

ANALYZE THE TRANSFERABLE COGNITIVE SKILLS IN LEARNING OF HIGHER SECONDARY STUDENTS

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ABSTRACT

The current study was carried out to analyze the transferable cognitive skills in the learning of higher secondary students. The first major objectives was to assess the transferable cognitive skills in learning of higher secondary students, the second was to compare the transferable cognitive skills in learning of higher secondary students based on gender, the third was to compare the transferable cognitive skills in learning of higher secondary students based on grade level, and Last, fourth was to compare the transferable cognitive skills in learning of higher secondary students based on age. The conceptual frame work was developed from the model of higher-order thinking (Katerina and Kristyna, 2016) and the model of learning and innovation skills (Namthip, Sirichai, and Chanatip, 2015). The population of the current study was 23,412 higher secondary level of students of Islamabad and Rawalpindi, and the sample size was 700 higher secondary level students. The stratified random sampling technique was used for data collection. The data were analyzed by mean, t-test, and ANOVA. The study revealed that higher secondary students show moderate overall proficiency in transferable cognitive skills, with strengths in creativity, critical thinking, and decision making, but weaknesses in systems thinking, knowledge transfer, and time management. The findings suggest a need for a balance and development of transferable cognitive skills in the learning of higher secondary students through the curriculum planning for learning of higher secondary students.

Keyword: Transferable, learning, creative, cognitive, higher-order and thinking

INTRODUCTION

In higher secondary school student faces many difficulties in learning and understanding academic topics. The difficulties, not only in understanding, even reflect in there writings and while they giving tests, they are not able to write properly their concepts just because of the ineffectively understand the topic in class time. Another depiction, students do not have abilities to write own concepts on paper. Student don't have this ability that's mean, they are insufficient with cognitive skills. Many students waste effective classroom time just because of disinterest in lectures. For those students active classroom time and discussion time would be very effective. But here, if teachers do not teach with those methods, students lose learning time. Shazia and Muhammad (2015) stated that effective time management can have a significant impact on a person's overall performance and accomplishments.

The learning skills include the engaging students in learning with flipping and discussion. Those methods are teaching tools, which can be used by teachers in during teaching. But here is the case, what are the learning skills for the students by which, students learn perfectly, giving tests properly, and taking interest more than old-time.

The teacher and students need to think deeply about the current topic this is the skill which can be created by the teacher, if a student doesn't have. Dipesh and Satish (2024) states Success in the twenty-first century requires the ability to think creatively for this teachers should have the ability to create creative thinking ability in students for conducting healthy discussions about academic topics in class time. When Creative Thinking grow, it can be create mental ability of student in participating creative writing. Ability of writing concepts in own words, do

reduce student stress and fear. For learning writing, ability students need to do the practice writing. Writing is the most important skill which includes correct grammar correct vocabulary and correct formation of letters. Which is not developed at a high level, it is a long process that can teach from secondary level to higher secondary level. Writing skills helps student concept apply on paper.

Another learning skill is active discussion. If a student can able to do active discussions with the teacher, it reduces misconceptions in the student's mind about a particular topic. For this discussion, students should have prior knowledge from other sources which can be guided by teachers before starting a new topic. Stephen (2025) states learning experiences that allow students to reflect on their presumptions in an attempt to promote growth in critical thinking skills are known as transformative curricula. A teacher can guide students in searching for a topic on the internet, or a few points related to the topic. This method develop interest of the student in-class time topic. It is not necessary for students to find out the extra knowledge from the internet. They might be searching from books, as well as last yearbooks, and giving tasks to discuss with any family member. In this way, students learn the ability to discuss with others and get views of others which can be evaluated by the teacher in class. If a student learns how to discuss any topic with others, many hidden abilities like choosing the correct word while communicating with others and using the right word for explaining their motive in front of others can be planted in students. By this, they can be doing dynamic discussions with others anytime. It gives them confidence in communication and conversation. It enhances knowledge and develops one main skill which is a problem-solving skill. Also promote student engagement in active learning. Which is reflected when they give assessments and do assignments. They also frequently inform teachers and elders about any difficulties which they face in learning and it can be e getting a correct tutorial on learning time. Addressing the needs of all students, teachers are needed given the tools they need to act as learning designers. Malik and Setiawan (2016) stated that transferable skills are abilities acquired in one context that can be applied effectively in different situations. They deserve to be recognized for their skills in developing innovative and interesting learning environments.

If students are trained at a higher secondary level with learning skills, they can be our future self-learners. Might be they are our future researchers and innovators in education but for this, we need to become them good self-learner. Also reduce their fear of learning and studying, and develop an interest in the study. According to Salava (2009) stated that a key goal of instruction is to support the development of transferable, adaptable knowledge and skills that can be effectively used in a variety of real-life contexts. Student should study with an interest not by force. We can be developed learning skills in students at the school level but at the college level, a student feels free from mandatory education. This is a reason, it is necessary to develop learning skills in high-level school students to become the future self-learners.

Students need proper training in learning skills, which means students should know, how to discuss their problems with teachers and this ability they can learn, if they go through with discussion, by teaching method in-class time. Susan (2002) stated that educators in higher education hold a considerable advantage compared to those teaching in other levels of the education system. They can learn how to discuss a matter, how to clarify the concept, and how to implement it in reality. Discussion method of teaching engages student to-ward learning. They increase attention and create focus and motivate them to participate in class time with the teacher-student groups. It gives the opportunity to indulge in a topic and helps everyone successfully achieve learning objectives. Discussion learning convert student to active learning, this cannot be e happens listening quietly. It can happen when students do healthy discussions with teachers, and teachers give them helpful feedback. It can lead to starting students' creativity and critical thinking.

Another learning skill is creative writing. Which needs a lot of creative thinking. Writing is also a communication source with the world, and academic writing supports getting good marks in exams. Mansoor, Ismail, and Shahnawaz (2021) states teaching and learning creative writing has become increasingly challenging and difficult across all contexts. Many students have fear of giving oral and written exams and in student future, they leave their education in mid of their educational career. Because they think, now they do not have the ability to do further studies. Due to a lack of understanding and writing power. And discussion skills and writing skills give confidence to the student for creative

thinking and writing. Due to this, they save their time in wasting tension and fear. Although those learning skills give them direction for critical thinking indirectly they shape their conversation intellectual discussions and on paper, write their concepts in a concise and better way.

1.2 Problem Statement

In the rapidly evolving educational landscape, there is an increasing demand for students to possess not only academic knowledge but also transferable cognitive skills that can be applied across various subjects and real-world situations. While prior studies have explored cognitive skills in different contexts, there is limited focus on how these skills are refined within higher secondary education. The term higher secondary refers to the educational system from 9th through 12th grade. Many students still struggle to effectively demonstrate essential cognitive abilities such as critical thinking, creativity, and communication. The challenge lies in effectively developing and integrating transferable learning skills within the curriculum and instructional practices, especially across diverse student demographics such as gender, age, and grade level. This study seeks to investigate and assess the development of transferable cognitive skills among higher secondary students, aiming to bridge the gap between theoretical knowledge and practical application. Moreover, it is necessary to assess the transferable cognitive skills in learning of higher secondary students, to compare the transferable cognitive skills in learning of higher secondary students based on gender, to compare the transferable cognitive skills in learning of higher secondary students based on grade level, and lastly, to compare the transferable cognitive skills in learning of higher secondary students based on age.

1.3 Research Objectives

- ✓ To assess the transferable cognitive skills in learning of higher secondary students.
- ✓ To compare the transferable cognitive skills in learning of higher secondary students based on gender.
- ✓ To compare the transferable cognitive skills in learning of higher secondary students based on grade level.
- ✓ To compare the transferable cognitive skills in learning of higher secondary students based on age.

1.4 Hypothesis

- ✓ H₀: There is no significant difference in the development of transferable cognitive skills among higher secondary students based on gender, grade level, and age.
- ✓ H_a: There is a significant difference in the development of transferable cognitive skills among higher secondary students based on gender, grade level, and age.

1.4.1 Sub-Hypotheses

- ✓ H₀2: There is no significant difference in transferable cognitive skills among higher secondary students based on gender.
- ✓ H_a: There is a significant difference in transferable cognitive skills among higher secondary students based on gender.
- ✓ H₀3: There is no significant difference in transferable cognitive skills among higher secondary students based on grade level.
- ✓ H_a: There is a significant difference in transferable cognitive skills among higher secondary students based on grade level.
- ✓ H₀4: There is no significant difference in transferable cognitive skills among higher secondary students based on age.
- ✓ H_a: There is a significant difference in transferable cognitive skills among higher secondary students based on age.

1.5 Significance of the Study

This study holds significant importance for educators, curriculum developers, policymakers, and other key stakeholders in the higher secondary education system. By examining the development and application of transferable cognitive skills among students, the research provides valuable insights into how these skills can be effectively nurtured to enhance learning outcomes. The findings will support teachers in refining instructional strategies that foster critical thinking, creativity, communication, and problem-solving. It will also guide curriculum developers in designing content that integrates cognitive skill development across all subjects. For policymakers and educational leaders, the study will offer evidence-based recommendations for policy formulation, teacher training, and resource allocation aimed at promoting lifelong learning. Ultimately, this research will contribute to preparing students for academic success, career readiness, and adaptability.

in an increasingly complex and interconnected world.

1. LITERATURE REVIEW

Learning skills are the skills, used for organizing knowledge, dealing with knowledge, and implementing that knowledge correctly. Tomlinson (2003) state that, learning skills are the helping tools for the imagination for power reasoning analyses for questions, and design the work as per the concept. Many times learners need to classify and identify the task outcomes in comparison with mental arguments. Then students need to communicate their thinking with the facilitator, for this student should listen actively. Understand the discussion of the class and the reading of the topic. Then combine both things and give a reply in classroom discussion. This can be possible if students know, how to communicate effectively. Learning skills polish student mind and enhance their knowledge. Some students learn automatically from the environment those skills. But the majority of students need training from teachers because teachers' way of teaching influences students' whole life. Visvanathan and Panneer, (2015) states, authentic activities, access to expert performances and process modelling, a reflection of how the information will be applied in real life, and encouragement of students to consider many viewpoints are all features of the situational learning environment. The integration of assessment with an activity-based approach to learning allows for the collaborative production of expertise by relevant task and interaction, on-site mentoring that suits them, and coaching.

The knowledge and learning skills are both crucial at every level. Skills cannot be recognized without the presence of knowledge and knowledge remains limited without the application of skills. The higher secondary education plays a vital role in shaping students into well-rounded, capable individuals ready to face the challenges of higher education, careers and life. According to Malik and Setiawan (2016) stated that students primary activities are still focused on utilizing lower-order thinking skills. Previous to this study, the transferable cognitive skills in various areas were explored but this study topic was created with the development of higher secondary pupils. It helps students apply knowledge across various contexts, enhancing their academic and personal growth.

Developing transferable cognitive skills in higher secondary students preparing them for diverse challenges. Slava (2008) stated that effectively develop flexible, high-level cognitive skills needed for solving complex real-world problems, instruction should emphasize complete learning tasks instead of isolated, fragmented parts of those tasks. These skills foster lifelong learning, enabling students to apply knowledge across subjects. Strengthening cognitive abilities supports creativity, logical reasoning, and effective communication. Ultimately, it equips students with the flexibility to succeed in higher education, careers, and an evolving global landscape. Teachers are essential in shaping students' cognitive skills, as they guide learning processes and foster critical thinking. Rustambek (2025) states design thinking, a forward-thinking teaching method, has been proven to develop key cognitive abilities in students. They can guide students through various short assignments, exams and essays throughout the course but students still struggle in writing assessments. Through planned instruction teachers can develop. These transferable skills are vital for success beyond the classroom. Teachers create the foundation for lifelong learning by encouraging writing creativity in students.

Administrators can foster transferable cognitive skills by integrating critical thinking, problem-solving, and creativity into the curriculum. They can promote interdisciplinary learning environment for educators. Stephen (2025) states transformative curriculum design represents a progressive approach that enables education to align with current global trends. It establishing a culture of collaboration and adaptability helps students apply knowledge across subjects. Clear policies and resources must support skill-building from early education through graduation.

Thomas (2015) defined that skills can be transferable, if specific requirements for curriculum design and reinforcement are fulfilled. Fostering diverse academic contexts by curriculum developers can integrate transferable cognitive skills for all subjects. Students develop a deeper understanding and application of knowledge. This approach prepares students for challenges in higher education and careers.

Educational psychologists are key stakeholders in higher secondary education. Samuel (1984) stated that learning involves more than just acquiring information, organizing and organizing information and cognitive abilities. They can enhance students'

ability to apply knowledge across subjects and real-world scenarios by developing effective learning strategies, they help optimize cognitive growth and academic success.

Ian (2010) stated that policymakers' present emphasis on generic abilities is significant and valuable, there are clear gaps in our knowledge of their nature and how to acquire them. Policymakers play a crucial role in integrating transferable cognitive skills in higher secondary education through policies that influence teacher training, resource allocation and assessment methods to enhance cognitive skill development. These skills help to create a well-prepared, innovative and competitive future workforce.

The involvement of stakeholders promotes a well-integrated approach enhances students' ability to apply knowledge across disciplines and real-world challenges. Strengthening cognitive skills prepares students for higher education, careers, and an evolving global landscape. Collaboration among stakeholders ensures a dynamic, skill-focused learning environment. Ultimately, fostering cognitive growth empowers students to succeed in diverse and competitive future opportunities.

2.1 Reasoning Leads to Creative Writing

Thinking is a natural process that can be cultivated by itself as per the human potential it can be higher order and lower order (Black, 2005). The students, who are good learners can easily learn and motivate thinking attributes. Very first critical thinking introduced by bloom's taxonomy, higher-order thinking ability related with analysis synthesis and evaluation level and the lower order thinking is related with the knowledge comprehension application (Duron, Limbatch & Waugh, 2006; Lauer, 2005, Choy and Cheah, 2009). Everyone knows that critical thinking is a very critical process to develop students. And, if students adopt this ability to think, they can solve many critical problems on their own. Tomlinson (2003) said, The Critical thinking understand as a subject that can be taught teacher. To develop analytical capacities, teachers, instruct multiple problems to solve. The student has the ability to adapt the message behind that practice they can be easily motivated and establish critical thinking behaviour in their personality.

Butterworth and Thwaites (2013). Without thinking, the ability to use problems to become a problem solver is difficult. in examinations, those

students cannot evaluate the gaps between the topic ok and their book works and do not understand the tricky questions which can be e given in question paper problem-solving method is a systematic method which can be related to thinking skills for example if a student who are critical thinker he can think creatively, when he face situation and solve problem smartly. Problem-solving skills work with; data, processes, and getting solutions. Creativity can be this theory is given by Polya in his book Penguin in 1990 as per him problem-solving skills special helps in mathematics solutions as well as problem-solving skill establish, by practicing step by step of any method with practice, and student can be a problem solver.

2.2 Critical Element that Contributes to Learning Innovation

The growing use of technological innovation in education and the constructivist theory of knowledge and learning, the learning environment is an essential part of the educational conversation. Socialized, oneself, unstructured, and regulated instruction are the four types of learning settings. The one of the structured setting is classroom teaching, in a classroom combines specific ways of applying languages to teach, involvement in particular activities, forms of social contact, and making use of the learning environment as a place of teaching and learning (Rebecca, 2011). These components work together to create a dynamic totality wherein the educational setting itself is crucial to changing the operational culture of the institution. They all interact with one another and are utterly encouraging of each other (Visvanathan and Panneer, 2015).

2.3 Train Students Professionally

Clive and Deborah (2012, pg. 80 & 84) states, Teachers are content as they know what to teach and how to teach in connection with academic plans, which means that they require a clear curriculum that students can follow to learn new information. This is a professional method of instruction where the teacher is aware of the working before entering the classroom. In practice, choices made in one cluster will have an effect on the others, but I've discovered it's best to start by carefully researching and analysing the scenario. This reveals a number of important elements that must be taken into account and will result in more effective choices in the other group. Expectations, targets, and objectives for

contextual evaluation; activities for teaching and learning content; and evaluations make up the clusters complete and perfect. In this approach, students receive instruction by absorbing teachers' focused work. Analysis in practice implies a teacher that makes a positive difference by applying what they have learned to observing situations, evaluating the modifications they implemented, and evaluating the impact of the development (Clive, and Deborah, 2012). All the above intentional teaching make affects pupils since students observe and learn instinctively the teacher's conduct.

2.4 Key Theories

This theoretical base justifies the investigation into how transferable cognitive skills are developed in K-

12 settings and how these skills vary across gender, grade levels, and age groups. This study draws from Bloom's upper-level domains. which align directly with the development of higher-order, transferable cognitive skills (Thomas, 2015). Bloom's (1956) cited in Esra, Ece, and Mahmut (2025) states taxonomy of Cognitive Domains, and the concept of 21st-Century Skills collectively inform how transferable cognitive skills are developed and applied in K-12 education. Bloom's taxonomy provides a structured hierarchy of cognitive processes remembering, understanding, applying, analyzing, evaluating, and creating.

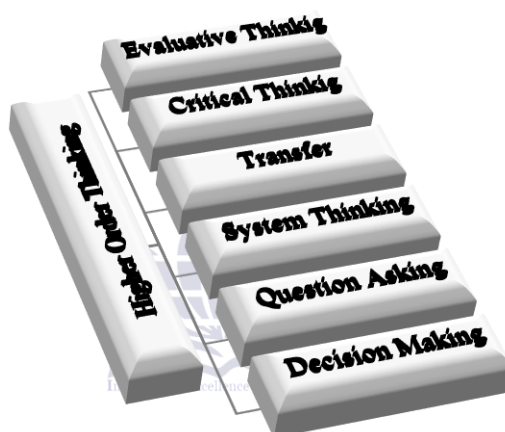


Figure 1. The Model of Higher order Thinking by Katerina & Kristyna (2016)

The study aligns with this model by assessing students' preparedness to apply knowledge in interdisciplinary and real-world contexts. According to Katerina and Kristyna (2016) the model influences students' thinking in a way that can significantly enhance their motivation to study the subject. It is important to illustrate the curriculum with concrete practical examples, incorporating problem-solving activities. Then Bandura's (1977) cited in Dale and Maria (2021) stated the Social Cognitive Theory, explains theory and highlights the importance of self-efficacy, observational learning, and motivation. Additionally explains the evaluative thinking is the ability to assess the value or effectiveness of information, processes, or outcomes using evidence and reasoning, critical thinking is the

disciplined process of actively analyzing, interpreting, and evaluating information to form a reasoned judgment, transfer is the ability to apply knowledge or skills learned in one context to new or different situations, systems thinking is the understanding how parts of a system interact and influence one another within a whole, question asking is the skill of formulating purposeful and insightful questions to explore, clarify, or deepen understanding and decision making is the cognitive process of choosing the best course of action among various alternatives. It supports students' belief in their cognitive capabilities and facilitating skill transfer across knowledge.

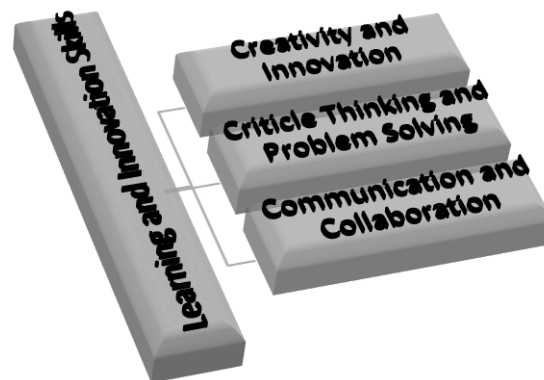


Figure 2. The Model of Learning and Innovation Skills by Namthip, Sirichai, and Chanatip (2015)

Additionally, Another model contribute in the conceptionl frame work was learning and innovation skills, Namthip etal. (2015) stated that 21st-century skills enable us to continuously learn and adjust to change. In today's world, mastering these skills has become a fundamental necessity for every individual. The explanation of domains such as creativity and innovation is the ability to generate original ideas and turn them into valuable concepts. Critical thinking and problem solving is the capacity to analyze information logically and make reasoned decisions to resolve challenges and communication and collaboration is the skill of effectively exchanging ideas and working together to achieve

educational goals. It also reinforces the significance of a collaborative effort among educators, curriculum developers, psychologists, and policymakers to build a dynamic learning environment that nurtures students' cognitive and academic growth.

Conceptual of the study: The Transferable learning skills are the combination of two model; higher order thinking by Katerina and Kristyna (2016) and learning and innovation Skills by Namthip etal. (2015). The "Transferable Learning Skills" can be developed in a student, in during classrooms teachings

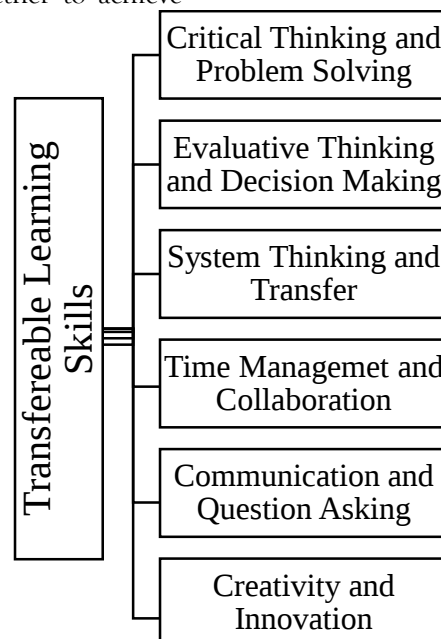


Figure 3. Conception Framework of the study

Transferable Learning Skills: The Transferable Learning skills are the behaviours which can be

developed in students. When they become familiar with Creative thinking, they might make a habit of

discussing problems with elders before concluding. They can think creatively and critically about solutions. That can be helpful in their studies. This attitude can be developed in higher secondary students easily because they are at a critical age for teens, and it is universally accepted that teenage concepts cannot be removed in a lifetime. It refers to a set of cognitive behaviours and competencies that students can apply across subjects and in real-life contexts. The development of transferable learning skills for students is essential in fostering independent, reflective, and capable learners. Particularly in higher secondary, students learn that is the crucial developmental stage where cognitive maturity allows for the internalization and habitual application of these transferable skills. Research suggests that behavioural patterns and cognitive habits formed during adolescence are likely to continue into adulthood. Therefore, higher secondary age group students are especially responsive to educational interventions targeting higher-order thinking and skill transfer. Additionally, Sub variables such as; Critical thinking and problem solving: The ability to analyse information objectively to make informed and effective decisions, Evaluative Thinking and Decision Making: Assessing options and outcomes to determine the best course of action based on evidence. The Time Management and Collaboration: Organizing time efficiently while working effectively with others to achieve shared goals. Communication and question asking: Conveying ideas clearly and asking relevant questions to facilitate understanding and learning, system thinking and transfer: Understanding complex systems holistically and applying knowledge across different contexts and Creativity and Innovation: Generating new ideas and implementing novel solutions to solve problems or improve processes.

The conceptual framework suggests that transferable learning skills; collaborative, constructivist instructional approaches, especially in higher secondary students for abstract thinking. These skills not only enhance academic achievement but also prepare students to navigate and adapt to complex, interdisciplinary, and real-world challenges. Therefore, fostering these competencies requires a joint effort from educators, curriculum designers, psychologists, and policymakers to create dynamic and supportive learning environments.

2.5 Time Management and Planning are Interconnected.

Jonassen (2011) says that, the constructive ability in the student's mind can be created with the help of a clear theme about the topic. Then give them a case study and ask them to find out different scenarios in the case study. This can be diverted student mind toward, finding out the problem which is the main achievement of the study. Chu, Reynolds, Tavares, Notari and lee (2017) stated that the knowledge building process is inquiry-based learning, engages students in the project deeply, and constructs their own understanding. While doing inquiry, they conclude much logical reason and knowledge of application through which, they reach the target inquiry.

Time management is the process of planning and dividing the work between time and activities. For performing work on time and achieving quality work due to perfect planning. Those types of personalities are goal-oriented many students understand this skill and utilize it in managing their studies on time. And understand the value of timely work, as well as they, can be organized their question paper in the given time during the examination session.

2.6 Transformed Learning through Problem-Solving

Although classrooms go beyond teacher-centred transmission, which is an outdated perception, the learning opportunities change, currently learning through ICT opens up new possibilities and potential for teaching and learning. Additionally known as communication technology, but in digital terms it calls ICT, enables students to freely search for, collect, arrange, control, and convey information. By doing so, they may solve problems independently. Butterworth and Thwaites (2013) states that, the everyday problem includes, how to choose between two directions. Which can be faced, when students lack problem-solving skills and need to construct interference skills. For constructing interference skills students need discussion sessions with teachers for reaching the conclusion.

2.7 Discussion Makes Work Perfect

Students cannot work independently without discussion, thus they must get clear guidance prior to starting their task. Discussion methods of teaching are very influential methods because students get a chance to speak with their mentors and during the discussion, they can talk about problems and share them mental complex with the teacher which is helpful for teachers to understand

student. Discussion method creates an environment in class, formulate cohesive arguments, shares an individual opinion, and builds a relationship between student and teacher as well as students to students. They engage all the time with speakers. This perspective increases the attention of non-interesting students in the class. And unconsciously they get an understanding of the topic. Learning skills can be established in students' personalities. Teachers use instructional strategies such as; direct instruction, then interacting with students on the given topic, advising them on many ways to achieve the academic targets, and giving them time to experience managing work in time and the task is writing skills are another skill that can be helped when students faced written papers and written assignments. All we knew writing is a communication skill as well because verbal communication is effective but written communication is more effective. (Feider and Brent, 2016) For making class effective teachers use useful tips, in taking class lectures they speak slowly, and clearly. Create eye contact with every student and maintain turn off volume high and low as per the need. Those volume frequencies differentiate the concentration level of students during class time. It is quite effective because if the same frequency is used for a long time, students can divert their attention to their deep thoughts. Student and feel bored while facing the same kind of teaching pattern for a long time and every time. Activity-based learning creates quick and interesting learning patterns in the classroom. Many teachers give class presentations and assignments, which can be a student shows in front of class fellows, this gives them confidence and with interest, they use their full potential and cognitive ideas to make it different and interesting. Students need to command vocabulary and use perfect grammar and correct knowledge about the topic. Individual a sing to everyone. This pattern is Highly Effective for students.

2.8 Transform Pupils into Decision-Makers

Incorporating more pupils into our classrooms is not the only solution for the future. Young people encounter difficulties outside of the classroom, such as while writing papers for exams. It is necessary to inspire pupils to make pedagogical decisions. Building them takes steps of procedure; it involves the process they follow to become self-learners first. The main interest in this topic is becoming our

students a self-learners. Means developing an independent learning attitude. This attitude helps them after schooling when nobody can force them for studies and by choice, many students left their education. Sonia and Catherine (2016) states, it is still a comparatively recent occurrence in education to have the chance to be an integral member of teams that make decisions that affect how well a group performs. Self-learners get information, a process that information independently, and made them understand it, for themselves. All this is done without a teacher and they move on into practical life. Majority of the Talent is wasted due to educational fear. This can appear due to a gap in communication between elders and teachers (Samuel, Rebecca, Nicole, Michele, and Celina, 2017).

2.9 Collaboratively Work with Communication

The concept of learning skills is collaborative work with academic knowledge and making learners independent. This is the behaviour reflected in students' personalities. Independent learners are the need of the 21st century, this century is an advanced century, and it needs many innovations and discoveries to enhancement in old knowledge. The word "communication" has been added to stress the goal of using a variety of devices in learning settings; it is important to remember that the device itself and the computer system itself not be the main focus. Children who communicate with others digitally have more opportunities for interaction and collaboration. Collaboration and communication with persons outside of their immediate surroundings help people better comprehend the world and themselves. Increase the learner environment and improve the standard of learners by fostering interaction and working together to create collaborations outside the classroom. Chee and Phaik (2009) stated that learning skills are effective when teaching style conducting a collaborative style. This style is conducted in class with discussion or we say student Centre classroom. In those types of discussion methods teachers allocate resources to students, give them goals for resolving conflicts and then discuss the outcomes. This type of study is held when the teacher gives a task as a group activity and collaborative learning. It gives confidence to the students. Some students lead the group the land the leadership and others are behaving as team members. But the main thing is common which communication with everyone is. In

order to make decisions and exercise successful management, communication is the foundation of all group and operational conditions (Sonia and Catherine, 2016).

The foundation of transformational education and instruction is the value of effective collaboration between educators and students in the learning process. When teachers and students communicate well, they may identify and meet students' needs, encourage deeper and more mindful of themselves thinking, model learning and language techniques, and give useful constructive suggestions. Through investigation, knowledge acquisition, review, and individualized instruction, instructors may play a specialist duty and encourage innovative thinking and inventiveness.

2. METHODOLOGY

The study is effective for students if they learn learning skills they become future self-learners in their lives. The independent variable of the study is learning skills and dependent variable is students' approaches. This study give purely for the betterment of the students. This can help in converting lower order thinking students into higher order thinking. This study conducting for measuring students' approaches to learning skills in their academic routine.

3.1 Research Design

The study employs a descriptive comparative research design to assess and compare transferable cognitive skills among higher secondary students. It examines variations across groups based on gender, grade level, and age using quantitative methods.

3.2 Case Selection

The study is conducted with students of higher secondary students of Islamabad Rawalpindi. This study covered, the academic section's higher secondary category selected was taken into account. In that included grades 9 and 10 at the Islamabad School as well as grades 11 and 12 at the College. Three hundred thirty-five (335) schools colleges and twenty-three thousand four hundred and twelve (23,412) students are registered in higher secondary level Academics in Islamabad.

Sample technique was stratified random sampling in which respondents were selected on the bases of the same identification. Which were the students of the higher secondary classes in school and colleges.

Sample size, 700 respondents out of 23,412 were selected which was 3% of total population (Cohen, Manion, and Morrison, 2013).

3.3 Data Collection

Data collection through personal visit to school and colleges period of five months and data collection was done after completed:

Instrument: In this study, the self-developed research instruments were used it has one scale was of Transferable learning skills. It was developed from the two domain of the frame work of higher order learning skills Katerina and Kristyna (2016) and learning and innovation skills Namthip et al. (2015) and developed research tool of this study. It contains 21 items and rated on 5-point Likert scale. Before doing complete survey for study, pilot testing was done to make self-developed instruments more appropriate and contextualized. After pilot testing and expert opinions, the instruments were administered to the sample of the study.

Validity of the instrument: The questionnaire appears to have moderate to strong construct validity, as many items significantly correlate with the total score. 10+ items show statistically significant correlation ($p < 0.05$), supporting their inclusion in the instrument. Then done:

Reliability of the instrument: Pilot testing was conducted to evaluate the study instrument's relevance and acceptable. The researcher conducted a pilot study with thirty research respondents. According to Fiona, Andrew, and Andrew (2016) said that the collection of initial information through trials is crucial for evaluating the accuracy and dependability of the pilot test sample consisted of 50 students, who were chosen and given a questionnaire 30 of them responded. Instrument improvement and determining the level of difficulty respondents test through answers to the questions, pilot testing is crucial before administering the questionnaire and gathering data. The pilot testing participant students were not included in the main testing.

Table 1: Alpha Reliability Coefficient of Transferable Cognitive Scale Scale/Instrument

No of items	Cronbach's value
20	0.553

The given table indicates the reliability of TCSS of higher secondary Level students. It is evident from this table that Cronbach's Alpha Coefficient is .553. It means that there was an average internal consistency because the instrument has only 20 items in that case it is acceptable.

3.4 Data analysis

Data was analysed with the help of the SPSS program. When data collection completed.

This study has a quantitative research approach, focusing on the collection and analysis of numerical data. It emphasizes objectivity and statistical comparison to assess and evaluate transferable cognitive skills among students. The purpose of the present study was to analyse the transferable cognitive skills in the learning of higher secondary students (9th, 10th, 11th, and 12th) in Islamabad and Rawalpindi, Pakistan. The chapter on data analysis provides information about the appropriate statistical tests used for testing the hypothesis and for achieving the objectives of this study. For this purpose, descriptive and inferential statistical tests were applied, including frequencies, percentages and maximum score, minimum score, mean, Independent T-test and Anova analysis. The assumption of analysis was Normality of distribution, indicating that a normal distribution is assumed for the data under analysis. After applying appropriate statistical techniques using the SPSS 23rd version data was presented in tables, which makes it easy to understand. A sample of 500 students from secondary schools with different age groups and genders took part in the present study. Data was analysed with the help of the SPSS program. When data collection completed. This chapter is based on the hypothesis and objectives of the study. A quantitative research paradigm with a descriptive research design was selected, keeping in

view the nature of the research. The transferable learning scale (TCS) was used as a tool for the study. This scale was self-developed and developed through two different models, first model higher order thinking (Katrina and Kristyna, 2016) and Learning and Innovation skills (Namthip et al., 2015). It consists of six subscales, the first subscale was related to Critical Thinking and problem solving, the second was evaluative thinking and decision making, third was system thinking and transfer, fourth was time management and collaboration, fifth was communication and question asking and sixth was creativity and innovation. The instrument of research was based on a 5-point Likert scale 5= Strongly Agree, 4= Agree, 3= Neutral, 2=Disagree, 1= Strongly Disagree) and 5 research question was based on Yes and No parameter.

Research paradigm, was to assess and compare the transferable cognitive skills of higher secondary students across variables such as gender, grade level, and age. Guided by the positivist worldview, the study seeks to get accurate, quantifiable data that can be statistically analysed to identify patterns and differences among groups. The underlying ontological assumption is that cognitive skills are real attributes that exist independently of the learner and can be consistently measured. The epistemological attitude of the study holds that valid knowledge about students' cognitive abilities can be derived through empirical investigation using standardized instruments. Methodologically, the study employs a quantitative approach, utilizing structured tools to collect data and applying statistical techniques to draw conclusions. This paradigm ensures objectivity, replicability, and generalizability of findings, making it well-suited for the comparative and evaluative nature of the research objectives.

3. RESULTS

Table 2: Grade wise Respondent Demographics

Sr. No.	Gender	Frequency	Percentage
1	Male	210	42.1
2	Female	289	57.9
	Total	499	100.0

4.1: The data presents the gender distribution of a sample of 499 individuals. Out of the total, 210 participants are male, accounting for 42.1% of the sample. In contrast, 289 participants are female, making up the remaining 57.9%. This indicates that females represent a larger proportion of the sample compared to males. Overall, the data shows a relatively balanced distribution with a slightly higher participation or representation of females in the surveyed population.

Table 3: Frequency Distribution Age wise

Sr. No.	Age Range	Frequency	Percentage
1	13-15	95	18.7
2	16-19	405	81.3
Total		500	100.0

4.2: It presents the age distribution of 500 individuals. It shows that the majority of respondents, 405 individuals or 81.3%, fall within the 16–19 age range. In contrast, a smaller group of 95 individuals, accounting for 18.7% of the total, belong to the 13–15 age range. This indicates that the sample is heavily concentrated among older adolescents, suggesting that the findings or trends observed in this data are more representative of the 16–19 age group.

Table 4: Frequency Distribution Class wise

Sr. No.	Class Range	Frequency	Percentage
1	9 th	117	23.4
2	10 th	66	13.2
3	11 th	145	29.1
4	12 th	172	34.3
Total		500	100.0

4.3: Data represents the distribution of 500 students across four academic classes: 9th, 10th, 11th, and 12th. Among them, the highest number of students, 172 (34.3%), are enrolled in the 12th grade, followed by 145 students (29.1%) in the 11th grade. The 9th grade has 117 students, making up 23.4% of the total, while the 10th grade has the fewest students, with 66, accounting for 13.2%. This distribution shows a stable increase in student numbers from 10th to 12th grade, suggesting either a larger intake in senior classes or a trend of students joining at higher levels. Overall, the total number of students is evenly categorized, with all four classes summing up to 500 students, or 100% of the sample.

Table 5: Transferable Cognitive Skills in Learning

Sr. No.	Variable	Sub-Variables	Means
1	Transferable Cognitive Skills		3.32
		Critical Thinking and Problem Solving	3.78
		Evaluative Thinking and Decision Making	3.84
		System Thinking and Transfer	1.43
		Time Management and Collaboration	2.05
		Communication and Question Asking	3.91
		Creativity and Innovation	3.98

4.4: The data presents the average ratings of various sub-variables under the broader category of Transferable Cognitive Skills. Overall, the mean score for this main variable is 3.32, indicating a moderate level of development or proficiency. Among the sub-skills, Creativity and Innovation scored the highest, with a mean of 3.98, followed closely by Communication and Question Asking at 3.91, and Evaluative Thinking and Decision Making at 3.84. Critical Thinking and Problem Solving also showed a strong performance with a mean of 3.78, suggesting that learners are generally competent in higher-order thinking and idea generation. In contrast, System Thinking and Transfer received a significantly low score of 1.43, highlighting it as a major area of weakness. Similarly, Time Management and Collaboration were also rated low at 2.05, suggesting challenges in effectively managing time and working in teams. These low-scoring areas may require targeted interventions or focused skill-building efforts.

Table 6: Comparison of Gender base

Variable	Gender Groups	n	Mean	t	df	Sig.
Transferable Cognitive Skills	Male	211	3.16			
				-5.778	498	0.000
	Female	289	3.44			

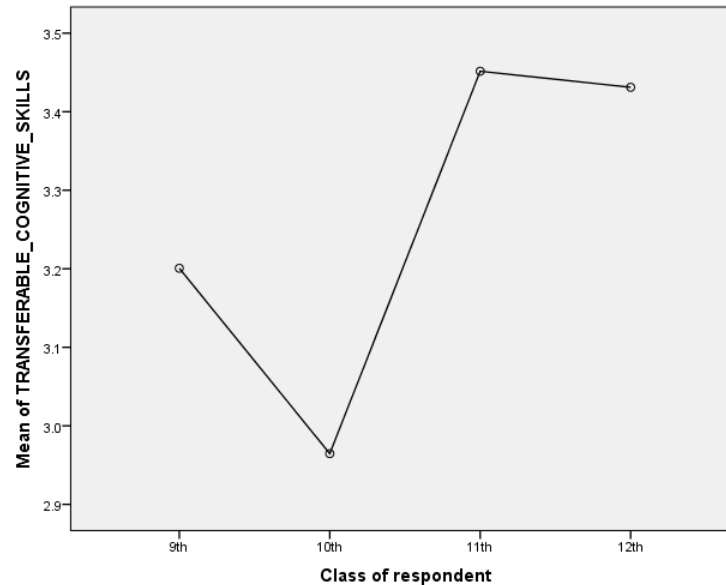
4.5: The data presents the results of an independent samples t-test examining the difference in Transferable Cognitive Skills between male participants (n = 211) had a mean score of 3.16, while female participants (n = 289) had a higher mean score of 3.44. The t-test value is -5.778 with 498 degrees of freedom (df) and a significance value (p-value) of 0.000. Since the p-value is less than 0.05, the difference in means is statistically significant. This indicates that female participants scored significantly higher than male participants in transferable cognitive skills.

Table 7: Comparison of Grade base

Variable	Grade Groups	Sum of Squares	Mean	F	df	a	Sig.
		14.747		17.043	1	0.05	0.035
Transferable Cognitive Skills	9 th		3.20				
	10 th		2.96				
	11 th		3.45				
	12 th		3.43				

4.6: This table presents the results of a one-way ANOVA (Analysis of Variance) conducted to determine whether there are statistically significant differences in Transferable Cognitive Skills scores among different grade levels (9th, 10th, 11th, and 12th). The analysis compares this variable across 4 grade levels: 9th grade: Mean = 3.20, 10th grade: Mean = 2.96, 11th grade: Mean = 3.45 and 12th grade: Mean (3.43).

Graph 1: Comparison of transferable cognitive skills in higher secondary level



Graph shows comparison of transferable cognitive skills in higher secondary level.

4.7: Graph shows the mean of transferable cognitive skills across students from 9th to 12th grade. The mean decreases from 9th (≈ 3.2) to 10th grade (≈ 3.0), then sharply increases in 11th grade (≈ 3.45), followed by a slight decline in 12th grade. Overall, 11th graders exhibit the highest cognitive skill scores. The y-axis represents the average score on the transferable cognitive skills scale, while the x-axis shows the student grade level. The grade 10th student's shows highest level of transferable cognitive skills in their learning.

Table 8: Comparison of Age base

Variable	Age Groups	n	Mean	t	df	Sig.
Transferable Cognitive Skills	13-15	94	3.44			
				2.186	497	0.029
	16-19	406	3.29			

4.8: Finally, the table shows the results of an independent samples t-test conducted to compare the mean scores of Transferable Cognitive Skills between two age groups: 13–15 years and 16–19 years. The younger group (13–15 years) consisted of 94 participants with a mean score of 3.44, while the older group (16–19 years) had 406 participants with a mean score of 3.29. The t-test yielded a t-value of 2.186 with 497 degrees of freedom, and the p-value (Sig.) was 0.029. Since the p-value is less than 0.05, the result is statistically significant, indicating that there is a meaningful difference in transferable cognitive skills between the two age groups. Specifically, the younger group demonstrated significantly higher mean scores in these skills compared to the older group.

VI. DISCUSSION

The study analyses the transferable cognitive skills in learning of higher secondary students. The study approach was quantitative and had a descriptive design. The population was taken from the higher secondary level of Islamabad and Rawalpindi. The sample size was selected as 700, and 500 responses were received, which means the rate of return was 71.43%. Research objectives and hypothesis demanded statistical operations of the Mean score, T-test, and Anova analysis reveal that transferable cognitive skills among higher secondary students have a balanced yet uneven distribution of abilities across sub-skills, alongside notable variations by gender, grade level, and age.

Interpretation of Key Findings

The variation in scores across sub-skills points to an imbalance, where strengths in creativity and analytical thinking are not matched by equally strong

organizational or systemic thinking skills. It is suggested that the null hypothesis (H_0) is not rejected, and the alternative hypothesis (H_a) is fail to accept. The data indicates that higher secondary students demonstrate moderate proficiency in transferable cognitive skills overall. Strengths are observed in areas such as creativity, critical thinking, and decision-making. However, significant weaknesses are evident in system thinking, transfer, and time management, which suggests need efforts in the development of these skills.

The finding shows that male and female students differ in their transferable cognitive skills which typically include problem-solving, critical thinking, analysis, adaptability, etc. The comparison is based on gender. The difference between male and female students in transferable cognitive skills is statistically significant. Female students performed significantly better than male students. The negative t-value (-5.778) indicates that male students had a lower average score than females, so it proven The alternative hypothesis that there is a significant difference in transferable cognitive skills based on gender is supported by the data and it was fail to rejected. Therefore, gender does play a significant role in the level of transferable cognitive skills among higher secondary students, with female students outperforming males in this area.

Secondly, there was a significant difference in Transferable Cognitive Skills across the 9th, 10th, 11th, and 12th grades. The null hypothesis H_0 is rejected and the alternative hypothesis H_a is accepted means that there is no significant difference in transferable cognitive skills among students of different grade levels. The result supports the research objective by confirming that grade level impacts the development or performance of transferable cognitive skills among higher secondary students.

Lastly, the data supports the conclusion that age has a significant impact on transferable cognitive skills in higher secondary students, with younger students (13–15 years) performing better. Since the p-value (0.029) is less than the significance level ($\alpha = 0.05$), so, reject the null hypothesis (H_0) and accept the alternative hypothesis (H_a) that means there is a statistically significant difference in transferable cognitive skills among higher secondary students based on age.

Assessing the Transferable Cognitive Skills in Learning of Higher Secondary Students: It demonstrates moderate overall proficiency in transferable cognitive skills.

Strengths are evident in creativity, critical thinking, and decision-making, reflecting students' capacity for innovation, evaluative reasoning, and effective judgment in problem-solving contexts. These skills are essential in equipping students to navigate complex academic and real-life challenges. However, pronounced weaknesses in systems thinking, knowledge transfer, and time management suggest limitations in students' ability to perceive interconnections within complex systems, apply learned knowledge to unfamiliar contexts, and organize tasks efficiently. These findings imply that while the current educational environment fosters imaginative and analytical thinking, it may offer fewer opportunities for structured, strategic, and integrative cognitive development. The decision to retain the null hypothesis for overall proficiency reflects that while sub-skill variations exist, the general skill level remains moderate.

Comparing the Transferable Cognitive Skills in Learning of Higher Secondary Students Based on Gender: It was found that significant difference, with female students outperforming male students. These findings may reflect differences in learning approaches, self-regulation, or study habits, as research frequently associates female students with higher levels of discipline, organizational skills, and verbal-analytical abilities. The result also raises pedagogical considerations regarding whether existing classroom strategies may better align with female learning styles and whether male students require more targeted instructional support to bridge the observed gap.

Comparing the Transferable Cognitive Skills in Learning of Higher Secondary Students Based on Grade Level: It confirms a significant difference in transferable cognitive skills across Grades 9 to 12 and suggests that academic progression influences cognitive skill development, though not in a linear manner. The dip in Grade 10 performance may relate to increased examination pressure, reducing opportunities for exploratory and applied learning. The peak in Grade 11 may reflect a less assessment-intensive year that allows for greater cognitive engagement, while the subsequent decline in Grade 12 could be attributed to the heightened focus on final examinations, where rote learning often takes precedence over the application of transferable skills. It is worth noting a reporting inconsistency, as numerical data indicate Grade 11 as the highest-scoring group, despite descriptive text elsewhere identifying Grade 10.

The last and fourth objective of the study was focused on compare the transferable cognitive skills in learning of higher secondary students based on age. It was revealed that attributed to the greater cognitive flexibility characteristic found in 13-15 age group students, as well as potentially higher adaptability and openness to new learning strategies. In contrast, age group of 16-19, students may experience greater specialization and academic pressures, narrowing their opportunities to engage in broad-based cognitive skill application.

V. CONCLUSION

The study found that higher secondary students show moderate overall proficiency in transferable cognitive skills, with strengths in creativity, critical thinking, and decision-making, but weaknesses in systems thinking, knowledge transfer, and time management. Female students outperformed males, possibly due to better discipline and study habits. Skill levels varied by grade, with Grade 11 performing best, likely due to less exam pressure, while Grades 10 and 12 saw declines. The 13-15 age group showed greater cognitive flexibility than the 16-19 age group students, who faced more academic pressure.

Future Suggestion: The findings suggest a need for a balance and development of transferable cognitive skills in the learning of higher secondary students through the curriculum planning for learning of higher secondary students.

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