as Class changes from IX to X but it is not so in case of Males. Class X Female students liked Content of Video Programs of Chemistry more than their counterparts of Class IX students. Irrespective of Class, Male students were found to like Content of Video Programs of Chemistry to the same degree.

#### **4.3.3 Influence of Gender, Class and their interaction on students' Reaction towards Presentation of Content of Video Programs of Chemistry**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Presentation of Content of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.11.

**Table 4.11:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Presentation of Content of Video Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	67.95	67.95	2.56	ns
Class (B)	1	179.71	179.71	6.78	p<0.01
AXB	1	159.82	159.82	6.03	p<0.05
Error	249	6596.31	26.49		
Total	252				

ns: Not Significant

# **4.3.3.1 Influence of Gender on students' Reaction towards Presentation of Content of Video Program of Chemistry**

From Table 4.11, it can be seen that the F-Value for Gender is 2.56 which is not significant. It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Chemistry of Male and Female students did not differ significantly. So there was no significant influence of Gender on Reaction towards Presentation of Content of Video Programs of Chemistry of students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Presentation of Content of Video Programs of Chemistry of Students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Presentation of Content of Video Programs of Chemistry of students is not rejected. It may, therefore, be said that both Male and Female students liked Presentation of Content of Video Programs of Chemistry to the same extent.

### **4.3.3.2 Influence of Class on students' Reaction towards Presentation of Content of Video Program of Biology**

The F-Value for Class is 6.78 which is significant at 0.01 level with df =1/249 (Vide Table 4.11). It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Chemistry of Classes IX and X students differ significantly. So there was a significant influence of Class on Reaction towards Presentation of Content of Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Presentation of Content of Video Programs of Chemistry of Students is rejected. Further, the mean score of Reaction towards Presentation of Content of Video Programs of Chemistry of Class IX students is 28.60 which is significantly lower than those of Class X students whose mean score of Reaction towards Presentation of Content of Video Programs of Chemistry is 30.34. It may, therefore, be said that Class X students liked Presentation of Content of Video Programs of Chemistry more than those of Class IX students.

### **4.3.3.3 Influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Program of Chemistry**

The F-Value for interaction between Gender and Class is 6.03 which is significant at 0.05 level with df=1/249 (Vide Table 4.11). It reflects that there is a significant difference in mean scores of Reaction towards Presentation of Content of Video Programs of Chemistry of Male and Female students studying in Classes IX and X. So there was a significant influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Programs of Chemistry is rejected. In order to know the trend of influence of interaction between Gender and Class on Reaction towards Presentation of Content of Video Programs of Chemistry is rejected. In order to know the trend of influence of interaction between Gender and Class on Reaction towards Presentation of Content, the Graph 4.5 has been plotted.

**Graph 4.5:** Influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Programs of Chemistry



From Graph 4.5, it can be seen that as Class changes from IX to X, there is a sharp improvement in Females' Reaction towards Presentation of Content of Video Programs of Chemistry while there is no change in Males' Reaction towards Presentation of Content of Video Programs of Chemistry. Male students of Classes IX and X liked Presentation of Content of Video Programs of Chemistry to the same extent while Female students of Class X liked Presentation of Content of Video Programs of Chemistry to the same extent while Female students of Class X liked Presentation of Content of Video Programs of Chemistry to the same extent while Female students of Class X liked Presentation of Content of Video Programs of Chemistry more than those of Class IX students.

#### 4.3.4 Influence of Gender, Class and their interaction on students' Reaction towards Content of Audio aspect of Video Programs of Chemistry

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Audio aspect of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.12.

**Table 4.12:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Audio aspect

 of Video Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	59.37	59.37	7.06	p<0.01
Class (B)	1	70.08	70.08	8.33	p<0.01
AXB	1	117.69	117.69	14.00	p<0.01
Error	249	2093.81	8.41		
Total	252				

ns: Not Significant

# **4.3.4.1 Influence of Gender on students' Reaction towards Audio aspect of Video Programs of Chemistry**

From Table 4.12, it can be seen that the F-Value for Gender is 7.06 which is significant at 0.01 level with df=1/249. It indicates that the mean scores of Reaction towards Audio aspect of Video Programs of Chemistry of Male and Female students differ significantly. So there was a significant influence of Gender on Reaction towards the Audio aspect of Video Programs of Chemistry of students. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards Audio aspect of Video Programs of Chemistry is rejected. Further the mean score of Reaction towards Audio aspect of Video Programs of Chemistry of Male students is 9.71 which is significantly higher than that of Female students whose mean score of Reaction towards the Audio aspect of Video Programs of Chemistry is 8.71. It may, therefore, be said that Male students liked the Audio aspect of Video Programs of Chemistry more than those of Female students.

### **4.3.4.2 Influence of Class on students' Reaction towards Audio aspect of Video Program of Chemistry**

The F-Value for Class is 8.33 which is significant at 0.01 level with df=1/249 (Vide Table 4.12). It indicates that the mean scores of Reaction towards Audio aspect of Video Programs of Chemistry of Class IX and Class X students differ significantly. So there was a significant influence of Class on Reaction towards the Audio aspect of Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Audio aspect of Video Programs of Chemistry is rejected. Further, the mean score of Reaction towards Audio aspect of Video Programs of Chemistry of Class IX students is 8.66 which is significantly lower than those of Class X students whose mean score of Reaction towards Audio aspect of Video Programs of Chemistry is 9.75. It may, therefore, be said that Class X students liked the Audio aspect of Video Programs of Class IX students.

### 4.3.4.3 Influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Program of Chemistry

The F-Value for interaction between Gender and Class is 14.00 which is significant at 0.01 level with df=1/249 (Vide Table 4.12). It reflects that there is a significant difference in mean scores of Reaction towards Audio aspect of Video Programs of Chemistry of Male and Female students studying in Classes IX and X. So there was a significant influence of interaction between Gender and Class on students' Reaction towards the Audio aspect of Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Programs of Chemistry is rejected. In order to know the trend of influence of interaction between Gender and Class on students' Reaction towards Audio Aspect of Video Programs of Chemistry is rejected. In order to know the trend of Programs of Chemistry, Graph 4.6 has been plotted.

**Graph 4.6:** Influence of interaction between Gender and Class on students' Reaction towards Audio Aspect of Video Programs of Chemistry



**From Graph 4.6**, it can be seen that as Class changes from IX to X, there is a sharp improvement in Females' Reaction towards Audio aspect of Video Programs of Chemistry but the reverse trend is observed in case of Males. Male students of Classes IX and X liked the Audio aspect of Video Programs of Chemistry to the same extent while Female students of Class X liked the Audio aspect of Video Programs of Chemistry more than those of Class IX students.

#### 4.3.5 Influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Chemistry

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.13.

**Table 4.13:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Students'Engagement during Video Programs of Chemistry

Source of variance	Df	SS	MSS	F-value	Remark
Gender (A)	1	2.48	2.48	0.61	ns
Class (B)	1	8.24	8.24	2.03	ns
AXB	1	14.42	14.42	3.56	ns
Error	249	1009.40	4.05		
Total	252				

ns: Not Significant

# 4.3.5.1 Influence of Gender on students' Reaction towards Student's Engagement during Video Programs of Chemistry

From Table 4.13, it can be seen that the F-Value for Gender is 0.61 which is not significant. It indicates

that the mean scores of Reaction towards Students' Engagement during Video Programs of Chemistry of Male and Female students did not differ significantly. So there was no significant influence of Gender on Reaction towards Students' Engagement during Video Programs of Chemistry of students. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards Students' Engagement during Video Programs of Chemistry is not rejected. It may, therefore, be said that both Males and Females Engagement during Video Programs of Chemistry was to the same extent.

# 4.3.5.2 Influence of Class on students' Reaction towards Students' Engagement during Video Program of Chemistry

The F-Value for Class is 2.03 which is not significant (Vide Table 4.13). It indicates that the mean scores of Reaction towards Students' Engagement during Video Programs of Chemistry of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on Reaction towards Students' Engagement during Video Programs of Chemistry of students. Thus the Null Hypothesis that there is no significant influence of Class on Reaction towards Students' Engagement during video Programs of Chemistry of students' Engagement during Video Programs of Class IX and Class X Students' Engagement during Video Programs of Chemistry was to the same extent.

# 4.3.5.3 Influence of interaction between Gender and Class on students' Reaction towards Students' Engagement during Video Program of Chemistry

The F-value for interaction between Gender and Class is 3.56 which is not significant (Vide Table 4.13). It reflects that there is no significant difference in mean scores of Reaction towards Students' Engagement during Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on Reaction towards Students' Engagement during Video Programs of Chemistry students. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on Reaction towards Students' Engagement during Video Programs of Chemistry of students is not rejected. It may, therefore, be said that Males and Females students studying in Classes IX and X engaged during Video Programs of Chemistry to the same extent.

### **4.3.6 Influence of Gender, Class and their interaction on students' Reaction towards Demonstration of Video Programs of Chemistry**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Demonstration of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.14.

**Table 4.14:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Demonstrationof Video Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	2.70	2.70	0.32	ns
Class (B)	1	188.04	188.04	22.41	p<0.05
AXB	1	57.38	57.38	6.84	p<0.01
	249	2089.48	8.39		
Error	252				
Total					

ns: Not Significant

# 4.3.6.1 Influence of Gender on students' Reaction towards Demonstration of Video Programs of Chemistry

From Table 4.14, it can be seen that the F-Value for Gender is 0.32 which is not significant. It indicates that the mean scores of Reaction towards the Demonstration of Video Programs of Chemistry of Male and Female students did not differ significantly. So there was no significant influence of Gender on Reaction towards the Demonstration of Video Programs of Chemistry students. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards the Demonstration of Video Programs of Chemistry is not rejected. It may, therefore, be said that both Males and Females liked the Demonstration of Video Programs of Chemistry to the same extent.

#### **4.3.6.2 Influence of Class on students' Reaction towards Demonstration of Video Program of Chemistry**

The F-Value for Class is 22.41 which is significant at 0.01 level with df=1/249 (Vide Table 4.14). It indicates that the mean scores of Reaction towards the Demonstration of Video Programs of Chemistry students of Class IX and Class X differ significantly. So there was a significant influence of Class on students' Reaction towards the Demonstration of Video Programs of Chemistry. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Demonstration of Video Programs of Chemistry is rejected. Further, the mean score of Reaction towards Demonstration of Video Programs of Chemistry of Class IX students is 9.02 which is significantly lower than those of Class X students whose mean score of Reaction towards Demonstration of Video Programs of Chemistry is 10.80. It may, therefore, be said that Class X students liked Demonstration of Video Programs of Chemistry more than those of Class IX students.

### **4.3.6.3 Influence of interaction between Gender and Class on students' Reaction towards Demonstration of Video Program of Chemistry**

The F-Value for interaction between Gender and Class is 6.84 which is significant at 0.01 level with df=1/249 (Vide Table 4.14). It reflects that there is a significant difference in mean scores of Reaction towards Demonstration of Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on Reaction towards Demonstration of Video Programs of Chemistry students. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on Reaction towards Demonstration of Video Programs of Chemistry students is not rejected. In order to know the trend of influence of interaction between Gender and Class on Reaction towards Presentation of Content of Video Programs of Chemistry students, the Graph 4.7 has been plotted.

**Graph 4.7:** Influence of interaction between Gender and Class on Reaction towards Demonstration of Video Programs of Chemistry students



#### Estimated Marginal Means of Demonstration

From Graph 4.7, it can be seen that as Class Changes from IX to X, there is a sharper improvement in Reaction towards Demonstration of Video Programs of Chemistry of Females than those of Males. Males and Females of Class X liked Demonstration of Video Programs of Chemistry more than their counterparts of Class IX students. Female students of Class X liked Demonstration of Video Programs of Chemistry more than those of Males and Females of Class IX students.

#### 4.3.7 Influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Chemistry

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.15.

**Table 4.15:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Videography of Video Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	6.77	6.77	0.62	ns
Class (B)	1	128.93	128.93	11.86	p<0.01
AXB	1	33.92	33.92	3.12	ns
Error	249				
Total	252				

ns: Not Significant

# **4.3.7.1 Influence of Gender on students' Reaction towards Videography of Video Programs of Chemistry**

From Table 4.15, it can be seen that the F-Value for Gender is 0.61 which is not significant. It indicates that the mean scores of Reaction towards Videography of Video Programs of Chemistry Male and Female students did not differ significantly. So there was no significant influence of Gender on Reaction towards Videography of Video Programs of Chemistry students. Thus, the Null Hypothesis that there is no significant influence of Gender on Reaction towards Videography of Video Programs of Chemistry students is not rejected. It may, therefore, be said that both Male and Female students liked Videography of Video Programs of Chemistry to the same extent

#### **4.3.7.2 Influence of Class on students' Reaction towards Videography of Video Program of Chemistry**

The F-Value for Class is 11.16 which is significant at 0.01 level with df =1/249 (Vide Table 4.15). It indicates that the mean scores of Reaction towards Videography of Video Programs of Chemistry of Class IX and Class X students differ significantly. So there was a significant influence of Class on students' Reaction towards Videography of Video Programs of Chemistry. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Videography of Video Programs of Chemistry is rejected. Further, the mean score of Reaction towards Videography of Video Programs of Chemistry of Class IX students is 14.21 which is significantly lower than those of Class X students whose mean score of Reaction towards Videography of Video Programs of Chemistry is 15.86. It may, therefore, be said that Class X students liked Videography of Video Programs of

Chemistry more than those of Class IX students.

# 4.3.7.3 Influence of interaction between Gender and Class on students' Reaction towards Videography of Video Program of Chemistry

The F-Value for interaction between Gender and Class is 3.12 which is not significant (Vide Table 4.15). It reflects that there is no significant difference in mean scores of Reaction towards Videography of Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Videography of Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Videography of Video Programs of Chemistry is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Videography of Video Programs of Chemistry to the same extent.

#### **4.3.8 Influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Chemistry**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Chemistry. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.16.

**Table 4.16:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Information Graphics of Video Programs of Chemistry

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	5.08	5.08	1.73	ns
Class (B)	1	73.85	73.85	25.24	p<0.01
AXB	1	0.72	0.72	0.25	ns
Error	249	728.26	2.92		
Total	252				

ns: Not Significant

# **4.3.8.1 Influence of Gender on students' Reaction towards Information Graphics of Video Programs of Chemistry**

From Table 4.16, it can be seen that the F-Value for Gender is 1.73 which is not significant. It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of Chemistry of Male and Female students did not differ significantly. So there was no significant influence of Gender on students' Reaction towards Information Graphics of Video Programs of Chemistry. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards Information Graphics of Video Programs of Chemistry. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards Information Graphics of Video Programs of Chemistry is not rejected. It may, therefore, be said that both Male and Female students liked Information Graphics of Video Programs of Chemistry to the same extent.

# **4.3.8.2 Influence of Class on students' Reaction towards Information Graphics of Video Program of Chemistry**

The F-Value for Class is 25.25 which is significant at 0.01 level with df=1/249 (Vide Table 4.16). It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of

Chemistry of Class IX and Class X students differ significantly. So there was a significant influence of Class on students' Reaction towards Information Graphics of Video Programs of Chemistry. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Information Graphics of Video Programs of Chemistry is rejected. Further, the mean score of Reaction towards Information Graphics of Video Programs of Chemistry of Class IX students is 3.98 which is significantly lower than their counterpart of Class X students whose mean score of Reaction towards Information Graphics of Video Programs of Chemistry is 5.09. It may, therefore, be said that Class X students liked Information Graphics of Video Programs of Chemistry is 5.09. It may, therefore, be said that Class X students liked Information Graphics of Video Programs of Chemistry is 5.09. It may, therefore, be said that Class X students.

### **4.3.8.3 Influence of interaction between Gender and Class on Reaction towards Information Graphics of Video Program of Chemistry students**

The F-value for interaction between Gender and Class is 0.25 which is not significant (Vide Table 4.16). It reflects that there is no significant difference in mean scores of Reaction towards Information Graphics of Video Programs of Chemistry of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Chemistry. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Chemistry is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Information Graphics of Video Programs of Chemistry to the same extent.

### 4.4.0 Influence of gender, class & their interaction on student's overall as well as dimension-wise reaction towards video programs of physics

The third objective was to study the influence of Gender, Class and their interaction on students' Overall as well as dimension-wise Reaction towards Video programs of Physics. There were seven dimensions of Video Programs towards which the Reaction of students were taken. The seven dimensions were Content, Presentation, Audio, Student's Engagement, Demonstration, Videography and Information Graphics. The data were analyzed Overall as well as dimension-wise and the results are given separately in the following captions.

### 4.4.1 Influence of Gender, Class and their interaction on students' Overall Reaction towards Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Overall Reaction towards Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus, the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.17.

**Table 4.17:** Summary of 2 X 2 Factorial Design ANOVA of Overall Reaction towards Video Programs of Physics students

Source of variance	Df	SS	MSS	F-value	Remark
Gender (A)	1	2851.75	2851.75	17.60	p<0.01
Class (B)	1	413.75	413.75	2.55	ns
AXB	1	126.24	126.24	0.78	ns
Error	434	70324.03	162.04		
Total	437				

ns: Not significant

# 4.4.1.1 Influence of Gender on students' Overall Reaction towards Video Program of Physics

From Table 4.17, it can be seen that the F-Value for Gender is 17.60 which is significant at 0.01 level with df=1/434. It indicates that the mean scores of Overall Reaction towards Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Overall Reaction towards Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Gender on students' Overall Reaction towards Video Programs of Physics is rejected. Further, the mean score of Overall Reaction towards Video Programs of Physics of Males is 103.24 which is significantly higher than that of Females whose mean score of Overall Reaction towards Video Programs of Physics is 99.16. It may, therefore, be said that on the whole Male students liked Video Programs of Physics more than those of Female students.

### **4.4.1.2 Influence of Class on Overall Reaction towards Video Program of Physics students**

The F-value for Class is 2.55 which is not significant (Vide Table 4.17). It indicates that the mean scores of Overall Reaction towards Video Programs of Physics of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on students' Overall Reaction towards Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on Overall Reaction towards Video Programs of Physics students is not rejected. It may, therefore, be said that on the whole, both Class IX and Class X students liked Video Programs of Physics to the same extent.

#### 4.4.1.3 Influence of interaction between Gender and Class on students' Overall Reaction towards Video Program of Physics

The F-Value for interaction between Gender and Class is 0.78 which is not significant (Vide Table 4.17). It reflects that there is no significant difference in mean scores of Overall Reaction towards Video Programs of Physics of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on students' Overall Reaction towards Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Genders' Overall Reaction towards Video Programs of Physics on students' Overall Reaction towards Video Programs of Physics is not rejected. It may, therefore, be said that on the whole Males and Females of Classes IX and X liked Video Programs of Physics to the same extent.

#### 4.4.2 Influence of Gender, Class and their interaction on students' Reaction towards Content of Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Content of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.18.



**Table 4.18:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Content of Video Programs of Physics

Source of variance	Df	SS	MSS	<b>F-value</b>	Remark
Gender (A)	1	59.19	59.19	5.07	p<0.05
Class (B)	1	40.45	40.45	3.47	ns
AXB	1	0.70	0.70	0.06	ns
Error	434	5062.99	11.67		
Total	437				

ns: Not significant

# 4.4.2.1 Influence of Gender on students' Reaction towards Content of Video Program of Physics

From Table 4.18, it can be seen that the F-Value for Gender is 5.07 which is significant at 0.05 level with df=1/434. It indicates that the mean scores of Reaction towards Content of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards the Content of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards the Content of Gender on students' Reaction towards the Content of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Content of Video Programs of Physics of Males is 19.64 which is significantly higher than that of Females whose mean score of Reaction towards Content of Video Programs of Physics is 18.79. It may, therefore, be said that Male students liked Content of Video Programs of Physics more than those of Female students.

### **4.4.2.2 Influence of Class on students' Reaction towards Content of Video Program of Physics**

The F-Value for Class is 3.47 which is not significant (Vide Table 4.18). It indicates that the mean scores of Reaction towards Content of Video Programs of Physics of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on students' Reaction towards Content of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Content of Video Programs of Physics is not rejected. It may, therefore, be said that both Classes IX and X students liked Content of Video Programs of Physics to the same extent.

# **4.4.2.3 Influence of interaction between Gender and Class on students' Reaction towards Content of Video Program of Physics**

The F-Value for interaction between Gender and Class is 0.06 which is not significant (Vide Table 4.18). It reflects that there is no significant difference in mean scores of Reaction towards Content of Video Programs of Physics of Male and Female students studying in Classes IX and X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Content of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Genders' Reaction towards Content of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Genders' Reaction towards Content of Video Programs of Physics on students' Reaction towards Content of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Content of Video Programs of Physics to the same extent.

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#### 4.4.3 Influence of Gender, Class and their interaction on students' Reaction towards Presentation of Content of Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards the Presentation of Content of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.19.

**Table 4.19:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Presentation of Content of Video Programs of Physics

Source of variance	Df	SS	MSS	F-value	Remark
Gender (A)	1	216.44	216.44	9.13	p<0.01
Class (B)	1	0.44	0.44	0.02	ns
AXB	1	7.96	7.96	0.34	ns
Error	434	10284.85	23.70		
Total	437				

ns: Not Significant

# **4.4.3.1 Influence of Gender on Reaction towards Presentation of Content of Video Program of Physics students**

From Table 4.19, it can be seen that the F-Value for Gender is 9.13 which is significant at 0.01 level with df=1/434. It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards the Presentation of Content of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction to Video Programs of Physics is rejected. Further, the mean score of Reaction towards the Presentation of Content of Video Programs of Physics of Male students is 32.62 which is significantly higher than those of Female whose mean score of students' Reaction towards Presentation of Content of Video Programs of Physics is 30.99. It may, therefore, be said that Male students liked the Presentation of Content of Video Programs of Physics more than those of Female students.

# **4.4.3.2 Influence of Class on students' Reaction towards Presentation of Content of Video Program of Physics**

The F-Value for Class is 0.02 which is not significant (Vide Table 4.19). It indicates that the mean scores of Reaction towards Presentation of Content of Video Programs of Physics of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on students' Reaction towards Presentation of Content of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Presentation of Content of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Presentation of Content of Video Programs of Physics is not rejected. It may, therefore, be said that Class IX and Class X students liked Presentation of Content of Video Programs of Physics to the same extent.

# 4.4.3.3 Influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Program of Physics

The F-Value for interaction between Gender and Class is 0.34 which is not significant (Vide Table 4.19).

It reflects that there is no significant difference in mean scores of Reaction towards Presentation of Content of Video Programs of Physics of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Presentation of Content of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Presentation of Content of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Presentation of Content of Video Programs of Physics to the same extent.

#### 4.4.4 Influence of Gender, Class and their interaction on students' Reaction towards Content of Audio aspect of Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Audio aspect of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.20.

**Table 4.20:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Audio aspect of Video Programs of Physics

Source of	df	SS	MSS	<b>F-value</b>	Remark
variance					
Gender (A)	1	28.86	28.86	4.95	p<0.05
Class (B)	1	18.58	18.58	3.19	ns
AXB	1	27.19	27.19	4.67	p<0.05
Error	434	2528.51	5.83		
Total	437				

ns= Not Significant

# 4.4.4.1 Influence of Gender on students' Reaction towards Audio aspect of Video Programs of Physics

From Table 4.20, it can be seen that the F-Value for Gender is 4.95 which is significant at 0.05 level with df=1/434. It indicates that the mean scores of Reaction towards Audio aspect of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards the Audio aspect of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards the Further, the mean score of Reaction towards Audio aspect of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Audio aspect of Video Programs of Physics of Male students is 10.75 which is significantly higher than that of Female students whose mean score of Reaction towards Audio aspect of Video Programs of Physics is 10.15. It may, therefore, be said that both Male students liked the Audio aspect of Video Programs of Physics is rejected.

# 4.4.4.2 Influence of Class on students' Reaction towards Audio aspect of Video Program of Physics

The F-value for Class is 3.19 which is not significant (Vide Table 4.20). It indicates that the mean scores of students' Reaction towards Audio aspect of Video Programs of Physics of Class IX and

Class X students did not differ significantly. So there was no significant influence of Class on students' Reaction towards the Audio aspect of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Audio aspect of Video Programs of Physics is not rejected. It may, therefore, be said that both Class IX and Class X students liked the Audio aspect of Video Programs of Physics to the same extent.

### 4.4.4.3 Influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Program of Physics

The F-Value for interaction between Gender and Class is 4.67 which is significant at 0.05 level with df=1/434 (Vide Table 4.20). It reflects that there is a significant difference in mean scores of Reaction towards Audio aspect of Video Programs of Physics of Male and Female students studying in Class IX and Class X. So there was a significant influence of interaction between Gender and Class on students' Reaction towards the Audio aspect of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Audio aspect of Video Programs of Physics is rejected. In order to know the trend of influence of interaction between Gender and Class on students' Reaction towards Audio Aspect of Video Programs of Physics, the Graph 4.8 has been plotted.

**Graph 4.8:** Influence of interaction between Gender and Class on students' Reaction towards Audio Aspect of Video Programs of Chemistry



#### Estimated Marginal Means of Audio

From Graph 4.8, it can be seen that with the change of Class from IX to X, there is a sharp decline in Reaction towards Audio aspect of Video Programs of Physics of Female students but there is a slight improvement in Reaction towards Audio aspect of Video Programs of Physics of Male students. Male and Female students of Class IX liked the Audio aspect of Video Programs of Physics to the same extent. In the case of Class X, Males liked the Audio aspect of Video Programs of Physics more than Females.

# 4.4.5 Influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Students' Engagement during Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.21.

**Table 4.21:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Students'Engagement during Video Programs of Physics

Source of variance	df	SS	MSS	<b>F-value</b>	Remark
Gender (A)	1	49.32	49.3	13.74	p<0.01
Class (B)	1	5.33	2	1.48	ns
AXB	1	0.54	5.33	0.15	ns
Error	434	1558.33	0.54		
Total	437		3.59		

ns: Not Significant

# **4.4.5.1 Influence of Gender on Reaction towards Student's Engagement during Video Programs of Physics students**

From Table 4.21, it can be seen that the F-Value for Gender is 13.74 which is significant at 0.01 level with df=1/434. It indicates that the mean scores of Reaction towards Students' Engagement during Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards Students' Engagement during Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards of Physics is rejected. Further, the mean score of students' Reaction towards Students' Engagement during Video Programs of Physics is 7.62 which is significantly higher than that of Female students whose mean score of Reaction towards Students' Engagement during Video Programs of Physics students is 6.85. It may, therefore, be said that Male students liked Students' Engagement during Video Programs of Physics more than Female students.

# 4.4.5.2 Influence of Class on students' Reaction towards Students' Engagement during Video Program of Physics

The F-Value for Class is 1.48 which is not significant (Vide Table 4.21). It indicates that the mean scores of students' Reaction towards Students' Engagement during Video Programs of Physics of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on students' Reaction towards Students' Engagement during Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Students'

Engagement during Video Programs of Physics is not rejected. It may, therefore, be said that both Classes IX and X students liked Students' Engagement during Video Programs of Physics to the same extent.

### 4.4.5.3 Influence of interaction between Gender and Class on students' Reaction towards Students' Engagement during Video Program of Physics

The F-Value for interaction between Gender and Class is 0.15 which is not significant (Vide Table 4.21). It reflects that there is no significant difference in mean scores of Reaction towards Students' Engagement during Video Programs of Physics of Male and Female students studying in Classes IX and X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Students' Engagement during Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Students' Engagement during Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Students' Engagement during Video Programs of Physics to the same extent.

### 4.4.6 Influence of Gender, Class and their interaction on students' Reaction towards Demonstration of Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards the Demonstration of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.22.

**Table 4.22:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Demonstrationof Video Programs of Physics

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	40.47	40.47	7.13	p<0.01
Class (B)	1	58.82	58.28	10.26	p<0.01
AXB	1	3.91	3.91	0.69	ns
Error	434	2464.45	5.68		
Total	437				

ns: Not Significant

# 4.4.6.1 Influence of Gender on students' Reaction towards Demonstration of Video Programs of Physics

From Table 4.22, it can be seen that the F-Value for Gender is 7.13 which is significant at 0.01 level with df=1/434. It indicates that the mean scores of Reaction towards the Demonstration of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards the Demonstration of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards the Demonstration of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Demonstration of Video Programs of Physics of Male students is 11.15 which is significantly higher than those of Female students whose mean score of Reaction towards Demonstration of Video Programs of Physics is 10.44. It may, therefore, be said that Male students liked the Demonstration of

Video Programs of Physics more than Female students.

# 4.4.6.2 Influence of Class on students' Reaction towards Demonstration of Video Program of Physics

The F-Value for Class is 10.26 which is significant at 0.01 level with df=1/434 (Vide Table 4.22). It indicates that the mean scores of Reaction towards Demonstration of Video Programs of Physics of Classes IX and X students differ significantly. So there was a significant influence of Class on students' Reaction towards Demonstration of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Demonstration of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Demonstration of Video Programs of Physics of Class IX students is 11.22 which is significantly higher than those of Class X students whose mean score of Reaction towards Demonstration of Video Programs of Physics is 10.37. It may, therefore, be said that Class IX students liked Demonstration of Video Programs of Physics X students.

### 4.4.6.3 Influence of interaction between Gender and Class on students' Reaction towards Demonstration of Video Program of Chemistry

The F-Value for interaction between Gender and Class is 0.69 which is not significant (Vide Table 4.22). It reflects that there is no significant difference in mean scores of Reaction towards Demonstration of Video Programs of Physics of Male and Female students studying in Classes IX and X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Demonstration of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Demonstration of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Demonstration of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Demonstration of Video Programs of Physics to the same extent.

### 4.4.7 Influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Physics

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Videography of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.23.

**Table 4.23:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Videography of Video Programs of Physics

Source of variance	df	SS	MSS	F-value	Remark
Gender (A)	1	80.93	80.93	12.54	p<0.01
Class (B)	1	2.78	2.78	0.43	ns
AXB	1	0.12	0.12	0.02	ns
Error	434	2801.77	6.46		
Total	437				

ns: Not Significant

#### 4.4.7.1 Influence of Gender on students' Reaction towards Videography of Video Programs of Physics

From Table 4.23, it can be seen that the F-Value for Gender is 12.54 which is significant at 0.01 level with df=1/434. It indicates that the mean scores of Reaction towards Videography of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards Videography of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards Videography of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Videography of Video Programs of Physics of Male students is 15.82 which is significantly higher than that of Female students whose mean score of Reaction towards Videography of Video Programs of Physics is 14.82. It may, therefore, be said that Male students liked Videography of Video Programs of Physics more than those of Female students.

# **4.4.7.2 Influence of Class on Reaction towards Videography of Video Program of Physics students**

The F-Value for Class is 0.43 which is not significant (Vide Table 4.23). It indicates that the mean scores of Reaction towards Videography of Video Programs of Physics of Class IX and Class X students did not differ significantly. So there was no significant influence of Class on students' Reaction towards Videography of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Videography of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Videography of Video Programs of Physics is not rejected. It may, therefore, be said that both Class IX and Class X students liked Videography of Video Programs of Physics to the same extent.

### 4.4.7.3 Influence of interaction between Gender and Class on students' Reaction towards Videography of Video Program of Physics

The F-Value for interaction between Gender and Class is 0.02 which is not significant (Vide Table 4.23). It reflects that there is no significant difference in mean scores of Reaction towards Videography of Video Programs of Physics of Male and Female students studying in Classes IX and X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Videography of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Videography of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Videography of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Videography of Video Programs of Physics to the same extent.

# **4.4.8 Influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Physics**

The objective was to study the influence of Gender, Class and their interaction on students' Reaction towards Information Graphics of Video Programs of Physics. Males and Females were the two levels of Gender. The two levels of Class were IX and X. Thus the data were analyzed with the help of 2 X 2 Factorial Design ANOVA and the results are given in Table 4.24.



**Table 4.24:** Summary of 2 X 2 Factorial Design ANOVA of Students' Reaction towards Information Graphics of Video Programs of Physics

Source	of	df	SS	MSS	<b>F-value</b>	Remark
variance						
Gender (A)		1	10.52	10.52	5.95	p<0.05
Class (B)		1	4.22	4.22	2.39	ns
AXB		1	0.97	0.97	0.55	ns
Error		434	766.85	1.77		
Total		437				

ns: Not Significant

# 4.4.8.1 Influence of Gender on students' Reaction towards Information Graphics of Video Programs of Physics

From Table 4.24, it can be seen that the F-Value for Gender is 5.95 which is significant at 0.05 level with df=1/434. It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of Physics of Male and Female students differ significantly. So there was a significant influence of Gender on students' Reaction towards Information Graphics of Video Programs of Physics. Thus, the Null Hypothesis that there is no significant influence of Gender on students' Reaction towards of Physics is rejected. Further, the mean score of Reaction towards Information Graphics of Video Programs of Physics is rejected. Further, the mean score of Reaction towards Information Graphics of Video Programs of Physics is 5.65 which is significantly higher than those of Female students whose mean score of Reaction towards Information Graphics of Video Programs of Physics is 5.29. It may, therefore, be said that Male students liked Information Graphics of Video Programs of Physics more than those of Female students.

# **4.4.8.2 Influence of Class on students' Reaction towards Information Graphics of Video Program of Physics**

The F-Value for Class is 2.39 which is not significant (Vide Table 4.24). It indicates that the mean scores of Reaction towards Information Graphics of Video Programs of Physics of Class IX and Class X students do not differ significantly. So there was no significant influence of Class on students' Reaction towards Information Graphics of Video Programs of Physics. Thus the Null Hypothesis that there is no significant influence of Class on students' Reaction towards Information Graphics of Video Programs of Physics IX students as well as Class X students liked Information Graphics of Video Programs of Physics to the same extent.

# 4.4.8.3 Influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Program of Physics

The F-Value for interaction between Gender and Class is 0.55 which is not significant (Vide Table 4.24). It reflects that there is no significant difference in mean scores of Reaction towards Information Graphics of Video Programs of Physics of Male and Female students studying in Class IX and Class X. So there was no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Physics. Thus the null hypothesis that there is no significant influence of interaction between Gender and Class on students' Reaction towards Information Graphics of Video Programs of Physics is not rejected. It may, therefore, be said that Males and Females of Classes IX and X liked Information Graphics of Video Programs of Physics to the same extent.

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# **4.5.0 Gender-wise comparison of reaction towards biology theory dominated video programs**

The objective was to compare the mean scores of Reaction towards Biology Theory dominated Video Programs of Male and Female students of IX and X Classes separately. The analysis was done separately for Class IX and Class X students and the results are presented in separate captions.

# **4.5.1 Gender-wise Comparison of Reaction towards Biology Theory Dominated Video Programs for Class IX Students**

Reaction towards Biology Theory Dominated Video programs of Male and Female Students of Class IX was compared by analyzing the data with the help of t-Test and the results are given in Table 4.25.

**Table 4.25:** Gender-wise M, SD, N and t-values of Reaction towards Biology Theory Dominated

 Video programs of Class IX students

Gender	Μ	SD	Ν	t-Value	Remark
Male	97.48	12.73	149	2.48	p<0.05
Female	93.82	12.82	153		

From Table 4.25 it can be seen that the t-value of 2.48 which is significant at 0.05 level with df=300. It indicates that the mean scores of Reaction towards Biology Theory Dominated Video programs of Male and Female students of Class IX differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Biology Theory dominated Video Programs of Male and Female students of Class IX is rejected. Further, the mean score of Reaction towards Biology Theory Dominated Video programs of Class IX Male students is 97.48 which is significantly higher than those of Class IX Female students whose mean score of Reaction towards Biology Theory Dominated Video programs is 93.82. It may, therefore, be said that Male students of Class IX liked Biology Theory Dominated Video programs more than Female students of the same class.

# **4.5.2 Gender-wise Comparison of Reaction towards Biology Theory Dominated Video Programs for Class X Students**

Reaction towards Biology Theory Dominated Video programs of Male and Female Students of Class X was compared by analyzing the data with the help of t-Test and the results are given in Table 4.26.

**Table 4.26:** Gender-wise M, SD, N and t-values of Reaction towards Biology Theory Dominated Video programs of Class X students

Gender	Μ	SD	Ν	t-Value
Male	99.04	13.06	84	1.35
Female	96.52	12.86	113	

From Table 4.26 it can be seen that the t-value of 1.35 which is not significant. It indicates that the mean scores of Reaction towards Biology Theory Dominated Video programs of Class X Male and Female students did not differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Biology Theory dominated Video Programs of Male

and Female students of X Class is not rejected. It may, therefore, be said that Male and Female students of Class X liked Biology Theory Dominated Video programs to the same extent.

# **4.6.0 Gender-wise comparison of reaction towards physics theory dominated video programs**

The objective was to compare the mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students of IX. The data were analyzed with the help of t-test and the results are given in Table 4.27.

**Table 4.27:** Gender-wise M, SD, N and t-values of Reaction towards Physics Theory Dominated Video programs of Class IX students

Gender	Μ	SD	Ν	t-Value
Male	92.97	17.44	32	1.18
Female	96.68	10.45	47	

From Table 4.27 it can be seen that the t-value of 1.18 which is not significant. It indicates that the mean scores of Reaction towards Physics Theory Dominated Video programs of Male and Female students of Class IX did not differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students of Class IX is not rejected. It may, therefore, be said that Male and Female students of Class IX liked Physics Theory Dominated Video Programs to the same extent.

# 4.7.0 Gender-wise comparison of reaction towards biology demonstration dominated video programs for classes IX and X students separately

Reaction towards Biology Demonstration Dominated Video programs of Male and Female Students of Classes IX and X were compared separately and the results are given under the following captions.

# **4.7.1 Gender-wise Comparison of Reaction towards Biology Demonstration Dominated Video Programs for Class IX Students**

Reaction towards Biology Demonstration Dominated Video programs of Male and Female Students of Class IX were compared by analyzing the data with the help of t-Test and the results are given in Table 4.28.

**Table 4.28:** Gender-wise M, SD, N and t-values of Reaction towards Biology Demonstration Dominated

 Video programs of Class IX students

Gender	Μ	SD	Ν	t-Value
Male	91.56	9.85	99	1.33
Female	93.72	13.89	139	

From Table 4.28 it can be seen that the t-value of 1.33 which is not significant. It indicates that the mean scores of Reaction towards Biology Demonstration Dominated Video Programmes of Class IX Male and Female students did not differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Biology Demonstration dominated Video Programs of Males and Females of IX Class is not rejected. It may, therefore, be said that Male and Female students

of Class IX liked Biology Demonstration Dominated Video Programmes to the same extent.

### **4.7.2 Gender-wise Comparison of Reaction towards Biology Demonstration Dominated Video Programmes for Class X Students**

Reaction towards Biology Demonstration Dominated Video Programmes of Male and Female Students of Class X were compared by analyzing the data with the help of t-Test and the results are given in Table 4.29.

**Table 4.29:** Gender-wise M, SD, N and t-values of Reaction towards Biology Demonstration Dominated

 Video Programmes of Class X students

Gender	Μ	SD	Ν	t-Value	Remark
Male	91.56	9.85	112	2.50	p<0.05
Female	93.72	13.89	98		

From Table 4.29 it can be seen that the t-value of 2.50 which is significant at 0.05 level with df=208. It indicates that the mean scores of Reaction towards Biology Demonstration Dominated Video Programmes of Class X Male and Female students differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Biology Demonstration dominated Video Programs of Male and Female students of X Class is rejected. Further, the mean score of Reaction towards Biology Demonstration Dominated Video Programmes of Class X Male students is 91.56 which is significantly lower than those of Female students whose mean score of Reaction towards Biology Demonstration Dominated Video Programmes is 93.72. It may, therefore, be said that Female students of Class X liked Biology Demonstration Dominated Video Programmes more than their male counterparts.

### **4.8.0** Gender-wise comparison of reaction towards chemistry demonstration dominated video programs for classes ix and x students separately

Reaction towards Chemistry Demonstration Dominated Video Programmes of Male and Female Students of Classes IX and X were compared separately and the results are given under the following captions.

#### **4.8.1 Gender-wise Comparison of Reaction towards Chemistry Demonstration Dominated Video Programmes for Class IX Students**

Reaction towards Chemistry Demonstration Dominated Video Programmes of Male and Female Students of Class IX was compared by analyzing the data with the help of t-Test and the results are given in Table 4.30.

**Table 4.30:** Gender-wise M, SD, N and t-values of Reaction towards Chemistry Demonstration Dominated Video Programmes of Class IX students

Gender	Μ	SD	Ν	t-Value	Remark
Male	92.16	12.12	45	4.16	p<0.01
Female	81.82	14.27	89		

From Table 4.30, it can be seen that the t-value of 4.16 which is significant at 0.01 level with df=132. It indicates that the mean scores of Reaction towards Chemistry Demonstration Dominated Video Programmes of Class IX Male and Female students differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Males and Females of IX Class is rejected. Further, the mean score of Reaction towards Chemistry Demonstration dominated Video Programs of Males that the that of Female students whose mean score of Reaction towards Chemistry Demonstration dominated Video Programs of Male students of IX Class is 92.16 which is significantly higher than that of Female students whose mean score of Reaction towards Chemistry Demonstration dominated Video Programs is 81.82. It may, therefore, be said that Male students of Class IX liked Chemistry Demonstration Dominated Video Programs more than those of Female students.

#### **4.8.2 Gender-wise Comparison of Reaction towards Chemistry Demonstration Dominated Video Programmes for Class X Students**

Reaction towards Chemistry Demonstration Dominated Video Programmes of Male and Female Students of Class X was compared by analyzing the data with the help of t-Test and the results are given in Table 4.31.

**Table 4.31:** Gender-wise M, SD, N and t-values of Reaction towards Chemistry Demonstration

 Dominated Video Programmes of Class X students

Gender	Μ	SD	Ν	t-Value
Male	95.11	12.77	55	0.84
Female	97.05	12.29	64	

From Table 4.31, it can be seen that the t-value of 0.84 which is not significant. It indicates that the mean scores of Reaction towards Chemistry Demonstration Dominated Video Programmes of Class X Male and Female students did not differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Male and Female students of Class X is not rejected. It may, therefore, be said that both Male and Female students of Class X liked Chemistry Demonstration Dominated Video Programmes to the same extent.

# 4.9.0 Gender-wise comparison of reaction towards physics demonstration dominated video programs for classes ix and x students separately

Reaction towards Physics Demonstration Dominated Video Programmes of Male and Female Students of Classes IX and X were compared separately and the results are given under the following captions.

#### 4.9.1 Gender-wise Comparison of Reaction towards Physics Demonstration Dominated Video Programmes for Class IX Students

Reaction towards Physics Demonstration Dominated Video Programmes of Male and Female Students of Class IX was compared by analyzing the data with the help of t-Test and the results are given in Table 4.32.

**Table 4.32:** Gender-wise M, SD, N and t-values of Reaction towards Physics Demonstration Dominated

 Video Programmes of Class IX students

Gender	Μ	SD	Ν	t-Value	Remark
Male	107.10	7.38	103	4.37	p<0.01
Female	99.86	15.63	146		

From Table 4.32, it can be seen that the t-value of 4.37 which is significant at 0.01 level with df=247. It indicates that the mean scores of Reaction towards Physics Demonstration Dominated Video Programmes of Class IX Male and Female students differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students of Class IX is rejected. Further, the mean score of Reaction towards Physics Demonstration dominated Video Programs of Male students of Class IX is 107.10 which is significantly higher than that of Female students whose mean score of Reaction towards Physics Demonstration dominated Video Programs is 99.86. It may, therefore, be said that Male students of Class IX liked Physics Demonstration Dominated Video Programs more as compared to their Female counterparts.

#### 4.9.2 Gender-wise Comparison of Reaction towards Physics Demonstration Dominated Video Programmes for Class X Students

Reaction towards Physics Demonstration Dominated Video Programmes of Male and Female Students of Class X was compared by analyzing the data with the help of t-Test and the results are given in Table 4.33.

**Table 4.33:** Gender-wise M, SD, N and t-values of Reaction towards Physics Demonstration Dominated Video Programmes of Class X students

Gender	Μ	SD	Ν	t-Value	Remark
Male	102.72	7.45	54	3.97	p<0.01
Female	95.59	11.04	56		

From Table 4.33, it can be seen that the t-value of 3.97 which is significant at 0.01 level with df=108. It indicates that the mean scores of Reaction towards Physics Demonstration Dominated Video Programmes of Male and Female students of Class X differ significantly. Thus, the Null Hypothesis that there is no significant difference in mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students of X Class is rejected. Further, the mean score of Reaction towards Physics Demonstration dominated Video Programs of Male students of IX Class is 102.72 which is significantly higher than that of Female students whose mean score of Reaction towards Physics Demonstration dominated Video Programs is 95.59. It may, therefore, be said that Male students of Class X liked Physics Demonstration Dominated Video Programs more as compared to their Female counterparts.

#### **Chapter V : Summary, Findings and Implications**

#### **5.1 Introduction**

The introduction discusses the growing trend of incorporating technology into education, emphasizing the need for teachers to develop techno-pedagogical competencies. Techno-pedagogy, the combination of teaching methods and technology, plays a crucial role in improving the learning process. It identifies the three areas of knowledge: content, pedagogy, and technology, and highlights the challenges faced in higher education.

#### **5.2 Rationale**

One of the major functions of the Central Institute of Educational Technology (CIET) is to produce educational media programs for students and teachers at the school level. This is mainly disseminated to the beneficiaries through broadcast mode. Recently MHRD has initiated a project Swayam Prabha to run 32 DTH channels that would telecast high-quality educational programs on 24 X 7 basis. NCERT is one of the national coordinators for one such channel. CIET, NCERT has planned to disseminate curriculum-based educational TV programs for classes IX-X and XI-XII through the DTH TV transmission. The quality of such programs is going to be monitored throughout the design, development, and delivery cycle of DTH-TV. The overall monitoring will be done by a 4-tier structure put in place by the MHRD viz., Operations and monitoring group, Technical Committee, and National Coordinators. The Subject Committee and Review Committee will ensure that quality content is produced. However such programs require techno-pedagogic analysis. At present, this exercise is not being conducted for the programs produced for the DTH-TV. This exercise will help producers for selection of suitable media and their appropriate use of the content. Ultimately the audience (students and teachers) is going to benefit from the media programs. The term "techno-pedagogy" refers to electronically mediated courses that integrate sound pedagogic principles of teaching or learning with the use of technology. Examples of some of the techno-pedagogic skills are media message compatibilities, contiguity of various message forms (spatially and temporally), message media suitability (self-control interactivity, talk back, etc.), message sensibilities and communication control, message credibility and media fidelity, media message integration, etc.

#### **5.3 Statement of Problem**

A study of techno-pedagogic analysis of selected media programs of science at secondary level produced by CIET

#### 5.4 Objectives of the study

- To study the influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Biology.
- To study the influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Chemistry.
- To study the influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Physics.
- To compare the mean scores of Reaction towards Biology Theory dominated Video Programs of Male and Female students for IX and X classes separately.

- To compare the mean scores of Reaction towards Chemistry Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Biology Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To compare the mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- To study Statement-wise association between Gender and Reaction towards Video programs of Class IX and X separately.
- To study the compatibility of the DTH programs in terms of the reflections of the teachers and students.

#### 5.5 Hypothesis of the study

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The following were the Hypotheses:

- There is no significant influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Biology.
- There is no significant influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Chemistry.
- There is no significant influence of Gender, Class and their interaction on students' overall as well as dimension-wise Reaction towards video programs of Physics.
- There is no significant difference in mean scores of Reaction towards Biology Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Chemistry Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Physics Theory dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Biology Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Chemistry Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant difference in mean scores of Reaction towards Physics Demonstration dominated Video Programs of Male and Female students for IX and X classes separately.
- There is no significant Statement-wise association between Gender and Reaction towards Video programs of Class IX and X separately.

#### 5.6 Sample Size

- For studying the reaction of students, one section of IX and one section of X from three schools of the Delhi NCR were selected based on access. All the students in these sections constitute the sample.
- For studying the reaction of 30 teachers standards were selected from Delhi NCR.

#### **5.7 Tools and Techniques**

The tools used for the present study are

- 1. Teachers Reaction Scale
- 2. Reaction Scale for Students

#### **5.8 Procedure of Data Collection**

Reactions will be taken during the telecast of the video programs from the students as well as from the teachers.

Statistical Techniques Used for Data Analysis:

- Frequency
- Percentage Analysis
- Content Analysis

#### **5.9 Findings**

The following were the findings of this study.

- 1. On the whole Male students liked Video Programs of Biology, Chemistry and Physics more than those of Female students.
- 2. On the whole, Class X students liked Video Programs of Biology and Chemistry more than those of Class IX students. In the case of Physics, on the whole, both Class IX and Class X students liked Video Programs of Physics to the same extent.
- 3. Males and Females of Classes IX and X liked the whole Video Programs of Biology and Physics to the same extent. But in the case of Chemistry, irrespective of Gender, on the whole Class X students liked Video Programs of Chemistry more than those of Class IX students. In case of Class IX students, on the whole, Male students liked Video Programs of Chemistry more than Female students.
- 4. Male students liked Content of Video Programs of Biology, Chemistry and Physics more than those of Female students.
- 5. Class X students liked Content of Video Programs of Biology and Chemistry more than those of Class IX students but in case of Physics, Classes IX and X students liked Content of Video Programs of Physics to the same extent.
- 6. Males and Females of Classes IX and X liked the Content of Video Programs of Biology and Physics to the same extent. But in the case of Chemistry, Class X Female students liked Content of Video Programs of Chemistry more than those of Class IX Female students. Irrespective of Class, Male students were found to like Content of Video Programs of Chemistry to the same degree.

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- 7. Both Male and Female students liked Presentation of Content of Video Programs of Biology and Chemistry to the same extent but Male students liked Presentation of Content of Video Programs of Physics more than those of Female students.
- 8. Class X students liked Presentation of Content of Video Programs of Biology and Chemistry more than those of Class IX students but in case of Physics, Classes IX and X students liked Presentation of Content of Video Programs of Physics to the same extent.
- 9. Male students from Class X liked Presentation of Content of Video Programs of Biology more than those of Females of the same class and also Males as well as Females of Class IX. In the case of Chemistry, Male students of Classes IX and X liked Presentation of Content of Video Programs of Chemistry to the same extent while Female students of Class X liked Presentation of Content of Video Programs of Chemistry more than those of Class IX students. In the case of Physics, Males and Females of Classes IX and X liked Presentation of Content of Video Programs of Physics to the same extent.
- 10. Male students liked the Audio aspect of Video Programs of Biology, Chemistry and Physics more than those of Female students.
- 11. Class X students liked the Audio aspect of Video Programs of Biology and Chemistry more than those of Class IX students but both Classes IX and X students liked the Audio aspect of Video Programs of Physics to the same extent.
- 12. Both Male and Female students of Classes IX and X liked the Audio aspect of Video Programs of Biology to the same extent. In the case of Chemistry, Male students of Classes IX and X liked the Audio aspect of Video Programs of Chemistry to the same extent while Female students of Class X liked the Audio aspect of Video Programs of Chemistry more than those of Class IX students. Male and Female students of Class IX liked the Audio aspect of Video Programs of Class IX liked the Audio aspect of Video Programs of Chemistry more than those of Physics to the same extent. In the case of Class X, Males liked the Audio aspect of Video Programs of Physics more than those of Females.
- 13. Male students liked students' Engagement during Video Programs of Biology and Physics was more than those Female students. In the case of Chemistry, Males and Females liked students' Engagement during Video Programs of Chemistry to the same extent.
- 14. Class X Students' Engagement during Video Programs of Biology more than those of Class IX students. Both Class IX and Class X Students' Engagement during Video Programs of Chemistry and Physics were to the same extent.
- 15. Male students of Class X engaged more during Video Programs of Biology than those of Class IX students but Female students of both Classes IX and X engaged to the same extent during Video Programs of Biology. In the case of Chemistry, Males and Females students studying in Classes IX and X engaged during Video Programs of Chemistry and Physics to the same extent.
- 16. Female students liked Demonstration of Video Programs of Biology more than those of Male students. Both Male and Female liked Demonstration of Video Programs of Chemistry to the same extent while in case of Physics, Male students liked Demonstration of Video Programs of Physics more than those of Female students.
- 17. Class X students liked Demonstration of Video Programs of Biology and Chemistry more than those of Class IX students. In the case of Physics, Class IX students liked Demonstration of Video Programs of Physics more than those of Class X students.
- 18. Males and Females of Classes IX and X liked Demonstration of Video Programs of Biology and

Physics to the same extent. In the case of Chemistry, Female students of Class X liked Demonstration of Video Programs of Chemistry more than those of Males and Females of Class IX students.

- 19. Male students liked Videography of Video Programs of Biology and Physics more than those of Female students. In the case of Chemistry, both Male and Female students liked Videography of Video Programs of Chemistry to the same extent.
- 20. Both Class IX and Class X students were found to like Videography of Video Programs of Biology and Physics to the same extent. In the case of Chemistry, Class X students liked Videography of Video Programs of Chemistry more than those of Class IX students.
- 21. Males and Females studying in Classes IX and X liked Videography of Video Programs of Biology, Chemistry and Physics to the same extent.
- 22. Male students liked Information Graphics of Video Programs of Biology and Physics more than Female students. In the case of Chemistry, Male and Female students liked Information Graphics of Video Programs of Chemistry to the same extent.
- 23. Both Class IX and Class X students liked Information Graphics of Video Programs of Biology and Physics to the same extent. In the case of Chemistry, Class X students liked Information Graphics of Video Programs of Chemistry more than those of Class IX students.
- 24. Males and Females from Classes IX and X liked Information Graphics of Video Programs of Biology, Chemistry and Physics to the same extent.
- 25. Male students of Class IX liked Biology Theory Dominated Video Programmes more than Female students of the same class but Male and Female students of Class X liked Biology Theory Dominated Video Programmes to the same extent.
- 26. Male and Female students of Class IX liked Physics Theory Dominated Video Programmes to the same extent.
- 27. Male and Female students of Class IX liked Biology Demonstration Dominated Video Programmes to the same extent. But Female students of Class X liked Biology Demonstration Dominated Video Programmes more than their Male counterparts.
- 28. Male students of Class IX liked Chemistry Demonstration Dominated Video Programmes more than those of Female students while Male and Female students of Class X liked Chemistry Demonstration Dominated Video Programmes to the same extent.
- 29. Male students of Class IX as well as Class X liked Physics Demonstration Dominated Video Programmes more as compared to their Female counterparts.

#### **5.10 Conclusion**

In an era marked by rapid digitalization and technological advancements, the fusion of pedagogy and technology, referred to as techno-pedagogy, plays a pivotal role in shaping the educational landscape. This research study delved into the realm of techno-pedagogy, with a focus on students' reactions to educational video programs in the context of Biology, Chemistry, and Physics. The findings of the study shed light on the interplay between various factors, including gender, class, and content format, in influencing students' responses to these programs.

The research uncovered several noteworthy insights:

- 1. Gender and Class Influence: Gender and class disparities emerged as significant influencers of students' reactions to educational video programs. Male students generally exhibited a higher affinity for the content, presentation, audio, and engagement aspects of the programs compared to their female counterparts. Class X students tended to exhibit a stronger liking for these programs, especially in the domains of Biology and Chemistry, as compared to Class IX students.
- 2. Content Format Matters: Different content formats, such as theory-dominated and demonstrationdominated video programs, evoked distinct responses. In Biology and Physics, male students showed a preference for theory-dominated programs, while female students displayed a strong liking for demonstration-dominated content. These nuances highlight the importance of tailoring educational content to suit diverse learning styles and preferences.
- 3. Delving into Specific Aspects: Beyond overall reactions, the study probed deeper into specific aspects of the video programs, including content, presentation, audio, engagement, videography, and information graphics. These granular insights can guide educators and content creators in refining their pedagogical approach and utilizing technology effectively.
- 4. Potential Implications for Educational Practices: The findings of this study have several implications for educational practices. Educators, curriculum developers, and content creators should consider the diverse preferences of students, especially with regard to gender and class. Adapting content delivery to suit these preferences can enhance engagement and learning outcomes.
- 5. Quality Enhancement through Techno-Pedagogic Analysis: The study underscores the need for techno-pedagogic analysis in the development of educational programs. Such analysis can bridge the gap between content, pedagogy, and technology, ultimately leading to higher-quality educational materials. The integration of techno-pedagogic skills can equip teachers with the tools to deliver more engaging and effective lessons.
- 6. Bridging the Digital Divide: In an age where technology plays a central role in education, it is crucial to address the digital divide and ensure that all students have access to high-quality educational content. Initiatives like Swayam Prabha, as mentioned in the study, are promising steps toward providing equitable access to educational resources.
- 7. Future Directions: This research paves the way for further exploration in the field of technopedagogy. Future studies can delve deeper into the dynamics of content delivery, incorporating feedback from students and teachers to refine the pedagogical approach.

Overall, the study highlights the evolving landscape of education, emphasizing the vital role of technopedagogy in shaping the learning experience. As the educational system continues to transform, understanding the nuances of student reactions to technology-mediated learning is essential for creating effective, engaging, and inclusive educational programs. The insights from this study can guide educators, content creators, and policymakers in adapting to the changing educational paradigm, ultimately benefiting both students and teachers.

#### **5.11 Implications**

#### 1. Teachers:

- Develop Digital Literacy: Teachers must be trained to use technology effectively in the classroom. Research can guide professional development programs to enhance digital skills.
- Adopt Techno-Pedagogical Practices: Teachers need strategies to integrate technology in ways that improve student engagement and learning outcomes.
- Evaluate Effectiveness: Teachers should assess how technology impacts student learning and adjust their use of digital tools accordingly.

#### 2. Teacher Educators:

- Curriculum Design: Teacher education programs must include training on integrating technology with pedagogy. Research can help develop curricula that focus on practical techno-pedagogical skills.
- Model Best Practices: Teacher educators should demonstrate effective technology use in teaching, serving as models for prospective teachers.
- Ongoing Professional Development: Research can suggest continuous development models to help teacher educators stay updated on emerging technologies and pedagogies.

#### 3. Prospective Teachers:

- Techno-Pedagogical Integration: Teacher preparation programs should focus on equipping prospective teachers with the skills to incorporate technology into their teaching effectively.
- Hands-on Practice: Research supports the inclusion of practical experiences with digital tools during teacher training.
- Foster Innovation: Prospective teachers should be encouraged to creatively use technology to enhance learning.

#### 4. Curriculum Developers:

- Align Technology with Content: Research can guide curriculum developers to create learning experiences that blend content, pedagogy, and technology.
- Support Diverse Learning Needs: Curriculum developers should consider how technology can meet the diverse needs of all students, including those with disabilities or from underserved backgrounds.
- Evaluate Tools: Research should provide evidence on the effectiveness of different digital tools to guide curriculum developers in selecting the best resources.

#### 5. Addressing Challenges:

- Access to Technology: Research should address issues like limited access to technology and suggest affordable solutions.
- Resistance to Change: Research can identify strategies to overcome resistance to technology adoption among educators.
- Continuous Improvement: Ongoing research is necessary to ensure that educators remain up-todate with evolving technologies and teaching practices.
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### **Appendix-I**

# वीडियो कार्यक्रम मापनी पर विद्यार्थियों की अनुक्रिया

### **REACTION TOWARDS VIDEO PROGRAMME SCALE FOR STUDENTS**

#### प्रिये विद्यार्थियों,

इस पांच बिंदु अनुक्रिया मापनी का उद्देश्य एन.सी.ई.आर. टी ढारा माध्यमिक स्तर के लिए बनाए गए विज्ञान के वीडियो कार्यक्रमों के विभिन पहलुओं के प्रति आपकी अनुक्रिया जानना है। हर कथन के आगे पांच विकल्प दिए गए हैं- पूर्णत: सहमत (पू स), सहमत (स), अनिश्चित (अ), असहमत (अ), पूर्णत: असहमत (पू अ) । आपसे अनुरोध है कि सभी कथनो को पढ़े और आपके अनुसार सबसे उपयुक्त विकल्प पर (४) टिक करे । यह जानकारी गुप्त रखी जाएगी एवं केवल शोध कार्य हेतु उपयोग की जाएगी ।

#### Dear Students,

The purpose of this five-point reaction scale is to know your reaction towards the various aspects of science video programs produced by NCERT at Secondary level. Against each statement, five alternatives are given. These are strongly agree (SA), agree (A), undecided (UD), disagree (D) and strongly disagree (SD). You are requested to read all the 33 items carefully and ( $\checkmark$ ) tick the most appropriate alternative for each student as per your understanding. This information will be kept confidential and will be used only for research purposes.

S No	कथन	पू स	स	अ	अ स	पू अ
- <del>.</del> . 110.	Statement	S A	A	U	D	SD
	पाट के उद्देश्यों के कथन दिअर्थी थे।					
1	There was ambiguity in the statement of objectives of the lesson.					
2	कैमरे का फोकस पढ़ाने वाले बिन्दु पर था।					
	The focus of the camera was on the point being taught.					
	कैष्शन कम समय के लिए दर्शाए गए थे।					
3	The captions displayed on the screen were for a short duration.					
4	वस्तु की छाया दिखाई नहीं दी।					
4	There was no shadow of the objects being shown.					

5	शिक्षक की आवाज सुनाई नहीं दे रही थी।			
	The voice of the teacher was not audible.			
6	शिक्षक के प्रस्तुतीकरण की गति तेज थी।			
0	The speed of the teacher's presentation was fast.			
_	विडियो में आवाज गूंज थी।			
1	There was an echo of sound in the video.			
	विडियो की पृष्टभूमि में संगीत नहीं था।			
8	There was no background music.			
	पाट में सहज बहाव नहीं था। शिक्षक की आवाज में स्वर परिवर्तन नहीं था।			
9	There was no smooth flow of the lesson			
	कक्षा में शिक्षक की हिलना-डलना उद्देश्य पर्ण था।			
10	The movement of the teacher was nurnoseful			
	चित्र/दश्य का विषय वस्त के साथ ठीक से जडाव था।			
11	The diagrams were preperly integrated with the subject			
	matter.			
10	शिक्षक की आवाज में स्वर परिवर्तन नहीं था।			
12	There was no voice modulation of the teacher.			
	विडियो में दिखाए गए प्रदर्शन वास्तविक स्थिति से संबंध नहीं रखते थे।			
13	The demonstrations were not corresponding to realistic			
	situations.			
	विडियो में वस्तएँ साफ दिखाई नहीं दे रही थी।			
14	The objects were not clearly visible in the video			
	विडियो में वस्तएँ अपने वास्तविक रंग में दिखाई गई।			
15	The objects were shown in their natural colours			
	विडियो की प्रष्टभूमि का रंग वस्त के दिखने में महायक था।			
16	The heatround colours halped in the display of chiests			
	The background colours helped in the display of objects.			
17	ועושעו א וזועוש שו עזיידעו א אסוזו שו אזועות אדו עו ו			
	teacher.			
	शिक्षक की वेशभूषा का रंग विडियो की पृष्ठभूमि के रंग से मेल खाता था।			
18	The colour of the dress of the teacher was suited to the			
	background.			

10	पाट के उद्देश्य नहीं बताए गए थे।			
17	The objectives of the lesson were not stated.			
20	विषय वस्तु प्रसंग से संबंधित थी।			
20	The subject matter was related to the topic.			
	पढ़ाने की विधि विषय-वस्तु के अनुसार नहीं थी।			
21	The method of teaching was not according to the subject matter.			
22	प्रसंग सरल भाषा में नहीं समझाया गया था।			
	The topic was not explained in simple language.			
22	बहुत से प्रासंगिक उदाहारण दिए गए।			
23	Many relevant examples were given.			
24	पढ़ाते समय प्रश्न नहीं पूछे गए।			
24	During teaching questions were not asked.			
25	प्रस्तुतीकरण में हास्य का पुट था।			
25	Humour was inbuilt in the presentation.			
26	पाट के अंत में मुख्य बिन्दु दोहराए गए।			
26	Recapitulation was done.			
27	पढ़ाते समय ब्लैक बोर्ड का उपयोग किया गया।			
27	The blackboard was used during teaching.			
20	मैं बिना पढ़े उत्तर दे रहा/ रही हूँ।			
28	I am responding without reading.			
20	सभी शिक्षण बिन्दू पूरी तरह से समझाए गए।			
29	Each point of teaching was thoroughly explained.			
	आडियो, विडियो तथा विषय-वस्तु में संतुलन नहीं था।			
30	There was no balancing among audio, video and textual material.			
21	प्रयोग को करने की प्रक्रिया नहीं बताई गई।			
51	Procedure of conducting practical was not told.			
	प्रदर्शन के दौरान आवश्यक सावधानी नहीं ली गई।			
32	During demonstrations necessary precautions were not taken.			
22	छात्रों ने पाट में सहभागिता की।			
55	Students participated in the lesson.			



# वीडियो कार्यक्रम मापनी पर शिक्षकों की अनुकिया

#### **REACTION TOWARDS VIDEO PROGRAMME SCALE FOR TEACHERS**

शिक्षक का नाम :	दिनांक :
Name of the Teacher	Date

#### वीडियो कार्यक्रम का नाम :

Name of video program.....

प्रिये शिक्षक,

इस पांच बिंदु अनुक्रिया मापनी का उद्देश्य एन.सी.ई.आर. टी ढारा माध्यमिक स्तर के लिए बनाए गए विज्ञान के वीडियो कार्यक्रमों के विभिन पहलुओं के प्रति आपकी अनुक्रिया जानना है। हर कथन के आगे पांच विकल्प दिए गए हैं- पूर्णत: सहमत (पू स), सहमत (स), अनिश्चित (अ), असहमत (अ), पूर्णत: असहमत (पू अ) । आपसे अनुरोध है कि सभी कथनो को पढ़े और आपके अनुसार सबसे उपयुक्त विकल्प पर (४) टिक करे । यह जानकारी गुप्त रखी जाएगी एवं केवल शोध कार्य हेतु उपयोग की जाएगी ।

Dear Teachers,

The purpose of this five-point reaction scale is to know your reaction towards the various aspects of Science video programs produced by NCERT at Secondary level. Against each statement, five alternatives are given. These are Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. You are requested to read all the 40 items carefully and ( $\checkmark$ ) tick the most appropriate alternative for each student as per your understanding. This information will be kept confidential and will be used only for research purposes.

S No	कथन	पू स	स	अ	अ स	पू अ
0.110.	Statement	S A	А	U	D	SD
1	वीडियो कार्यक्रम में उद्देश्य का सहज प्रवाह था।					
	There was a smooth flow of shots.					
2	विषय वस्तु की मात्रा पाठ की समयावधि के अनुसार नहीं थी।					
	The size of content was not as per the duration of the lesson.					
3	पढ़ाने की विधि छात्रों के स्तर के अनुसार नहीं थी।					
	The method of teaching was not as per the level of students					
4	पाठ क्रमानुसार प्रस्तुत नहीं किया गया।					
	The lesson was not presented in sequential order.					
5	दृश्य श्रृव्य साधन आवश्यकता अनुसार थे।					
	Teaching aids were as per requirement					
6	शिक्षक की विषय वस्तु पर पकड़ नहीं थी।					
	The teacher did not have mastery over the subject matter.					

		(		
7	प्रस्तुतिकरण की दृश्य संरचना प्रभावित कर रही थी।			
	The overall view of the presentation was appealing.			
	पाट के उद्देश्य के कथन दिअर्थी थे।			
8	There was ambiguity in the statement of objectives of the lesson.			
9	कैमरे का फोकस पढ़ाने वाले बिंदु पर था।			
	The focus of the camera was on the point being taught.			
	पर्दे पर दर्शाए गए कैष्शन कम समय के लिए थे।			
10	The captions displayed on the screen were for a short duration.			
11	वस्तु की छाया दिखाई नहीं दी।			
11	There was no shadow of the object being shown.			
10	शिक्षक की आवाज सुनाई नहीं दे रही थी।			
12	The voice of the teacher was not audible.			
12	शिक्षक के प्रस्तुतिकरण की गति तेज थी।			
15	The speed of presentation by teacher was fast.			
14	शिक्षक की आवाज में स्वर परिवर्तन नहीं था।			
14	There was no voice modulation of the teacher.			
15	वीडियो में गूंज थी।			
15	There was no echo in the video.			
16	वीडियो पृष्ठभूमि में संगीत नहीं था।			
16	There was no background music.			
17	पाट में सहज बहाव नहीं था।			
17	There was no smooth flow of the lesson.			
10	कक्षा में शिक्षक का हिलना-डुलना उद्देश्य पूर्ण था।			
18	The movement of the teacher was purposeful.			
	चित्र/दृश्य का विषयवस्तु के साथ ठीक से जुडाव था।			
19	The diagrams were properly integrated with the subject matter.			
	वीडियो में दिखाए गए प्रदर्शन वास्तविक स्थिति से संबंध नहीं रखते थे।			
20	The demonstrations were not corresponding to realistic situations.			
21	वीडियो में वस्तुएं साफ दिखाई नहीं दे रही थी।			
21	The objects were not clearly visible in the video.			

22	वीडियो में वस्तुएं अपने वास्तविक रंग में दिखाई गई।			
22	The objects were shown in their natural colours.			
22	वीडियो की पृष्ठभूमि का रंग वस्तु के दिखने में सहायक था।			
23	The background colours helped in the display of objects.			
	वीडियो से शिक्षक की वेषभूषा में प्रकाश का परावर्तन नहीं था ।			
24	There was no reflection of light due to the dress of the teacher.			
	शिक्षक की वेषभूषा का रंग वीडियो पृष्ठभूमि के रंग से मेल खाता था।			
25	The colour of the dress of the teacher was suited to the background.			
26	पाठ के उद्देश्य नहीं बताए गए थे।			
20	The objectives of the lesson were not stated.			
27	विषयवस्तु प्रसंग से संबंधित थी।			
27	The subject matter was related to the topic.			
	पढ़ाने की विधि विषय वस्तु के अनुसार नहीं थी।			
28	The method of teaching was not according to the subject matter.			
	गांग गान भाषा में नहीं गावामा गा।			
29	प्रतग तरल गांधा म गहा तमझाया गया या।			
29	The topic was not explained in simple language.			
29	The topic was not explained in simple language. बहुत से प्रासंगिक उदाहरण दिए गए थे 1			
29 30	प्रसंग सरस नाथा म नहा सनझाया गया या।       The topic was not explained in simple language.       बहुत से प्रासंगिक उदाहरण दिए गए थे ।       Number of relevant examples were given.			
29 30 31	प्रसंग सरस नाथा म नहा सनझाया गया या।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।			
29 30 31	प्रसंग सरस नाथा म गहा समझाया गया या।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे ।         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.			
29 30 31 32	אמיו ממו איז אומן איז אומן זימן מון         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।			
29 30 31 32	אמיו ממו איקו איקומו יומן יומן מון         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।         Humour was inbuilt in the presentation.			
29 30 31 32 33	א תית תעת יועו יועו יועו יועו יועו יועו י			
29 30 31 32 33	xku kka ulul u ulu ulu         The topic was not explained in simple language.         aga ki xikilua satistu ka yikilua ulu         number of relevant examples were given.         ugia ku zyst examples were not asked.         ykt ga examples were not asked.			
29 30 31 32 33 34	א संग सरस नाथा म गहा समझाया गया या।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।         Humour was inbuilt in the presentation.         पाट के अन्त में मुख्य बिन्दु दोहराए गए।         Recapitulation was done.         पढ़ाते समय ब्लैक बोर्ड का उपयोग किया गया।			
29 30 31 32 33 34	xku kka ulul u ulu ulu         The topic was not explained in simple language.         aga ki xikilua satista ulu ulu         umber of relevant examples were given.         uard kuu xaa en			
29 30 31 32 33 34 35	א सग सरस नावा म नहा सनझावा गया था।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।         Humour was inbuilt in the presentation.         पाट के अन्त में मुख्य बिन्दु दोहराए गए।         Recapitulation was done.         पढ़ाते समय ब्लैक बोर्ड का उपयोग किया गया।         The blackboard was used during teaching.         मैं बिना पढ़े उत्तर दे रहा/ रही हूँ।			
29 30 31 32 33 34 35	प्रसंग सरस माया म महा समझाया गया या।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।         Humour was inbuilt in the presentation.         पाट के अन्त में मुख्य बिन्दु दोहराए गए।         Recapitulation was done.         पढ़ाते समय ब्लैक बोर्ड का उपयोग किया गया।         The blackboard was used during teaching.         मैं बिना पढ़े उत्तर दे रहा/ रही हूँ।         I am responding without reading.			
29 30 31 32 33 34 35	प्रसंग सरस नाथा म महा समझाया गया था।         The topic was not explained in simple language.         बहुत से प्रासंगिक उदाहरण दिए गए थे 1         Number of relevant examples were given.         पढ़ाते समय प्रश्न नहीं पूछे गए।         During teaching questions were not asked.         प्रस्तुतिकरण में हास्य का पुट था।         Humour was inbuilt in the presentation.         पाट के अन्त में मुख्य बिन्दु दोहराए गए।         Recapitulation was done.         पढ़ाते समय ब्लैक बोर्ड का उपयोग किया गया।         The blackboard was used during teaching.         मैं बिना पढ़े उत्तर दे रहा/ रही हूँ।         I am responding without reading.         सभी शिक्षण बिन्दु पूरी तरह से समझाए गए।			

		ऑडियो/वीडियो तथा विषय वस्तु में संतुलन नहीं था।			
	37	There was no balancing among audio, video and textual material.			
		प्रयोग को करने कि प्रक्रिया नहीं बताई गई।			
	38	Procedure of conducting practical was not told.			
		प्रदर्शन के दौरान आवश्यक सावधानी नहीं ली गई।			
	39	During demonstrations necessary precautions were not taken.			
		छात्रों ने पाठ में सहभागिता की।			
	40	Students participated in the lesson.			
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# **APPENDIX-III**

# अवलोकन सूची

### **Observation Schedule**

अवलोकन कर्ता का नाम				
Name of Observer				
विद्यालय का नाम व पता				
Name & Address of S	choolol			
	_			
Title of Video Program	n	<b>Huidlia</b> Duration		
The of video Trogra	11			•••••
प्रसारण की तिथि				
Date of Telecast				
कक्षा	विषय	प्रकरण		
Class	Subject	Theme		
		0	5, 0, 0 <b>r</b>	
<ul> <li>पूर्व निर्धारित योजनी के अनु</li> </ul>	सार विडिया कायक्रम प्रसारित	[ किया गया ]	हा/नहा/आनणात	
ICHUI The video Program w	as telecast as per schedi	ıle	Ves/No/Undecided	
comment	us telecast as per selled	are.		
• वीडियो में उल्लेखित विषय	पर आधारित विषय-वस्तु को ध	शामिल किया गया ा	हाँ/नही/अनिर्णीत	
टिप्पणी				
The Program covered	the content of the topic	c mentioned.	Yes/No/Undecided	
comment				
• उल्लेखित कक्षा के स्तर की र्ग	वेषय-वस्त वीडीयो में सम्मिलि	ात थी ।	हाँ/नही/अनिर्णीत	
टिप्पणी				
The Program covered	the content of the level	of the class mentioned.	Yes/No/Undecided	
comment				
	<u></u>		<u> </u>	
<ul> <li>छात्रा का कायक्रम का विषय जिल्लाने</li> </ul>	ग्वस्तु क बार म पहल स बताय	त गया था ।	हा/नहा/आनणात	
The students were bri	efed about the content (	of the video program	Yes/No/Undecided in	
comment		or the video program.		
विडियो कार्यक्रम में विषय-व	गस्तु की त्रुटि देखी गयी ।		हॉ/नही/अनिणीत	
The concentural minted	koo waa nationd in the	ridaa program	Voo/No/Undooidad	
comment	kes was noticed in the v	ndeo program	165/100/Ulldecided	

• विद्यार्थी विडियो कार्यक्रम देखने के लिए उत्सुक थे ा टिप्पणी The children were attentive while viewing the video program. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided
• शिक्षकों को विडियो कार्यक्रम पसंद आया । टिप्पणी Overall the video programme was liked by the teachers. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided
• कार्यक्रम की दृश्य गुणवत्ता उपयुक्त थी । टिप्पणी Video quality of the program was good. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided
• कार्यक्रम की ऑडियो गुणवत्ता उपयुक्त थी । टिप्पणी Audio quality of the program was good. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided
• कार्यक्रम में बैटने की व्यवस्था उपयुक्त थी ा टिप्पणी Seating arrangement was adequate. comments	हाँ/नही/अनिर्णीत Yes/No/Undecided
• टी.वी का स्थान ऐसा था कि सभी छात्र विडियो कार्यक्रम अच्छी तरह से देख सके ा टिप्पणी TV placement was such that all the students were able to watch the video program properly. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided
• कक्षा के बाहर का शोर-गुल प्रसारण में बाधा नहीं डाल रहा था ा टिप्पणी Outside noise was not interfering in the telecast. comment	हाँ/नही/अनिर्णीत Yes/No/Undecided

•कार्यक्रम के बाद छात्र वीडियो में समस्याओं और अवधारणाओं के बारे में शिक्षक से प्रश्न पूछे l निष्णणी	हाँ/नही/अनिर्णीत
Students asked questions to the teacher about the issues and concepts in the video, after the programs.	Yes/No/Undecided
•कक्षा में प्रसारण के दौरान छात्र आपस में बातें कर रहे थे और शोर मचा रहे थे ।	
रिप्पणी Students were talking among themselves and making noises during the telecast h	ighlighting in the
comments	Yes/No/Undecided



# 8. List of Media Programs: Description

#### 8.1. Digestion and Absorption

Language: English Level: Secondary Duration: 11:02 Subject: Biology Digestion of food is a complex process that starts with the mouth and passes through various stages. The digested end products are absorbed into the body and the undigested food is finally egested out through the anus. This video explains the phases through which food passes in our body.

#### 8.2. Neural Control and Coordination

Language: English Duration: 06:09

Level: Secondary Subject: Biology

In our body, the neural system and the endocrine system jointly coordinate and integrate all the activities of the organs so that they function in a synchronized fashion. The neural system coordinates and integrates functions as well as metabolic and homeostatic activities of all the organs. Neurons, the functional units of the neural system, are excitable cells due to a differential concentration gradient of ions across the membrane. This educational video explains the central neural system which includes neural control and coordination.

#### 8.3. Solutions

Language: English Level: Secondary Duration: 16:34 Subject: Chemistry Every day, we rarely come across pure substances. Most of these mixtures contain two or more pure substances. Their utility or importance in life depends on their composition. A solution is a homogeneous mixture of two or more substances. This video explains the characteristics and various properties of solutions.

#### 8.4. Acids, Bases and Salts

Language: English Level: Secondary Duration: 19:40 Subject: Chemistry In our daily life, we use a large number of substances such as lemon, tamarind, common salt, sugar and vinegar. The substances that are sour in taste are acidic in nature. Generally, bases are bitter in taste and soapy to touch. This video explains the chemical properties and indicators of acids and bases. It further explains the use of indicators and reaction of acids and bases with metals.

#### 8.5. Diversity of Living Organism

Language: English Duration: 24.46

Diverse life forms share the environment, and are affected by each other as well. As a result, a stable community of different species comes into existence. All organisms which are multicellular eukaryotes without cell walls are known as kingdom Animalia. This video explains about kingdom Animalia and its characteristics by illustrating examples.

Level: Secondary Subject: Biology

#### 8.6. Electricity and Circuits

Language: English Duration: 5:23 Electricity has an important place in modern society. It is a controllable and convenient form of energy for a variety of uses in homes, schools, hospitals, industries and so on. The materials that conduct electricity are called good conductors of electricity. The materials which don't conduct electricity at all are bad conductors of electricity. There are also some materials that conduct electricity under specific conditions. They are not completely bad conductors. This video shows a demonstration of how to make

#### 8.7. First and Second Law of Motion

an electric switch and it also explains whether tap water conducts electricity.

Language: English Duration: 26:49

Level: Secondary Subject: Physics

In our everyday life we observe that some effort is required to put a stationary object into motion or to stop a moving object. We ordinarily experience this as a muscular effort and say that we must push or hit or pull on an object to change its state of motion. The concept of force is based on this push, hit or pull. The first law of motion is stated as "An object remains in a state of rest or of uniform motion in a straight line unless compelled to change that state by an applied force". In addition, we see that some objects are at rest and others are in motion. Birds fly, fish swim, blood flows through veins and arteries, and cars move. Atoms, molecules, planets, stars and galaxies are all in motion. We often perceive an object to be in motion when its position changes with time. However, there are situations where the motion is inferred through indirect evidence. The second law of motion states that the rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of force. This video explains the first and second law of motion and its mathematical formula.

#### 8.8. Is matter around us pure?

Language: English Level: Secondary Duration: 24:20 Subject: Chemistry When a scientist says that something is pure, it means that all the constituent particles of that substance are the same in their chemical nature. A pure substance consists of a single type of particle. In other words, a substance is a pure single form of matter. As we look around, we can see that most of the matter around us exists as mixtures of two or more pure components. This video explains the mixture and its characteristics.

#### 8.9. Exothermic and Endothermic

Level: Secondary Language: English Duration: 21:19 Subject: Chemistry The endothermic reactions absorb energy from the surrounding that is in the form of heat. While the exothermic reaction releases energy into the surrounding from the system. This video demonstrates and explains exothermic and endothermic reactions.

Level: Secondary Subject: Physics

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# **8.10.** To study Parenchyma and Sclerenchyma Tissue Plants by Preparing Temporary Slides

Language: English Duration: 9:48 Level: Secondary Subject: Biology

This video explains the different characteristics of parenchyma and sclerenchyma tissues on the basis of cell wall, arrangement of cells, lumen, living/dead cells, shape of the outline, intercellular space and stain. This video starts with the definition of tissues as "a group of similar cells performing a particular function" and also explains the different types of plant tissues for introducing the parenchyma and sclerenchyma tissues. This video further shows the microscopic structure of parenchyma and sclerenchyma tissues in plants by preparing temporary slides.

# 8.11.To study the external features of monocot and dicot plants and characteristics of Spirogyra, fern, pinus and an Angiosperm Plant

Level: Secondary Subject: Biology

Language: English Duration: 27:17

This video explains that in dicot plants, seeds have two cotyledons while in monocot plants there is only one cotyledon. In dicot plants, leaf venation is reticulated while in monocot plants leaf venation is parallel. Dicot plants have tap roots while monocot plants have fibrous roots. In dicot plants, flowers have petals in multiples of 3 while in monocot plants, flowers have petals in multiples of 4 or 5. Second Video explains the characteristics of spirogyra, agaricus, moss, fern, pinus and an angiosperm plant. Dr. Reena Mohapatra starts this video by reminding us about heterotrophs and autotrophs. Plants can be classified into five such as thallophyta, bryophyta, pteridophyta, gymnosperms and angiosperms. Thus, this video helps in categorizing different plants as it shows examples of each category and explains its characters by displaying specimens.

#### 8.12. Flowers as natural indicator

Language: English Subject: Biology

This video explains how flowers can be used for acid base tests. Swati Bedekar starts this video by asking the question "whether it's possible to do an acid base test without a litmus paper". This video shows how color changes when an acid (hydrochloric acid) and a base were dipped on a paper colored by the flowers.

# **8.13.** To prepare a stained temporary mount of onion peel and human cheek epithelial cells and to study its characteristics

Language: English Duration: 15:56

The video starts by explaining about the cells and then explains the structure of plant cells by preparing a stained temporary mount of onion peel. All living organisms are made up of cells. It is the basic structural and functional unit of life. Our body is also made up of cells. We cannot see cells with our naked eye but we can see the cells by making a temporary mount. Second video shows the process of preparing a temporary mount of human cheek epithelial cells and it also explains its characteristics. This practical video concludes by providing the difference between plant cell and animal cell.

Level: Secondary Subject: Biology

#### Level:Secondary Duration: 6:36

#### 8.14. Our Environment

Language: English Level: Secondary Duration: 31:34 Subject: Biology In this, the habitat of different animals are shown by figuring out different animals and their nature. Habitat is the place where animals can live, get their nourishment and can propagate successfully. There are many types of habitats, however, these may be broadly grouped as terrestrial (on land) and aquatic (in water). It aims to make viewers understand about the different adaptations of plants, animals and birds in different habitats.

#### 8.15. Source of light, light travels in a straight line and formation of image by convex lens

Language: English Subject: Physics

Level: Secondary Duration: 26:49

We cannot see without light. The visual ability of humans and other animals is the result of a complex interaction of light, eyes and the brain. We are able to see because light from an object can move through space and reach our eyes. The first video concludes by displaying some examples on luminous and illuminated objects. Second video explains that the light travels in a straight line. The apparatus used in this video are wooden case, torch, two plastic sheets with slits, drawing board, drawing paper, stylus, tape and light probe. Wooden case with torch and two plastic sheets fixed in such a manner that the slits in the sheets are in one line with the light of the torch allowing clear passage of light. Then the experiment shows that the light passes through the straight line. The last video is another practical video showing different images formed by convex lenses. In this video the object is placed at different levels/angles to show differences in images

#### 8.16. Improvement in Food Resources

Language: Hindi Subject: Biology Duration: 30:08 This video explains how to increase the yields of crops. This video explains the major groups of activities for improving crop yields which are classified as: Crop variety improvement, Crop production improvement and Crop protection management. The video explains how variety improvement can be done through various factors such as higher yield, improved quality, biotic and abiotic resistance, etc. Further, it also explains crop production movement which includes nutrient management, irrigation, and cropping patterns.

#### 8.17. Blood Grouping (Rakht Samuh parikshan)

Language: Hindi Duration: 6:13

This video shows how to check the blood groups of humans using antiserum and also explains the different types of blood groups. Blood of humans are grouped into A, B, AB and O systems based on the presence or absence of two surface antigens, A, B on the RBCs. Persons with 'O' blood group can donate blood to persons with any other blood group and hence 'O' group individuals are called 'universal donors'. Persons with 'AB' group can accept blood from persons with AB as well as the other groups of blood. Therefore, such persons are called 'universal recipients'. It further explains another antigen, the Rh antigen similar to one present in Rhesus monkeys (hence Rh), is also observed on the surface of RBCs of the majority (nearly 80 per cent) of humans.

Level: Secondary

Level: Secondary Subject: Biology

#### 8.18. Saral and Sanyukt Sukshmdarshi ke vibbhin bhagon ka addyan

Language: Hindi Duration: 6:31

#### Level: Secondary Subject: Biology This is a practical video explaining different parts of the microscope. The microscope has a strong basal

foot and a vertical arm joined by an inclination joint. ed with the help of clips at desired position. The video describes in detail about the body of microscope which consists of a movable tubular body tube raised on rack and pinion mechanism. The tube has an ocular or evepiece of specific magnification which can be changed for lower or higher magnification, i.e., 5X, 10X or 15X. Eye piece with pointer are also available.

#### 8.19. Biodiversity 1

Language: English Duration: 16:01

This video program presents biodiversity, or biological diversity, which implies the variety of living beings and their habitats on Earth. It showcases the different habitats on land, water and air, as well as the various kinds of organisms that are linked with food chains. The video shows how all living organisms contribute to the ecosystem in their own ways.

#### 8.20. Biodiversity 2

Language: English Duration: 16:01

Different habitats offer living conditions to different organisms. This video program of Biodiversity shows how different kinds of flora and fauna find living conditions in various habitats. But in the present times, sadly, some animals are getting extinct. Further, biodiversity is also a source of spiritual and cultural heritage that has added to the celebration of life on our planet.

#### 8.21. Effect on mass on simple pendulum

Language: Hindi Duration: 20:40

Subject: Physics This video delineated the effect of mass on the time period of a simple pendulum by describing an experiment and performing activities related to it. This video started with the introduction of instruments used in the experiment which are 3 simple balls, 1 spring balance, 1 rubber cork, 1.5-meter thread, 1-meter scale and 1 laboratory stand. Then, the presenter showed how to calculate the least count of a variety of simple balls by using a spring balance. It tried to explain and calculate the time period taken by the variety of three balls in a periodic time by counting each oscillation of the balls. Therefore, it showed that the spell of any simple pendulum is not dependent on the mass of its sphere.

#### 8.22. Inertia

Language: Hindi Duration: 10:33

Level: Secondary Subject: Physics

In this video, the presenter performed three experiments to explain the effect of inertia on different objects. The presenter very beautifully explained, by taking everyday life examples/situations, why something happens due to inertia; for example, flowers on trees fell down when they want to be in rest and branches are in motion. By taking day to day life circumstances, the video showed the importance of inertia and clarified the difference between the inertia of different objects.

Level: Secondary

Level: Secondary

Subject: Biology

Subject: Biology

Level: Secondary

#### 8.23. Seemant Gharshan ka adyan

Language: Hindi Duration: 27:07

96

Level: Secondary Subject: Physics

The video demonstrated the role of Friction with a variety of planes. The presenter tried to show the relevance of opposite forces applied on the object to represent/study the phenomenon of friction for a better understanding of the viewers. For this, she performed one scientific experiment by taking a variety of surface planes (mirror, paper and table) and slide wooden blocks by using a spring balance. Furthermore, she also calculated the forces (in the unit of Newton) applied by sliding the object on a variety of surface planes. Therefore, the presenter concluded that the forces applied by the contact of the object to the surface planes are dependent on the nature of the object and friction between them.

# **ICT INITIATIVE**

#### Technology Initiative for Reaching Out and Bridging Digital Divide

Technology use and its integration has become one of the basic building blocks of modern society within a short span of time, hereby making it an essential part of education. The National Education Policy (NEP) - 2020 envisions extensive use and integration of technology in teaching, learning, and assessment, to transform India into a digitally empowered society and knowledge economy.

The NEP 2020 further states that the thrust of technological interventions will be for data-based decision making, supporting professional development, overcome language barriers, support DIVYANG, enhancing educational access, and streamlining educational planning, management, and administration, including processes related to admission, attendance, assessment, etc. The recent efforts of the Government of India (GoI) seek to integrate the use of technology in almost every sphere of life. Given the emergence of digital technologies and the importance of leveraging technology for teaching-learning at all levels of school education; from foundational (Primary & Grade 1 to 2) to Secondary (Grade 9 to 12) level, teacher & adult education; the NEP-2020 recommends the following key initiatives:



The National Digital Education Architecture (NDEAR), developed as part of the implementation of NEP-2020 vision and goals of National Educational Technology Forum (NETF) is a globally pioneering effort in education to create a unifying national digital infrastructure to energise and catalyse the education ecosystem. NDEAR envisions Digital Infrastructure for School Education which is federated, unbundled, interoperable, inclusive, accessible, evolving, and aims to create and deliver diverse, relevant, contextual, innovative solutions that benefit students, teachers, parents, communities, administrators and result in timely implementation of policy goals.

#### **Goals of National Digital Education Architecture**



# **ICT INITIATIVE**



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PMeVidya is an innovative and unique initiative by the Ministry of Education, Government of India to sustain education by leveraging ICT and to facilitate learning and teaching at school level. It offers multifarious educational resources in multi-platform mode viz. digital/ online through 200+ DTH TV Channels, community radio, content for Divyangs (CwSNs), podcast etc. Takes advantage of the several streaming patforms available accross the country to telecast educational content in audio/video mediums.

