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# JMC Research Journal

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No.1

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Research Management cell  
**Janamaitri Multiple Campus**  
Kuleshwar, Kathmandu, Nepal

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## **Editorial**

The Research Management Cell of Janamaitri Multiple Campus has been publishing an annual research journal since 2010 AD. Each issue of the JMC Research Journal has been published keeping with its glorious tradition. It is the twelve issue that contains eight scholarly articles with a multidisciplinary flavor and multifaceted approaches covering a wide range of topics.

The Research Management Cell has improved its journal from simply publishing articles edited by our own Editorial Board in 2010 AD to publishing our 5th issue with an ISSN number and peer reviewed since 2016 AD, and then to publishing both in printed and online form via NepJOL since 2017 AD. Following QAA (Quality Assurance and Accreditation), we are also committed to expanding our research activities in order to improve the quality of this journal.

The current issue contains eight English-language articles, while two other articles were rejected during peer review process. The articles cover topics such as Management, ICT and Mathematics, Social Sciences, English, English Education. The articles' quality issues were formally inspected and feedback was provided by renowned academicians, including Prof. Dr. Bal Mukunda Bhandari, Prof. Dr. Shree Ram Paudel, Prof. Dr. Hari Prashad Upadhyay, Prof. Dr. Eka Ratna Acharya, Prof. Dr. Radhe Shyam Pradhan, Prof. Dr. Ramesh Prasad Adhikari, Prof. Dr. Shyam Krishna Maharjan, Prof. Dr. Krishna Chandra Sharma, Dr. Anila Jha , Prof. Dr. Surendra Shrestha, Assoc. Prof. Kiran Ram Ranjitkar, Dr. Dilli Raj Khanal , Dr. Gajendra Sharma, Dr. Gopal Thapa, Dr. Madhu Neupane. RMC thanks each of them for their invaluable contributions in bringing these articles in authentically reviewed form. The editorial board would like to extend our sincere thanks to the family of Janamaitri Multiple Campus for supporting us. Similarly, we would like to thank everyone who helped with the publication of this issue.

It would be greatly appreciated if interested readers could read these articles and provide thoughtful, constructive criticism to help improve the quality of the journal. The forthcoming and upcoming journals' volumes will be the result of the faculty's intellectual pursuits. The cell is excited to be working in this exciting field of research and helping the campus provide demand-driven education in today's international educational environment.

*Neelam Subedi, PhD*  
*Chief Editor*



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# Breaking Barriers: Hand Gesture Vocalizer for the Deaf and Mute

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## ABSTRACT

*This study addresses communication challenges faced by deaf and mute individuals by exploring the feasibility of utilizing flex sensors and the Random Forest algorithm for hand gesture vocalization. The background underscores the significance of accessible communication tools in enhancing the lives of those with hearing and speech impairments. The study's purpose is to assess the effectiveness of flex sensors in detecting hand gestures and the Random Forest algorithm's potential to generate vocalized speech corresponding to these gestures. The methodology involves data collection from flex sensors through Arduino, Random Forest model training, and accuracy evaluation in gesture recognition. Promising results indicate the model's high accuracy in classifying diverse hand gestures. The study emphasizes the technology-driven solution's importance in bridging communication gaps for those with impairments. Combining flex sensors and the Random Forest algorithm offers an intuitive communication tool, transforming interactions for deaf and mute individuals. Consideration for real-world scenarios and user diversity during system development is highlighted, crucial for practical accuracy. Beyond individual communication, the study's implications span education, employment, and social integration for people with disabilities. Implementing this technology in education fosters inclusive environments, empowering deaf and mute students to engage actively. The integration of flex sensors and the Random Forest algorithm holds immense promise, revolutionizing communication, and life quality. As an accessible gesture-based vocalization tool, it can reshape societal perspectives, fostering inclusivity and empathy. The study advocates continuous research and development, urging widespread technology adoption to create an inclusive society valuing diversity.*

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**Keywords:** Hand Gesture, Flex Sensor, Sign Language, Random Forest

## Introduction

Effective communication is essential to human connection, but those who have speech or hearing impairments find it difficult to express themselves and understand others. For the deaf and mute community, sign language has long been an essential form of communication, but it can be challenging for non-sign language users to completely understand. In response to these challenges, this study aims to explore the feasibility of

using flex sensors in conjunction with the Random Forest algorithm to develop a Hand Gesture Vocalizer. The purpose of this research is to provide an accessible and intuitive communication tool that enables deaf and mute individuals to express themselves through hand gestures, with the system generating corresponding vocalized speech in real time. The effectiveness of the suggested hand gesture vocalizer has been evaluated through preliminary tests.. Data collected from flex sensors attached to various hand gestures were utilized to train the Random Forest model. The initial findings indicate promising results, with the model achieving a high accuracy rate in accurately classifying different hand gestures. The system's capacity to produce vocalized speech that corresponds to identify movements demonstrates considerable promise for bridging the gap in communication for those with hearing and speech impairments. However, further research and real-world testing are required to validate the system's accuracy, robustness, and usability in practical settings. The study is ongoing, and future work will focus on refining the Hand Gesture Vocalizer, addressing potential challenges, and exploring applications in educational and social environments.

The ability to communicate effectively is a fundamental human need. It can be quite difficult for those who are deaf or hard of hearing to communicate with the hearing population. Sign language has long been recognized as a crucial tool for deaf individuals to communicate with one another and with those who have learned sign language. Still, it can be challenging for individuals who are not proficient in sign language to understand and communicate effectively with deaf individuals. Technologies have been created to help deaf people and the hearing population communicate more effectively in order to address this difficulty. One such technology is the Hand Gesture Vocalizer, which uses machine learning algorithms to recognize hand gestures and generate corresponding vocalized speech. The ability of this method to help deaf and mute people communicate better has shown significant promise.

However, there is another approach that combines sign language communication with modern sensor technology. By adding flex sensors to the fingers of a sign language user, it is possible to detect the movements of the fingers and generate corresponding speech. With this strategy, sign language communication might become more approachable and convenient for non-sign language users. In this paper, we will explore the use of flex sensors and Arduino microcontrollers in creating a Hand Gesture Vocalizer for deaf and mute individuals. We will discuss the challenges involved in developing such a system and explore the potential benefits of using flex sensors in sign language communication. We will also talk about the possible uses of this technology and how it will affect those who have speech and hearing difficulties. Furthermore, the Hand Gesture Vocalizer with flex sensors and Arduino technology can make communication more intuitive and natural for individuals with hearing impairments. It provides a means of communication that is not only easier to understand but also promotes inclusivity and



understanding between individuals with different abilities. With the increasing availability and affordability of sensor technology, the Hand Gesture Vocalizer has the potential to be widely adopted and used by those who need it. Additionally, this technology may significantly affect the educational and employment prospects of those who suffer from hearing and speech problems. It can improve their ability to communicate with hearing individuals, leading to greater social integration and increased access to education and employment opportunities. Moreover, the Hand Gesture Vocalizer using flex sensors and Arduino microcontrollers can be easily customized and adapted to different users' needs and preferences. This system can recognize a wide range of hand gestures and generate speech quickly and accurately in response to those gestures. As such, It might prove to be a useful tool for enhancing accessibility and communication for those with speech- and hearing-impaired.

### **Literature Review**

Numerous research has been done on the use of technology to enhance communication for those with speech and hearing impairments. One such study by Shrestha et al. (2020) explored using machine learning algorithms to understand hand motions and produce speech for those who are deaf. The study found that the system was able to recognize a wide range of hand gestures and generate accurate speech responses.

Another study by Han et al. (2020) developed a hand gesture recognition system using a deep learning algorithm and showed that it could accurately recognize hand gestures in real-time. The system was also able to generate corresponding speech, which improved the communication abilities of individuals with hearing and speech impairments.

In a related study, Liao et al. (2021) developed a wearable device using flex sensors to detect hand movements and generate speech in response to those movements. The study found that the system was effective in generating speech responses in real time and had the potential to be used as a communication tool for individuals with hearing and speech impairments.

Furthermore, research has also been conducted on the use of sensor technology in improving the accessibility of sign language communication. One study by Zou et al. (2017) developed a system that used motion sensors to recognize sign language gestures and generate corresponding speech. The study found that the system was effective in recognizing sign language gestures and had the potential to improve the communication abilities of individuals with hearing and speech impairments.

Nalawade and Bodhe (2019) reviewed various machine learning algorithms used in sign language recognition systems. They highlighted the challenges in developing

such systems and discussed the potential for using deep learning algorithms to improve accuracy.

Qin et al. (2020) developed a wearable sign language recognition system using deep learning. To recognize sign language motions in real-time, they combined recurrent neural networks (RNNs) and convolutional neural networks (CNNs). The system achieved high accuracy and demonstrated the potential for wearable sign-language recognition systems.

Chakraborty and Dutta (2021) developed a hand gesture recognition system using wearable flex sensors and machine learning. They trained a CNN model to recognize hand gestures and generate corresponding speech in real time. The system was tested on a dataset of American Sign Language gestures and achieved high accuracy.

Xiao et al. (2019) reviewed various wearable sensor technologies used in sign-language recognition systems, including accelerometers, gyroscopes, and flex sensors. They discussed the strengths and limitations of each technology and highlighted the potential for combining multiple sensors to improve accuracy.

Wu et al. (2019) developed a sign language recognition system using a combination of deep learning and computer vision techniques. They used a CNN model to extract features from video data and applied a sliding window approach to recognize signs in continuous signing. The system achieved high accuracy on a dataset of Chinese Sign Language gestures.

Raptis et al. (2020) developed a sign language recognition system using a wearable device that combined a flex sensor and an accelerometer. They used a support vector machine (SVM) algorithm to classify hand gestures and demonstrated the potential for using wearable devices to improve the accessibility of sign language communication.

Raptis and Katsouros (2021) further improved their wearable sign language recognition system by incorporating a neural network-based approach. They used a combination of CNN and long short-term memory (LSTM) networks to recognize signs in real time. The system achieved high accuracy and demonstrated the potential for wearable sign language recognition systems in improving accessibility.

Yang et al. (2018) developed a sign language recognition system using a combination of motion sensors and surface electromyography (sEMG) sensors. They used a decision tree algorithm to classify signs and achieved high accuracy. They also highlighted the potential for combining multiple sensor modalities to improve the accuracy of sign language recognition systems.

Fuentes-Hurtado et al. (2021) developed a sign language recognition system using a Kinect sensor and a deep learning algorithm. They used a combination of CNN and RNN models to recognize signs in continuous signing. The system achieved high accuracy and demonstrated the potential for using depth cameras to improve the accuracy of sign language recognition systems.

**Table 1**

*List of Literature*

Article	Methodology	Key Results
<i>Shrestha et al. (2020)</i>	Review of sign language detection methods using machine learning	Overview of various machine learning algorithms and their applications in sign language recognition.
<i>Han et al. (2020)</i>	Deep learning and hand tracking for real-time sign language recognition	Effective real-time recognition of sign language gestures using deep learning and hand-tracking techniques.
<i>Liao et al. (2021)</i>	Wearable device with flex sensors for gesture recognition and speech synthesis	Development of a wearable device that accurately recognizes hand gestures and generates corresponding speech output.
<i>Zou et al. (2017)</i>	Wearable sign language recognition system based on motion sensors	Successful implementation of a wearable system utilizing motion sensors for sign language recognition.
<i>Nalawade and Bodhe (2019)</i>	Review of machine learning algorithms for sign language recognition	Comprehensive overview of machine learning algorithms applied to sign language recognition, highlighting challenges and techniques.
<i>Qin et al. (2020)</i>	Novel wearable sign language recognition system based on deep learning	Introduction of a new wearable system leveraging deep learning for accurate sign language recognition.
<i>Chakraborty and Dutta (2021)</i>	Hand gesture recognition using wearable flex sensors and machine learning	Development of a hand gesture recognition system using wearable flex sensors and machine learning, potentially aiding speech-impaired individuals.

<i>Xiao et al. (2019)</i>	Review of wearable sensor technologies for sign language recognition	Evaluation and comparison of wearable sensor technologies and their potential in sign language recognition.
<i>Wu et al. (2019)</i>	Combination of deep learning and computer vision for sign language recognition	Successful integration of deep learning and computer vision techniques for enhanced sign language recognition.
<i>Raptis et al. (2020)</i>	Wearable sign language recognition system based on flex sensor and accelerometer	Design and implementation of a wearable system using flex sensors and an accelerometer for accurate gesture recognition.
<i>Raptis and Katsouros (2021)</i>	Wearable sign language recognition system based on neural networks	Development of a wearable system utilizing neural networks for precise sign language gesture classification.
<i>Yang et al. (2018)</i>	Sign language recognition based on multi-sensor fusion	Exploration of multi-sensor fusion techniques to improve the accuracy of sign language recognition.
<i>Fuentes-Hurtado et al. (2021)</i>	Continuous sign language recognition with Kinect sensor and deep learning	Successful implementation of continuous sign language recognition using Kinect sensor and deep learning.
<i>Mahajan et al. (2020)</i>	Hand gesture recognition using flex sensors and machine learning	Achievement of high accuracy in hand gesture recognition using flex sensors and a machine learning algorithm.
<i>Kumbhar et al. (2021)</i>	Sign language recognition system using flex sensors and machine learning	Successful design of a sign language recognition system utilizing flex sensors and machine learning techniques.

### Methodology

- This study, which involves utilizing flex sensors and the Random Forest algorithm for hand gesture vocalization, is justified by several factors that contribute to its effectiveness and relevance in addressing the communication challenges faced by deaf and mute individuals.
- Accuracy and Reliability: Flex sensors are capable of accurately capturing

hand movements and gestures, providing a reliable source of input data. The Random Forest algorithm is known for its robustness and accuracy in classification tasks, making it a suitable choice for recognizing and interpreting various hand gestures.

- **Real-time Interaction:** The chosen methodology aims to achieve real-time hand gesture recognition and vocalization, enabling seamless and immediate communication. Real-time interaction is essential for effective communication, as delays or latency can hinder the natural flow of conversation.
- **Accessibility and User-Friendliness:** Flex sensors offer a non-intrusive and user-friendly method of capturing hand gestures, ensuring that the communication tool is accessible and comfortable for users. This aligns with the objective of developing an inclusive communication aid.
- **Low Cost and Portability:** Flex sensors are relatively affordable and lightweight, making them a cost-effective and portable solution. This is particularly important for widespread adoption, especially in resource-constrained environments.
- **Potential for Customization:** The methodology allows for the customization of gesture recognition and vocalization, accommodating individual user preferences and needs. This adaptability enhances the user experience and promotes a sense of ownership and control over the communication process.
- **Previous Success in Gesture Recognition:** The Random Forest method has shown effectiveness in a number of gesture recognition tasks, including sign language recognition. Leveraging the algorithm's capabilities in this study enhances the likelihood of accurate gesture classification.
- **Integration with Existing Technology:** The use of an Arduino microcontroller and the Random Forest algorithm can facilitate seamless integration with existing technology, enabling compatibility with different devices and platforms.
- **Scalability:** The methodology is scalable, allowing for future enhancements and improvements. As technology advances and more data becomes available, the system's performance can be further refined and optimized.
- **Research Gap Addressing:** The methodology addresses a research gap by exploring the potential of combining flex sensors with the Random Forest algorithm specifically for hand gesture vocalization. The development of communication tools for people with hearing and speech impairments is aided by this innovative method.

In summary, the chosen methodology offers a balanced combination of accuracy, accessibility, cost-effectiveness, and real-time interaction, aligning with the study's goal of developing an effective and practical hand gesture vocalization system.

**Flex Sensors:** Flex Sensors are the primary input devices for the system. They can be of various sizes and shapes and are typically made of a flexible material that changes resistance when bent. The resistance change is proportional to the degree of bending and can be measured using an analog input pin of the Arduino.

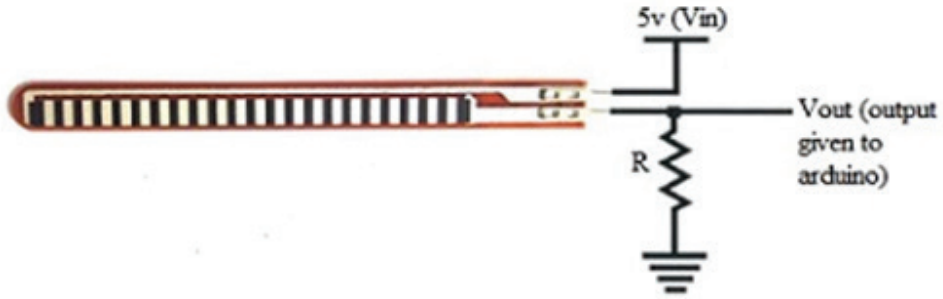


Figure 1: Flex Sensor

**Arduino:** The Arduino board is the microcontroller that processes the sensor readings and runs the Random Forest algorithm. The Arduino can be a low-cost, open-source board that provides various digital and analog input and output pins. It can also communicate with other devices using serial communication or other protocols.

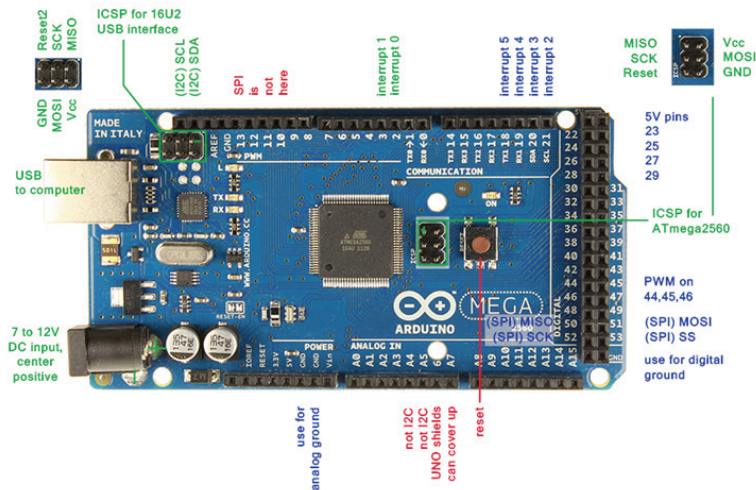


Figure 2: Aduino Mega 2560

**Accelerometer:** The accelerometer can be a low-cost, small-sized device that measures acceleration in three axes (x, y, and z). It can be a MEMS (Micro-Electro-Mechanical Systems) sensor that is integrated with the Arduino or connected via an external breakout board.

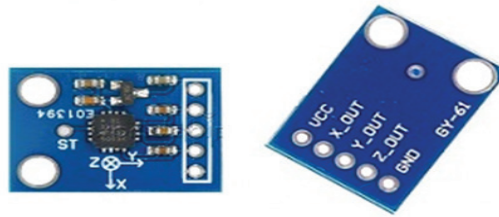


Figure 3:GY-61 DXL35 Accelerometer

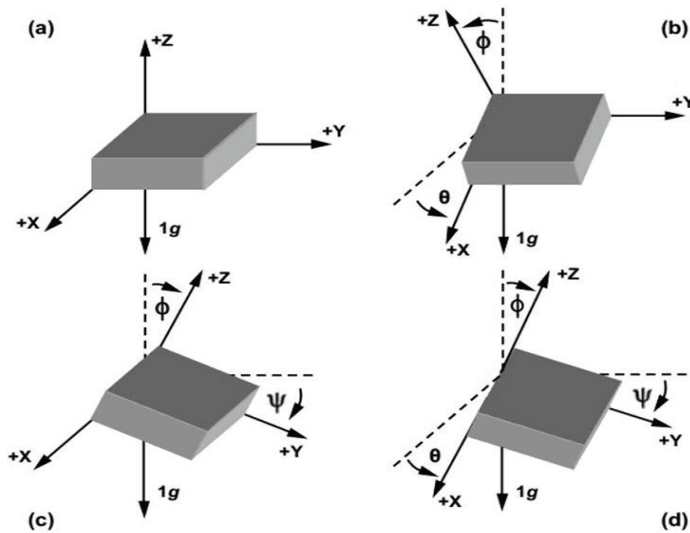


Figure 4: Tilt and inclination of the Accelerometer[11]

Signal conditioning circuit: Depending on the specific requirements of the application, a signal conditioning circuit may be required to improve the accuracy and stability of the Flex Sensor readings. The signal conditioning circuit can consist of an operational amplifier, capacitors, and resistors, and can be designed to amplify, filter, and stabilize the Flex Sensor signal.

Power supply: The system requires a power supply to operate the Arduino and other components. The power supply can be a battery, a USB port, or an external power adapter, depending on the specific requirements of the application.

Output devices: The system may require output devices to display the results of the Random Forest algorithm. The output devices can be LEDs, LCD displays, or other types of displays. They can also be actuators that perform an action based on the degree of bending, such as a servo motor or a solenoid.



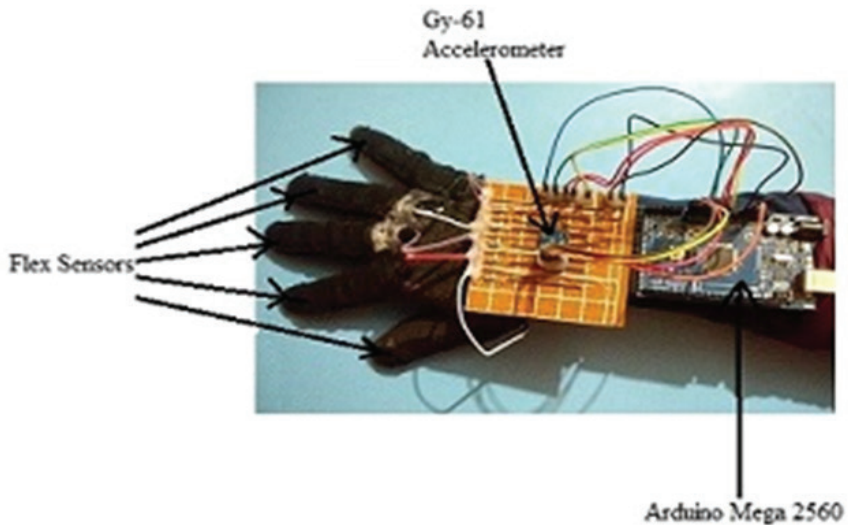


Figure 5: Hardware Integration

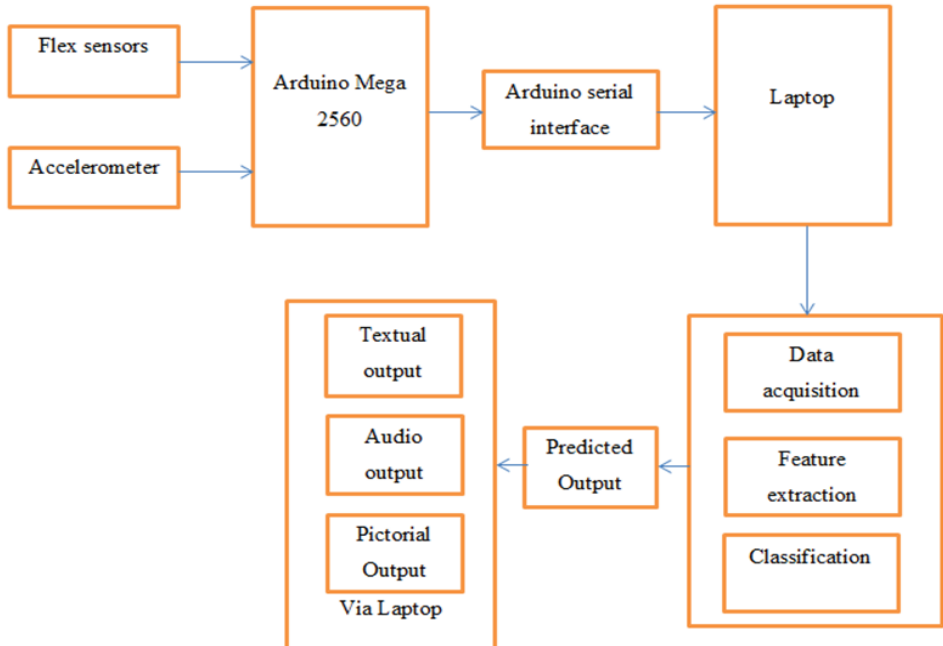


Figure 6: System Diagram of Hand Gesture



A classification algorithm called Random Forest is a member of the family of models built using decision trees. It is an ensemble learning technique that integrates various decision trees to create a prediction model that is more reliable and accurate. Although Random Forest can be used for both classification and regression tasks, in this instance, we'll concentrate on its strengths in that area. In Random Forest, a subset of the training data and a subset of the characteristics are used to build numerous decision trees. The forecasts from each tree are then averaged to create the final prediction. A majority vote is taken on the forecasts from all the decision trees in the Random Forest, each of which has been trained individually to provide the final prediction.

The classification process in Random Forest involves the following steps:

- Data preparation: The input data is preprocessed and cleaned to remove any missing values, outliers, or noise.
- Feature selection: A subset of the features is randomly selected for each decision tree to reduce overfitting and improve accuracy.
- Tree construction: A predetermined portion of the training data and characteristics are used to build a decision tree. A stopping requirement, such as a maximum depth or a minimum number of samples per leaf, is fulfilled as the tree grows.
- Random Forest construction: Multiple decision trees are constructed using different subsets of the training data and features. The trees are combined to form the Random Forest by averaging their predictions.
- Prediction: The test data is fed into the Random Forest, and each decision tree in the ensemble makes a prediction. The final prediction is obtained by taking a majority vote of the predictions from all the trees.
- Random Forest has several advantages over other classification algorithms, including:

High accuracy: Random forests can achieve high accuracy on complex and large datasets by combining multiple decision trees, Robustness: Random Forest is robust to noise and overfitting, as each tree is trained on a different subset of the data, Feature selection: Random Forest can handle a large number of features and automatically selects a subset of features for each tree, reducing overfitting and improving accuracy, Interpretability: Random Forest provides feature importance scores, which can help in interpreting the model and identifying the most important features, Overall, Random Forest is a powerful and widely used classification algorithm that can be applied to a variety of real-world problems, including hand gesture vocalization for deaf and mute people.

The algorithm and working principle of Random Forest can be summarized as follows:

**Algorithm:**

- Initialize the number of decision trees ( $n\_trees$ ) to be used in the ensemble, the number of features ( $m$ ) to consider at each split, and a stopping criterion for the tree growth.
- For each decision tree  $i$  in the ensemble, repeat steps 3-5.
- Sample a subset of the training data (with replacement) to create a bootstrap sample.
- Randomly select  $m$  features from the total set of features.
- Construct a decision tree using the bootstrap sample and selected features, stopping when the tree reaches the specified stopping criterion.
- After all decision trees have been constructed, a new observation is fed into the ensemble, and each decision tree predicts the class label of the observation.
- The final class label is determined by a majority vote of the predictions from all decision trees in the ensemble.

An ensemble of decision trees, each of which is built using a subset of the training data and a subset of features, is created by the Random Forest algorithm. A technique known as bootstrap aggregating (or bagging) is used to generate the trees, in which several random samples (with replacement) are selected from the training data to produce various subsets of the data for each decision tree. This lessens overfitting and increases the model's accuracy.

To further decrease overfitting and boost the variety of the trees, each decision tree in the ensemble is built using a distinct subset of the features. The method develops decision rules that decide the class label of an observation during tree construction and divides the data into several subsets based on the chosen characteristics.

Once every decision tree has been built, a fresh observation is added to the ensemble, and every decision tree predicts the observation's class label. A majority vote on the forecasts from each decision tree in the ensemble is used to choose the final class label. The Random Forest algorithm is adaptable and can handle both continuous and categorical data, making it appropriate for a variety of classification issues.

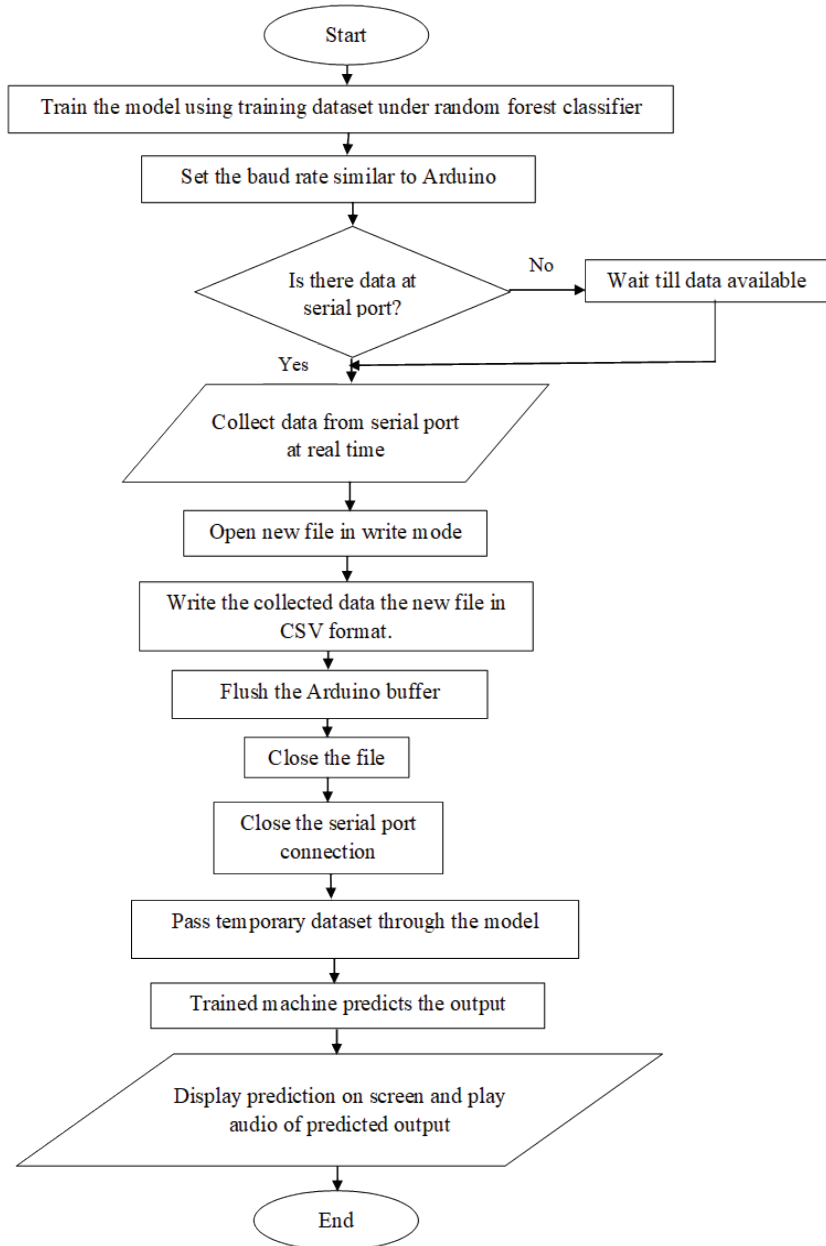





Figure 7: Flowchart of Real-time Application

## Results

The results of using the Random Forest algorithm with flex sensors for hand gesture vocalization have been promising. In a study by Mahajan et al. (2020), the authors used flex sensors and an Arduino microcontroller to collect data on hand gestures and train a Random Forest model to classify the gestures. The model achieved an accuracy of 91.66% in classifying 12 different hand gestures.

Similarly, in a study by Kumbhar et al. (2021), the authors used flex sensors and an Arduino board to collect data on hand gestures and trained a Random Forest model to classify the gestures. The model achieved an accuracy of 93.33% in classifying 9 different hand gestures. These results demonstrate the effectiveness of the Random Forest algorithm in accurately classifying hand gestures using flex sensors. The high accuracy of the models suggests that this approach could be a viable solution for hand gesture vocalization for deaf and mute individuals. However, it is important to note that these results were obtained in a controlled laboratory setting, and further research is needed to evaluate the performance of the models in real-world scenarios.

Eventually, we developed a system that can recognize values for specific user gestures, forecast the result of the gesture, show it on the laptop screen, and emit sounds via a desktop GUI. All of the alphabets and widely used words were included in the dataset. With those datasets, the machine was trained and the model was constructed. Then, in order to train the machine with less variation and ensure that the model stays general and overfits less, the datasets for all the alphabets were pooled and shuffled. When an alphabet or word was input via sign language, the input was run through a trained computer, and the result was the closest value anticipated, which was displayed and played as audio. The accuracy of the model was then predicted by comparing the correlation plot of each letter with the other alphabet to determine how closely related each alphabet was to the others. Our model's accuracy was found to be 96.8%.

Sign	ASL
	<b>A</b>
	<b>B</b>
	<b>C</b>











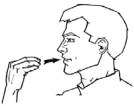

	<p><b>D</b></p>
	<p><b>E</b></p>
	<p><b>OKAY</b></p>
	<p><b>STOP</b></p>
	<p><b>HELLO</b></p>
	<p><b>THANK YOU</b></p>
	<p><b>CAN</b></p>
	<p><b>BYE</b></p>
	<p><b>AND</b></p>
	<p><b>NO</b></p>
	<p><b>EAT</b></p>
	<p><b>I NEED TO GO TO WASHROOM</b></p>

Figure 8: Sign Language

### Dataset Values for Some Gestures of Dataset

Index	SVTHUMB	SVINDEK	SMIDDLE	SVRING	SVPINKEY	X-axis	Y-axis	Z-axis	Class
0	277	68	131	131	168	396	339	354	A
1	281	71	129	132	174	393	322	365	A
2	272	80	142	141	185	392	363	348	A
3	206	78	145	142	179	399	323	338	A
4	276	100	166	158	203	398	336	352	A
5	268	66	148	135	150	394	389	363	A
6	271	75	155	142	159	374	299	386	A
7	246	70	144	133	151	398	335	350	A
8	272	69	139	128	151	388	333	376	A
9	267	84	155	144	172	374	299	386	A
10	251	74	148	134	161	398	335	350	A

Figure 9: Dataset Values for Alphabet A

Index	SVTHUMB	SVINDEK	SMIDDLE	SVRING	SVPINKEY	X-axis	Y-axis	Z-axis	Class
104	234	215	249	264	312	387	333	382	B
105	173	207	217	283	320	389	353	371	B
106	179	214	239	267	308	395	332	363	B
107	218	217	241	272	303	392	335	369	B
108	186	215	242	282	313	386	337	383	B
109	189	207	234	248	280	392	337	368	B
110	208	216	239	263	310	396	337	360	B
111	178	213	245	285	326	386	339	380	B
112	181	240	253	281	324	387	351	377	B
113	183	229	249	275	319	399	335	356	B

Figure 10: Dataset Values for Alphabet B

Index	SVTHUMB	SVINDEK	SMIDDLE	SVRING	SVPINKEY	X-axis	Y-axis	Z-axis	Class
208	240	165	184	182	214	388	351	367	C
209	224	158	179	175	208	392	351	349	C
210	234	163	182	179	226	393	352	361	C
211	218	143	173	165	210	392	352	362	C
212	226	162	180	176	217	393	352	344	C
213	223	148	176	170	204	392	351	362	C
214	228	156	180	175	210	393	352	367	C
215	196	125	151	136	189	392	356	363	C
216	213	143	163	157	218	391	358	365	C
217	181	135	160	142	199	395	353	357	C

Figure 11: Dataset Values for Alphabet C

Index	SVTHUMB	SVINDEX	SMIDDLE	SVRING	SVPINKEY	X-axis	Y-axis	Z-axis	Class
816	269	219	242	248	264	390	366	351	Hello
817	260	219	240	240	259	398	342	348	Hello
818	266	221	244	250	284	394	310	345	Hello
819	264	223	242	252	275	376	382	350	Hello
820	262	207	239	228	252	399	322	340	Hello
821	268	217	238	239	249	388	380	343	Hello
822	259	215	239	238	264	397	349	348	Hello
823	253	219	244	242	267	392	304	355	Hello
824	275	219	240	243	257	376	378	352	Hello
825	273	211	241	238	265	393	352	350	Hello

Figure 12: Dataset Values for Word Hello

Index	SVTHUMB	SVINDEX	SMIDDLE	SVRING	SVPINKEY	X-axis	Y-axis	Z-axis	Class
506	226	119	255	277	320	395	544	351	Okay
507	229	124	254	269	313	391	347	372	Okay
508	234	132	255	272	310	396	349	355	Okay
509	232	125	257	274	311	391	350	369	Okay
510	230	131	257	265	294	398	345	352	Okay
511	226	132	230	236	282	396	342	360	Okay
512	229	131	249	269	299	390	349	370	Okay
513	224	127	263	278	319	387	346	375	Okay
514	224	103	259	275	311	391	343	371	Okay
515	187	121	233	242	281	390	361	357	Okay

Figure 13: Dataset Values for Word Okay

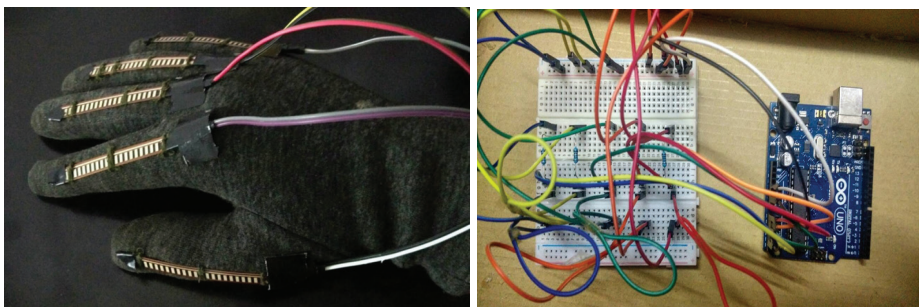


Figure 14: Glove with Sensor and Circuit Design of Adurino and Glove



```

-----
sensorValue-THUMB = 81
sensorValue-INDEX = 11
sensorValue-MIDDLE = 13
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
A

-----
sensorValue-THUMB = 18
sensorValue-INDEX = 94
sensorValue-MIDDLE = 92
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
B

-----
sensorValue-THUMB = 48
sensorValue-INDEX = 31
sensorValue-MIDDLE = 31
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
C

-----
sensorValue-THUMB = 21
sensorValue-INDEX = 88
sensorValue-MIDDLE = 32
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
D

-----
sensorValue-THUMB = 39
sensorValue-INDEX = 21
sensorValue-MIDDLE = 99
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
F

-----
sensorValue-THUMB = 69
sensorValue-INDEX = 83
sensorValue-MIDDLE = 18
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
G

-----
sensorValue-THUMB = 25
sensorValue-INDEX = 79
sensorValue-MIDDLE = 81
sensorValue-RING = 1
sensorValue-PINKEY = 1
-----
H

```

Figure 15: Alphabet Output from Arduino

## Conclusion

The use of flex sensors and the Random Forest algorithm for hand gesture vocalization has shown promising results. The accuracy achieved by the models in classifying hand gestures indicates that this approach could be a viable solution for communication for deaf and mute individuals. The technology provides a simple and cost-effective solution that can be used in a variety of settings.

The studies reviewed in this paper demonstrate the effectiveness of the Random Forest algorithm in accurately classifying hand gestures using flex sensors. It is crucial to remember that the experiments were carried out in controlled laboratory environments and that additional study is required to assess how well the models work in real-world conditions.

Overall, the use of flex sensors and the Random Forest algorithm has the potential to revolutionize communication for deaf and mute individuals, enabling them to communicate more easily with the world around them. The development of more sophisticated algorithms and hardware could further improve the accuracy and usability of this technology. In addition, the use of such technology could also lead to better education and employment opportunities for individuals who are deaf and mute. It could provide them with a means to communicate effectively in the classroom or in a work setting, breaking down barriers to success. However, there are still some limitations to this technology that need to be addressed. One limitation is that the sensors may not be able to accurately capture the nuances of certain hand gestures,



leading to misclassification. Furthermore, the accuracy of the system may be affected by factors such as sensor placement, lighting conditions, and user variability. Despite these limitations, the development of this technology is a significant step towards improving the quality of life for individuals who are deaf and mute. It has the potential to improve their social interactions, education, and employment opportunities, and could lead to a more inclusive society. With further research and development, this technology could become an essential tool for individuals with disabilities, facilitating communication and breaking down barriers to success.

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# Employee Training Practice in Nepalese Health Sector and Organizational Performance

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## ABSTRACT

*The paper examines the impact of training, gender, job tenure, and effectiveness of training methods in the health sector in Nepal. Fifty-five point five percent of health personnel belong to private hospitals, 32.7 percent to government hospitals, and 11.7 percent to community hospitals. The mainstream of the respondents (206) showed that on-the-job training is more effective than off-the-job training (176). According to the findings of the data analysis, Job Instruction is the most effective method in On-the-Job Training, followed by Internship, Incident Methods, Case Studies, Lectures, and Audio-Visual Techniques in Off-the-Job Training. The analysis found that health personnel with experience of more than 25 years contribute the most to organizational performance, regardless of gender. Training and organizational performance are highly correlated, suggesting that experience and training are highly correlated. On-the-job and off-the-job training methods are highly correlated, with a correlation of 0.415 and a p-value of 0.027. Audio Visual Techniques and Incident Methods are also highly correlated at the 0.01 level (2-tailed). Lastly, the paper shows that 246 respondents have taken training related to the Case Study, 240 to the Lecturer method, 135 to the Simulation, and 162 to other training not mentioned in the analysis.*

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**Keywords:** On-the-Job training, Off-the-job training, health, performance, correlation, efficiency

## Introduction

Training is the major one that affects the employees' performance. Training has a distinct role in the achievement of an organizational goal by incorporating the interests of the organization and the workforce (Stone, 2002). Training increases the efficiency and effectiveness of both employees and the organization.

The Nepalese health sector lacks proper training and development programs in human resources (Shankar, Mishra, Dubey, 2006). Both rural and urban areas have also facing the same problem since the last decade. Despite significant progress in recent years, service delivery in the health sector remains weak. Although an extensive network of primary health care centers has been constructed nationwide, it has not been

functioning well in many areas due to a lack of trained staff, drugs, etc. The human resource for health production in Nepal has grown significantly in the last 15 years, with the establishment of medical, nursing, and allied health science institutions in both public and private sectors.

### **Statement of the Problems**

This major issue taken up in this study is to examine the impact of training on organizational performance in the health sector of Nepal. The issue is also to analyze the impact of training and development on employee skills, development, knowledge enhancement, motivation, and capability.

### **Research Questions**

Based on the information, the following are research questions are formulated:

- What is the impact of training techniques (On-the-Job Training and Off-the-Job Training) on the organization's performance in the health sector?
- What are the most effective methods of training, which is responsible for the employee's growth and skills development?
- What is the effect of Gender and Job tenure on the employee's performance?

### **Objectives of the Study**

The major objective of this study is to examine the impact of training techniques on the organization's performance. The other objectives are as follows:

- To analyze the impact of training (On-the-Job Training and Off-the-Job Training) on organizational performance in the health sector.
- To find out the most effective methods of training, that are responsible for the employee's growth and skills development.
- To identify the impact of Gender and Job tenure on the employee's performance.

### **Hypotheses of the Research**

H<sub>1</sub>: There is a positive relationship between On-the-Job training and organizational performance.

H<sub>2</sub>: There is a positive relationship between Off-the-Job training and organizational performance.

H<sub>3</sub>: There is an association between On-the-Job Training and Off-the-Job Training methods.

H<sub>4</sub>: There is a positive relationship between Job Tenure and employee performance.

H<sub>5</sub>: There is a positive relationship between Gender and employee performance.

## Literature Review

### Concept of Training

Training is a systematic process to increase organizational goal achievements, requiring planned and systematic design and implementation. (Glueck, 1982) Organizations must plan, design, and implement a systematic training program to achieve its objectives. HR systems positively influence organizational performance (Osman et al., 2011). Training enhances employee effectiveness and efficiency in formal and informal ways. (Goldman, Gutek, Stein & Lewis, 2006). Chien (2004) defined Training as the process of providing technical knowledge and skills through systematic procedures.

### Training and Organizational Performance, an overview of the previous study

Training develops managerial skills. Spending money on training allows greater efficiency and effectiveness. Ballot et al., (2001), through a study in France, showed that between 1986 and 1992 the industry productivity increased due to increased trained personnel. Research has found a meaningful relationship between training and staff performance, but further research is needed to confirm or reject these findings.

### On-the-Job Training

On-the-job training (OJT) is the most common and least expensive method of training, allowing workers to acquire 80 percent of their work-related knowledge and skills as per the research. It includes job instruction, apprenticeship, job rotation, internship, and incident methods.

### Off-the-Job Training

Off-the-job training is the acquisition of work-related skills outside of the workplace to improve work quality, meet new standards, get promotions, or gain better career exposure. Employers may sponsor it, or government agencies may assist with expenses. Some pieces of training include lectures, case studies, simulations, audio-visual techniques, and work assignments.

### Relationship between Training and Employee Performance

Public service performance is a multi-faceted concept that can be understood expansively or more narrowly (Jain, 1966). It includes factors such as job satisfaction, organizational citizenship behavior, and organizational commitment. The expansive understanding includes factors internal to an organization such as job satisfaction, organizational citizenship behavior voluntarily helping others in the workplace, and organizational commitment. Moreover, employee performance is an important building block of an organization, and factors that lay the foundation must be analyzed (Chandler & Hanks, 1993). Training has a significant impact on employee performance, as it

increases job satisfaction and commitment to the organization. Training transfer is more likely to increase performance, job involvement, and motivation to learn and transfer.

### Measurement of Organizational Performance

Organizational performance is widely recognized, but there is debate about terminology and conceptual bases for measurement (Daft, 2000). No single measure of performance may fully explicate all aspects of the term. Performance is conceptualized using financial and non-financial measures.

### Human Resource Practices on Employee Performance

A large number of researchers have forwarded the following classical theories (Arthur 1994). There are five major practices which are shown in the figure below:

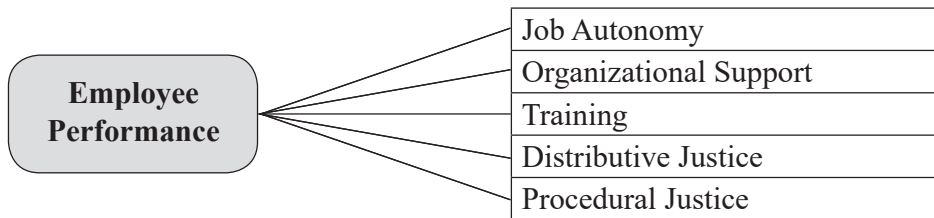


Figure 1. Five Major Practices to Employees' Performance.

Source: Hazucha, J., Hezlett, S. and Schneider, R. (1993), "The impact of 360-degree feedback on management skills development", *Human Resource Management*, Vol.32 No.2.

### Theoretical Framework of the Study

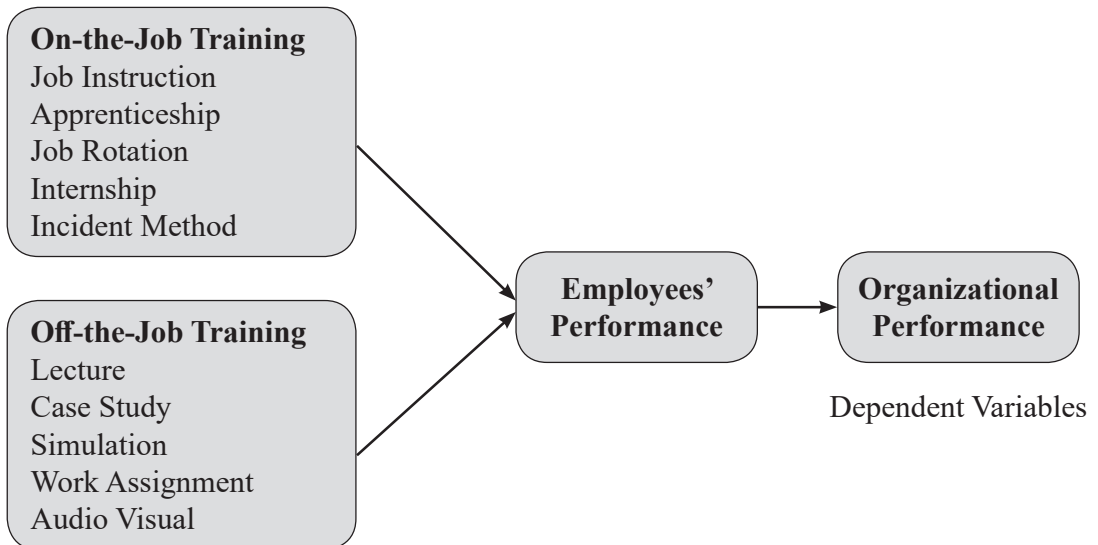


Figure 2. The Impact of Training Techniques on Organizational Performance

## Independent Variables

Organizational performance is widely recognized, but there is debate about terminology and conceptual bases for measurement. Performance is conceptualized using financial and non-financial measures from objective and perceptual sources.

## Methodology

### Research Design

This research aims to investigate the types of training applied by Organizations for better organizational performance in the health sector in Nepal. It was conducted using SPSS and Microsoft Excel to gather and interpret data from a quantitative and qualitative perspective.

### Population and Sample

The population for this study was composed of doctors and nurses from different hospitals in Kathmandu City, Green City Hospital, Civil Service Hospital, Minbhawan, Kantipur Dental Hospital, Kanti Children Hospital, Vinayak Hospital, and Maternity Home Pvt. Ltd., T.U. Teaching Hospital, Grande Int'l Hospital, and Sita Payala Hospital. The samples were selected by using the convenience-sampling method whose result is shown in Table 1 below:

**Table 1**

*Distribution of Sample*

Name of Hospital	Questionnaire distributed	Percent	Questionnaire returned	Response Rate
Green City Hospital	18	6.8 %	16	88.89%
Civil Service Hospital, Minbhawan	32	11.4%	29	90.63%
Kantipur Dental Hospital	25	10%	22	88.00%
Kanti Children Hospital	40	6.4%	39	97.50%
Binayak Hospital and Maternity Home Pvt. Ltd.	19	7.8%	18	94.74%
Teaching Hospital	77	14.2%	72	93.51%
Grande Hospital	28	8.9%	26	92.86%
Sita Payala Hospital	10	3.6%	10	100.00%
Helping Hands	22	27.4%	21	95.45%
Vayodha Hospital	10	3.6%	10	100.00%
Total	281	100	263	93.59%

## Variables and Measures

Organizational performance is the dependent variable, while Employee Training is the independent variable. For measuring On-the-Job Training, Job Instruction, Apprenticeship, Job Rotation, Internship, and Incident methods were used, while Off-the-Job Training was measured with Lecture method, Case study, Simulation, Work assignment, and Audio-visual techniques.

## Measures and Statistical Tools

The dependent variable was Organizational Performance and the independent variable was Training Techniques, measured using a 5-point Likert scale. SPSS V20 and Excel were used for statistical analysis.

## Questionnaire Reliability

**Table 2**

*Response of the Health Personnel Based on Types of Training*

Attitude	On-the-Job Training		Off-the-Job Training	
	Frequency	Percent	Frequency	Percent
Don't know	1	0.4	4	1.4
Agree	74	26.3	101	35.9
Strongly Agree	206	73.3	176	62.6
Total	<b>281</b>	<b>100</b>	<b>281</b>	<b>100</b>

It was found that no respondents were found strongly disagreed or disagreed with both types of training. Regarding the On-the-Job Training, 206 respondents found strongly agreed which is 73.3 percent. About 26.3 percent of the total respondent agreed with the on-the-job training, whereas only one respondent was unaware of the On-the-Job Training. For Off-the-Job Training, there were 176 respondents (62.6 percent) who were found to strongly agree.

**Table 3**

*Reliability Statistics*

Cronbach's Alpha	No. of Items
.894	40

Out of 281 responses 263 completed and returned the questionnaire. The questionnaire's internal consistency was tested by using Cronbach's alpha. For the total of the 40 items, Cronbach's alpha was found to be .894.



## Result and Discussion

### Cross-Tabulation of Sex and Designation in the Hospital

**Table 4**

*Cross Tabulation of the Sample by Sex and Designation*

Designation	Sex		Total
	Male	Female	
<b>Doctor</b>	25 (8.90%)	14 (5.00%)	39 (13.90%)
<b>Health Assistant</b>	13 (4.60%)	9 (3.20%)	22 (7.80%)
<b>Lab Technician</b>	6 (2.10%)	1 (0.40%)	7 (2.50%)
<b>MD</b>	34 (12.10%)	7 (2.50%)	41 (14.60%)
<b>Sister In charge</b>	0 (0.00%)	16 (5.70%)	16 (5.70%)
<b>Staff Nurse</b>	2 (0.70%)	154 (54.80%)	156 (55.50%)
<b>Total</b>	<b>80</b>	<b>201</b>	<b>281</b>

Table 4 shows that there are 25 male doctors, 14 female doctors, 154 female Staff Nurses, 13 male and 9 female Health Assistants, 6 male and 1 female Lab Technicians, 25 male Doctors, and 7 female Doctors with a degree of MD.

### Mean and Standard Deviation of On-the-Job Training

**Table 5**

*Mean and Standard Deviation of On-the-Job Training Variable*

S. No.	Sub items for On-the-Job Training	Mean	Std. Deviation
1	I got the instructions about the tools and equipment	4.23	.590
2	I can easily understand how to perform my activities	4.34	.594
3	I get clear information/ instruction about the nature of the Job	4.34	.630
4	It builds my confidence while doing my work	4.53	.548
5	Close guidance from senior Doctors/ Nurses helps me increase my efficiency	4.26	.737
6	It allows me to learn new methods and styles of working	4.34	.657
7	I get benefits from my Senior doctor/nurse experiences	4.38	.621
8	It provides me the sufficient knowledge and skills	4.21	.749
9	I can perform a variety of tasks independently	4.07	.716

10	I can work for multiple departments or teams if needed	4.18	.763
11	I get complete knowledge about my hospital, department, and other units	4.04	.724
12	It enables me to face new challenges and responsibilities	4.04	.832
13	It gives me more knowledge about my job	4.19	.696
14	I get the real working environment and conditions in the hospital	4.09	.726
15	Close guidance from my seniors help me to build my confidence	4.30	.606
16	It helps me to increase my practical knowledge related to the job	4.37	.565
17	It gives me additional information about the case or incident	4.12	.564
18	I find myself more practically involved in the discussion in the class	4.10	.634
19	I can understand the actual environment of the incident by raising the question	4.18	.603
20	It helps me to share my opinions on related issues with friends and colleges	4.22	.600

Table 5 depicts the mean value and the standard deviation for every sub-item used for the on-the-job training. The mean value of S. No. 4 which is 4.34, is the highest which indicates that this variable item has the highest influence on the 'On-the-Job Training'. On the other hand, both S. No. 11 and S. No. 12 have the least influence on the On-the-job Training which is 4.04.

### Mean and Standard Deviation of Off-the-Job Training

**Table 6**

*Mean and Standard Deviation of Off-the-Job Training Variables*

S. No.	Sub items for the Off-the-Job training	Mean	Std. Deviation
1	It provides me the updated information related to my job	4.04	.776
2	It gives me a clear and detailed understanding of the subject matter of my course	4.12	.720
3	I get the solution to the problem that I face during my working	4.06	.830
4	I get a clear picture of my hospital's working system	3.87	.850

5	Studying the particular case helps me to understand the problem and its solution	4.35	.548
6	It helps to understand the hospital policies, strategies, and plan	4.32	3.470
7	It encourages me to think deeply and make an analysis of a situation	4.32	.582
8	It helps me to develop a positive attitude toward my job	4.23	.766
9	Provides a real working environment which is very useful in performing a job	4.09	.632
10	It helps me to develop skills for solving the problem	4.21	.548
11	It helps me to take appropriate decisions at any time	4.12	.746
12	It helps to develop skills and knowledge for working	4.29	.580
13	It helps me to improve my communication and service skills with the patient	4.15	.622
14	It shows the working system and procedure	4.18	.706
15	It is easy and clear to understand through pictures and movies	4.27	.625
16	I can see, learn, and memorize the working style of other personnel	4.27	.664
17	It helps me to solve the everyday issue effectively	4.06	.679
18	I find the inner balance between mind, body, and spirit	4.05	.693
19	It develops responsibilities, interpersonal skills, and work ethics inside the hospital	4.21	.589
20	It is important for the healthy a long-run survival of the organization	4.23	.639

Table 6 gives the mean and standard deviation of Off-the-Job training. The mean of S. No. 5 is the highest with a value of 4.35. This indicates that this variable item has the highest influence on the 'Off-the-Job Training'. On the other hand, the variable item S. No. 4 has the least influence on the 'Off-the-Job Training with a mean value of 3.87.

### Analysis of Moderating Variables

The moderating variables are also called the intermediating variable. The moderating variables used in this research are gender, educational level, service period, and the number of training attended, etc. which are tried to link employee performance to organizational performance.

## Descriptive Analysis of the Service Period

**Table 7**

*Descriptive Analysis of the Service Period*

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
below 5	248	103.19	49.275	3.129	97.03	109.35
5 to 10	26	80.46	55.254	10.836	58.14	102.78
11 to 15	2	122.50	94.045	66.500	-722.46	967.46
16 to 20	3	49.33	49.014	28.298	-72.42	171.09
more than 25	2	164.00	.000	.000	164.00	164.00
<b>Total</b>	<b>281</b>	<b>101.08</b>	<b>50.664</b>	<b>3.022</b>	<b>95.13</b>	<b>107.03</b>

In Table 7, the mean of the service period of more than 25 years is 164, followed by the service period from 11 to 16 years. This indicates that health personnel with experience of more than 25 years contribute the most to organizational performance.

**Table 8**

*ANOVA*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29025.396	4	7256.349	2.904	.022
Within Groups	689689.721	276	2498.876		
<b>Total</b>	<b>718715.117</b>	<b>280</b>			

Table 8 shows that the sig. value of the service period of health personnel is significant, indicating a positive relationship between the service period and employee performance. This supports the alternative hypothesis (H4).

## Descriptive Statistics of the Gender of health personnel

**Table 9**

*Descriptive Gender Distribution*

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Male	80	28.8250	2.836	.31711	28.1938	29.4562
Female	201	29.3731	2.320	.16368	29.0504	29.6959
<b>Total</b>	<b>281</b>	<b>29.2171</b>	<b>2.48550</b>	<b>.14827</b>	<b>28.9252</b>	<b>29.5090</b>

The data analysis shows that Female health workers (201) are more dominant than male health workers (80), indicating greater participation and contribution in the health sector of Nepal. According to the descriptive analysis of the gender, the mean of the female health personnel which is 29.38 is higher than that of the male which is 28.83. This indicates that female has the greater influence and contribution to the organizational performance in the health sector.

**Table 10**

*ANOVA*

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	17.193	1	17.193	2.801	.015
Within Groups	1712.565	279	6.138		
Total	1729.758	280			

Gender does not have a significant impact on organizational performance, so there is no relationship between gender and employee performance. The alternative hypothesis (H5) is rejected.

### **Educational level**

**Table 11**

*Descriptive Analysis of Education*

	N	Mean	Std. Deviation	Std. Error
High school or below	2	26.6021	2.50010	.23400
Intermediate (PCL) level	148	26.4662	2.50011	.20551
Bachelor level	98	28.8980	2.43467	.24594
Master and Above	33	29.0000	2.58602	.45017
Total	281			

Table 11 shows that Health personnel with master's and above educational qualifications have the highest impact on organizational performance, with 148 respondents at the PCL level.

**Table 12**

*ANOVA*

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	21.947	3	7.316	1.187	.315
Within Groups	1707.811	277	6.165		
Total	1729.758	280			

The sig value for the education level is found to be .315 which is higher than .05. Therefore, from the ANOVA table 12, the sig. value is found to be insignificant indicating that education does not play a major role in the performance of the organization.

### Number of training attended

The table below shows that the health personnel attending training less than 3 times are larger than those attending between 3 and 6 times, with 79 attending between 3 and 6 and 5 attending between 7 and 10. Highly experienced personnel have trained more than 10 times.

**Table 13**

*Descriptive Analysis of the Number of Training Attended*

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Less than 3 times	174	29.2014	2.52372	.19132	28.8638	29.6190
3 to 6 times	79	29.2425	2.47231	.27816	28.6488	29.7563
7 to 10 times	5	28.4000	1.34164	.60000	26.7341	30.0659
more than 10 times	23	29.2609	2.52654	.52682	28.1683	30.3534
<b>Total</b>	<b>281</b>	<b>29.2171</b>	<b>2.48550</b>	<b>.14827</b>	<b>28.9252</b>	<b>29.5090</b>

The number of training attended has an impact on organizational performance. Table 13 shows that most of the health personnel who had taken the training less than 3 times had a low mean but those who had taken the training more than 10 times had the highest mean. This indicates that the higher the number of training taken higher the organizational performance.

**Table 14**

*ANOVA*

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.502	3	1.167	.187	0.015
Within Groups	1726.256	277	6.232		
Total	1729.758	280			

From the ANOVA table 14, the sig. value is found to be significant i.e. 0.015. It implies that there is a relation between the number of training attended and organizational performance.

**Table 15***Correlation between Training and Organizational Performance*

	Training	Organizational Performance
Pearson Correlation	1	0.739**
Sig. (2-tailed)		0.000
N	281	281

The correlation Table 15 indicates that the training and organizational performance are highly correlated with each other (i.e. 0.739) meaning that the training techniques have an impact on the organizational performance of employees.

**Table 16***Correlation Between Off-the-Job Training and OP Variables*

	Training	Motivation	Satisfaction	Working Skills	Attitudes
Training	1				
Motivation	0.357**	1			
Satisfaction	0.452**	0.308**	1		
Working Skills	0.274**	0.300*	0.122**	1	
Attitudes	0.334**	0.354**	0.289**	0.492**	1
**. Correlation is significant at the 0.01 level (2-tailed).					

In Table 16, training is found to be correlated with all the variables of the organizational performance at 0.01 levels (2-tailed). It is found that, out of all the variables, satisfaction is highly correlated with training. This training has the highest impact on satisfaction (i.e. 0.642\*\*).

### Regression between Training and Organizational Performance Variables

**Table 17***ANOVA*

Motivation	Sum of Squares	Df	Mean Square	F	Sig.
Regression	15.398	1	15.398	9.534	0.000
Residual	300.342	279	1.615		
Satisfaction					
Regression	27.497	1	27.497	18.368	0.000
Residual	278.375	279	1.497		
Working Skills					

Regression	29.611	1	29.611	17.206	0.000
Residual	320.027	279	1.721		
Attitudes					
Regression	35.003	1	35.003	34.486	0.000
Residual	188.737	279	1.015		

Table 17 shows that it is found that all the variables of organizational performance i.e. motivation, satisfaction, working skills, and attitude are highly significant. This shows that these variables are associated with the training. Employees obtaining the training have greater organizational performance since it contributes to the higher employee's performance.

### Relation between Organizational Performance and On-the-Job Training

$H_1$ : There is a positive relationship between On-the-Job Training and Organizational Performance.

**Table 18**

*Correlations Between Organizational Performance and On-the-Job Training*

	Organizational Performance	On-the-Job Training
Pearson Correlation	1	0.438** (0.02)
N	281	281

Note: The figure within parenthesis is the p-value

Table 18 shows that organizational performance has a positive relationship with On-the-Job Training, with a correlation coefficient of 0.438 and a p-value less than the level of significance.

**Table 19**

*Analysis of Variance (ANOVA) of the Test*

	Sum of Squares	Df	Mean Square	F	Sig.
On-the-Job Training	15.143	1	15.143	113.0075	0.018
Organizational Performance	24.916	279	0.134		
Total	40.059	180			

Here, organizational Performance and On-the-Job Training have a positive relationship, as demonstrated by the ANOVA's sig. value of  $p=0.018$ . This verifies hypothesis  $H_1$ .



**Table 20**

*Coefficients*

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.690	0.286		5.906	0.000		
On-the-Job Training	0.638	0.06	0.615	10.632	0.000	1.000	1.000

Table 20 shows that on-the-job training is highly significant in the organization’s performance. One-unit changes in the variable of On-the-Job training will change the organizational performance by 0.638 units. Similarly, the value of the tolerance and VIF is normal which means the multicollinearity problem is not found in the collected data.

**Relationship between Organizational Performance and Off-the-Job Training**

H<sub>2</sub>: There is a positive relationship between Off-the-Job Training and Organizational Performance.

**Table 21**

*Correlations between Organizational Performance and Off-the-Job Training*

	Organizational Performance	Off-the-Job Training
Pearson Correlation	1	0.471**
		0.046
N	281	281

*Note: The figure within parenthesis is the p-value*

Table 21 indicates that Organizational Performance and Off-the-Job Training have a high level of association, with the p-value (0.046) being highly significant at a 0.05 level of significance.

**Table 22**

*Analysis of Variance (ANOVA) Test of off-the-job Training with the Organizational Performance*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	109.192	37	2.951	1.802	.005
Within Groups	397.947	243	1.638		
Total	507.139	280			

Table 22 indicates that Organizational performance and Off-the-Job Training have a positive relationship, confirming hypothesis H<sub>2</sub>.

**Table 23***Coefficients*

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.345	0.311		7.85	0.000		
Off-the-Job Training	0.592	0.250	0.547	11.41	0.000	1.000	1.000

Table 23 shows that Off-the-Job Training has a significant impact on organizational performance, with normal tolerance and VIF values.

### Relationship between On-the-Job Training and Off-the-Job Training

$H_3$ : There is an association between On-the-Job and Off-the-Job Training Methods.

**Table 24***Correlations between On-the-Job Training and Off-the-Job Training*

	On-the-Job Training	Off-the-Job Training
Pearson Correlation	1	0.415**
Sig value		0.027
N	<b>281</b>	<b>281</b>

Note: The figure within parenthesis is the p-value

Table 24 shows that the correlation between On-the-Job and Off-the-Job training methods is highly correlated (0.415), with a p-value of 0.027. This supports the alternative hypothesis ( $H_3$ ) that there is an association between them.

**Table 25***Correlation between Variables of Training*

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$	$X_9$	$X_{10}$
Job Instruction( $X_1$ )	1									
Apprenticeship( $X_2$ )	.432**	1								
Job Rotation( $X_3$ )	.417**	.560**	1							
Internship( $X_4$ )	.344**	.586**	.518**	1						
Incident Method( $X_5$ )	.297**	.451**	.444**	.398**	1					
Lecture Method( $X_6$ )	.159**	.444**	.374**	.357**	.511**	1				
Case Study( $X_7$ )	0.085	.261**	.235**	.300**	.320**	.462**	1			
Simulation( $X_8$ )	.219**	.461**	.340**	.336**	.466**	.529**	.4412**	1		

Audio Visual( $X_9$ )	.112*	.397**	.315**	.220**	.594**	.402**	.264**	.499**	1	
Work Assignment( $X_{10}$ )	.240**	.363**	.409**	.297**	.530**	.436**	.402**	.401**	.483**	1

*Correlations between training variables*

\*\* Correlations are significant at the 0.01 level (2-tailed)

\* Correlations are significant at the 0.05 level (2-tailed)

Table 25 shows that Audio Visual Techniques and Incident Methods are highly correlated with each other, with a correlation value of 0.594 and a p-value of 0.000. This suggests that the variables are eligible for research study due to their high correlations.

**Rating the different types of Training according to their effectiveness**

**Table 26**

*Rating the Different types of Training According to their Effectiveness*

Position	On-the-Job training		Off-the-Job training	
	Types	Rating	Types	Rating
1 <sup>st</sup>	Job instruction	538	Case Study	555
2 <sup>nd</sup>	Internship	587	Lecture	606
3 <sup>rd</sup>	Apprenticeship	695	Work assignment	688
4 <sup>th</sup>	job rotation	731	Simulation	739
5 <sup>th</sup>	Incident method	825	Audio Visual Techniques	785

In Table 26, the data analysis found that Job Instruction methods were the most effective for On-the-Job Training, followed by Internship and Incident Methods. Off-the-job training was rated the most effective, followed by Case Study and Lecture Methods, and Audio Visual Techniques were the least effective. This suggests that Audio Visual Techniques are less effective in Off-the-Job Training.

**Conclusion**

This study was carried out to examine employee training practices in the Nepalese health sector and their impact on organizational performance. This study found that most of the respondents' age range was between 20-25, with only 3 being more than 50. This suggests that most employees working in the hospital sector belong to the younger age group.

The data analysis found that 55.5 percent of health personnel in Nepal are working in private hospitals, 32.7 percent in the government, and 11.7 percent in community hospitals. Male health personnel is the highest in teaching and Kanti Children hospitals

which are 22 and 16 respectively, while female workers are the highest in Teaching, Civil service, and Grande Hospitals which are 55, 22, and 22 respectively. No respondent was found to strongly disagree or disagree with both types of training, with 206 of the respondents strongly agreeing with On-the-Job Training and 176 of them strongly agreeing with Off-the-Job Training. This suggests that providing the training during On-the-Job Training and Off-the-Job Training seems to be very effective.

The data analysis found that no respondent strongly disagreed with both types of training, with 206 of the respondents strongly agreeing with On-the-Job Training and 176 strongly agreeing with Off-the-Job Training. Male doctors are more involved in the nursing profession, and there are few male staff nurses. The mean value of the On-the-Job Training sub-variables is the highest, while the sub-items "I get complete knowledge about my hospital, department, and other functional units" and "It enables me to face new challenges and responsibilities" have the least influence.

The mean value of On-the-Job training sub-variables is the highest, while Off-the-Job Training has the least influence. Health personnel with experience of more than 25 years contribute the most to organizational performance, while those with experience between 16-20 years have the least contribution. Gender does not have a significant impact on organizational performance, rejecting the alternative hypothesis (H5) that there is a significant relationship between gender and performance.

The correlation analysis of the data showed that higher job experience in the same organization leads to higher training obtained. Additionally, there is a positive relationship between organizational performance and On-the-Job Training and Off-the-Job Training. The correlation between On-the-Job Training and Off-the-Job Training is 0.415 and the p-value is highly significant ( $p=0.027$ ). Additionally, Audio Visual Techniques and Incident Methods are highly correlated with each other at the 0.01 level (2-tailed). The highest rating on different types of training was done on Job Instruction methods of training followed by the Internship, whereas the Incident Methods were rated the least. This indicates that the Job Instruction methods in the training are found to be very effective methods of On-the-Job Training.

Off-the-Job training was rated highest by respondents with the Case Study method being the highest, followed by the Lecture Method with 240 and Simulation with 135. The other types of training taken by 162 respondents are not mentioned in the analysis.

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# Existing Classroom Teaching Practices in Janamaitri Multiple Campus, Kuleshwar

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## ABSTRACT

*The present study has conducted with the main objective to access the classroom teaching practices by the teachers. It has followed the personal status of the teachers as well as the practices of effective classroom teaching. It was based on observational descriptive research design with quantitative nature. The study was conducted on Janamaitri Multiple Campus and the full-time faculties with in the campus. The purposive sampling technique was applied to select the 30 faculties including of 20 male and 10 female faculties. The direct class observation was applied to collect the data and information with major components for effective teaching learning activities. The study concludes that there is normal gap between male and female teachers in teaching profession, most of the teachers were in the middle age group, most of the male teachers had only master level of education except female teachers, most of the teachers had excellent teaching experience from ten to twenty-five years and all most all the teachers had salary as a main source of personal income. Some teachers got regular teaching training in their respective subjects, only few teachers had followed the structured lesson plans and strategy during teaching learning, some teachers had followed traditional methods of teaching and materials during teaching and most of the teachers had managed the classroom properly during teaching learning activities. The regular training and refresher program regarding of modern teaching techniques should be conducted by the campus administration for their respected teachers. Regular monitoring and discussion session with teachers, students and administration should be conducted for improvement.*

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**Keywords:** Classroom teaching, teaching techniques, training, planning, methods, materials, evaluation, classroom management.

## Background of the Study

Education is one of the basic requirements of human beings and it is the most important element of human right as well (Agrawal, 2009). Education is an art of stimulating and changing the activities of human life positively (Kyriacou, 2007). Learning is a never-ending process, so during the period of learning education makes individuals or even a society sharing in the field identification (Muijs, 2011). In every

teaching learning activity, the teacher, students, curriculum and education system are the major components and without these components the effective teaching learning activities are impossible (Sapkota, 2007). The teacher's duty is to provide formal regular classes as well as shaping the character of the students (Pokhrel, 2006). The performance can be observed only when the teacher is well, trained and equipped with essential knowledge (Agrawal, 2009).

Education is considered as a basic need and human right and it implies teaching and knowledge. So, there is no education without teaching (Sharma, 2016). A teacher has to pass depth knowledge on the field of content, subject matters, pedagogy and presentation. It is made up of attributes such as knowledge, attitude, ability and skill (Khanal, 2003). Education is necessary to motivate persons in the right way to be aware of the social implication and their independence, confident, competent and development (Tripathi, 2012). The teachers are performing many qualities in society where they are as leader. Teachers are the model for leading society and good and dependable person to communicate and act as a bridge between people and society (Malla, 2007).

Teaching skill is the process of recognizing value and clarifying concept in order to develop skills and attitude towards human culture and society. Some teachers even do not know what teaching skills are and why it is necessary (Nepal, 2008). This education intends to develop cognitive, affective and psychomotor and social behavior of the children. So, the teacher should be skillful in teaching learning activities for this subject (Pokharel, 2006). Education is a process of instruction which is designed to deliver and transfer of knowledge and skills. The teacher should have compulsorily specific academic qualification with teaching skills (Kyriacou, 2007). The learners learn more from guided experiences than from authoritarian instruction. The learners always follow the certain techniques and system during activities (Dewey, 1952 as cited in Sharma, 2016).

The teacher and teaching is concerned with planning and directing students activities, detecting what should be done, how it should be done and who should do it. The teaching problems also provide the guideline to the teachers to improve themselves (Thomas, 1958 as cited in Chataut, 2016). The problems concerning the learners as individual personalities, the nature and importance of learning, outcomes from different kinds of experience, needs of youth and adults, the planning, selecting, directing and evaluating of classroom teaching learning experience, motivation and guidance of students, the classroom management and related activities and the school and community relationship affect every teacher. At last he suggested that we could not guide or direct learning successfully without considering all the factors which affect a teaching situation (Maharjan, 1999).



Piaget (1968) suggest on theory of constructivism impacts learning curriculum because teachers have to make a curriculum plan which enhances their students logical and conceptual growth. He emphasized teacher as continually in conversation with the students, creating the learning experiences that is open to new direction depending upon the needs of the students as the learning progresses. The guide book and other teaching materials are helpful for preparing lesson plan while teaching (Alcon, 1954). The sequence of objectives according subject matter in many topics is found. Availability of material is less, lack of library and lab for practical activities (Tripathi, 2006). The secondary level trained teachers found more skills in performing a number of teachings skilled in performing a number of teaching competencies (Bista, 2009).

Several researches have conducted on various aspects of teaching, performance, satisfaction, effectiveness etc. but only few studies have conducted on practices of teaching techniques and management in classroom. So, this study was based on how the teachers used the teaching techniques for effective teaching? How the teachers applied the major components of teaching techniques during teaching learning activities?

### **Objective of the Study**

The main objective of this study was to assess the existing classroom teaching practices by the teachers in Janamaitri Multiple Campus. Specifically, to analyze the personal status of the teachers, to assess the existing teaching skills and techniques and to examine the methods and materials they used during teaching learning.

### **Research Methods and Procedures**

Descriptive observational based research design was adopted for this study. The study was made an attempt to analyze the classroom teaching techniques by the teachers. This study was focused on existing situation of teacher's personal status, knowledge, practices, teaching learning techniques, class room management and problems. The study was conducted among regular teachers in Janamaitri Campus due to the researcher's own work place. The study was mainly based on primary sources of data as well as secondary sources. Primary data were collected from the regular full-time teachers and secondary data were obtained from books, journals, reports etc. for discussion Khanal (2015). The total teachers were not included in this study but few full-time teachers were sampled by purposive sampling method. The total 30 full time teachers 10 teachers from each stream out of 79 teachers were sampled. In this study, 20 male teachers and 10 female teachers were selected purposively as a sample. The class observation method was the main method of this study. Some basic themes related to effective teaching learning techniques for class observation were developed and applied for the teachers and teaching learning activities during class observation. At first, the researcher established rapport with the teachers to get the permission



and basic information for class observation. The collected information was carefully checked and tabulated manually under different heading and sub-heading for analysis and interpretation.

## Results

After collecting the data, it was tabulated and kept in sequential order according to the objectives of the study. The collected data were analyzed and interpreted by using simple statistical measurement procedures like number and percentage were followed and calculated to make present study easily understandable and clear.

### Personal Status of the Teachers

This section includes mainly personal information related to the teachers and the data. Personal details of teachers comprise data related to some socio-demographic characteristics and other details related to their profession, Socio-demographic characteristics represents only age, sex, educational qualification teaching experience and personal income related data.

**Table 1**

*Personal Status of the Teachers*

Variables	Observed Teaching Faculties					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Sex						
Age distribution						
Less than 30	2	10.0	1	10.0	3	10.0
31-40	6	30.0	4	40.0	10	33.3
41-50	7	35.0	3	30.0	10	33.3
51 and above	5	25.0	2	20.0	7	23.3
Total	20	100.0	10	100.0	30	100.0
Present Qualification						
Master	12	60.0	6	60.0	18	60.0
Up to M. Phil	8	40.0	2	20.0	10	33.3
Up to Ph. D.	0	00.0	2	20.0	2	6.7
Total	20	100.0	10	100.0	30	100.0
Teaching Experience						
Up to 5 years	3	15.0	1	10.0	4	13.3
6-10 years	3	15.0	2	20.0	5	16.7
11-15 years	4	20.0	1	10.0	5	16.7
16-20 years	6	30.0	2	20.0	8	26.7

21 years and above	4	20.0	4	40.0	8	26.7
Total	20	100.0	10	100.0	30	100.0
Regular Personal Sources of Income*						
Salary	20	100.0	10	100.0	30	100.0
Bank interest	4	20.0	3	30.0	7	23.3
House rent	12	60.0	3	30.0	15	50.0
Bank share	9	45.0	4	40.0	13	43.3
Business	6	30.0	1	10.0	7	23.3
Others	4	20.0	3	30.0	7	23.3

(Note: \* The percentage may exceed 100 due to multiple responses.)

The table 1 shows that maximum 66.7 percent were male teachers while 33.3 percent were female teachers during the study. Similarly, out of the total sampled teacher, highest 33.3 percent were from aged group 31-40 and 41-50 followed by 23.3 percent from 51 years and above age group. It is found that highest male teachers from 41-50 years age group and highest female teachers from 31-40 years age group respectively in terms of present age group.

It is found that highest 60.0 percent teachers had master degree followed by M. Phil degree holder with 33.3 percent at the time of study. Similarly, 20 percent female teachers had their Ph. D. degree while the male teachers had not any Ph. D. degree at the time of study. The data indicates that equal 26.7 percent teachers had 16-20 years and 21 and above years of teaching experience followed by 6-10 years and 11-15 years of teaching experience with equally 16.7 percent. Most of the male teachers had 16-20 years of teaching experience while 40 percent of female teachers had 21 and above years of teaching experience.

The data revealed that all most all the teachers had salary as the main source of income, 50.0 percent teachers got house rent as a regular source of income, 43.3 had banking share, and equally 23.3 percent had bank interest, business and other sources of regular income. Similarly, 60.0 percent male teachers had house rent, 45.0 percent had banking shares and 40.0 female teachers had also banking shares and 30.0 percent had house rent as a regular source of income

### **The Practices of Teaching Techniques and Skills**

Teachers are the key persons in any academic institution and effective teaching is the key features for institutional improvement. Teaching techniques and skills play vital role in effective teaching. Teachers develop their teaching techniques and skills every time through best practices shared by other teachers, continuing education and classroom experience. The teacher should have the different skills like innovative,

socialized, prepared, organized, clear objectives for lessons, effective, disciplined and so on. The researcher observed the class room teaching in the following components related with effective teaching skills and techniques.

**Table: 2**

*Existing Practices on Teaching Techniques and Skills*

Variables Sex Educational Training	Observed Teaching Faculties					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Trained	12	60.0	7	70.0	19	63.3
Untrained	8	40.0	3	30.0	11	36.7
Total	20	100.0	10	100.0	30	100.0
Preparation of Daily Lesson Plans						
Prepared	7	35.0	3	30.0	10	33.3
Unprepared	13	65.0	7	70.0	20	66.7
Total	20	100.0	10	100.0	30	100.0
Use of Teaching Materials						
Highly used	8	40.0	3	30.0	11	36.7
Less used	12	60.0	7	70.0	19	63.3
Total	20	100.0	10	100.0	30	100.0
Use of Teaching Methods						
Appropriate	8	40.0	4	40.0	12	40.0
Inappropriate	12	60.0	6	60.0	18	60.0
Total	20	100.0	10	100.0	30	100.0
Sitting Arrangement						
Managed	16	80.0	7	70.0	23	76.7
Unmanaged	4	20.0	3	30.0	7	23.3
Total	20	100.0	10	100.0	30	100.0
Evaluation Techniques						
Proper	15	75.0	8	80.0	23	76.7
Improper	5	25.0	2	20.0	7	23.3
Total	20	100.0	10	100.0	30	100.0

The table-2 indicates that only 63.3 percent teachers were trained through different formal and non-formal education. Similarly, 60 percent of male teachers and 70.0 percent of female teachers were trained at the time of study. It is found that 66.7

percent teachers had not prepared the lesson plan followed by 65.0 percent male and 70.0 female teachers had not prepared the lesson plan at the time of study. The data indicates that only 36.7 percent teachers had used several teaching materials during teaching followed by 40.0 percent male and 30.0 percent female teachers had used teaching materials during observation.

The observational data indicates that 40.0 percent teachers had used appropriate teaching methods and followed by equally 40.0 male and female teachers had used appropriate teaching methods during teaching. Most of the male and female teachers had used inappropriate teaching methods or simple teaching methods. Similarly, 76.7 percent teachers had managed the classroom sitting arrangement followed by 80.0 percent male and 70.0 percent female teachers had managed the classroom properly at the time of observation. Most of teachers 76.7 percent had applied proper evaluation system during and after end of the teaching learning activities while 23.3 percent teachers had improper practices of evaluation during observation. Mostly female teachers 80.0 percent had good practices of evaluation during teaching learning activities.

### **Discussion**

The data shows that there is normal gap between male and female teachers in teaching profession where females are still a behind then males. Because of less educational opportunity for female and high dropout rate of female in higher education so the female teachers are less involved in higher education teaching and it is also similar to the research findings of Agrawal (2009). In this study, it is found that the age is just a number in terms of academic performance. Most of the teachers were in the middle age and they are doing satisfactory job which is similar to the research findings of Alcon (1994). The higher education is the main factors for college level teaching, specially the M.Phil. and Ph. D. is most for teaching in higher education and quality teaching learning as well which is consistent with the findings of Pokhrel (2006). It is found that the experienced teachers are seemed to be less in numbers. It is obvious that the students gain more knowledge from more experienced teacher. The teaching experiences variation among the teachers can affect the teaching learning activities. Those who had long teaching experience could have high skill of teaching which is consistent with the Tripathi (2012). Similarly, the level of income also plays significant role professional development as well as working motivation. Most of the teachers were engaged in different economic activities with satisfactory sources of regular income and that enhances the working capacity of the teachers which is consistent of the research findings of Pokharel (2006).

Training is one of the major aspects of promoting teaching learning performance of the teachers. Most of the teachers had good training in their respective subjects and

techniques of teaching which is consistent of the research findings of Muijs (2011). Similarly, the lesson plan plays important role in effective teaching learning in a planned way because the lesson plan is considered as the backbone of the fulfillment of the objectives of any curricular activities Bista (2009). The lesson plan gives the positive impact on teaching learning activities and helps to complete the course in appropriate time with predetermined goals. The teachers follow the right way and guidelines by lesson plans and it is also similar to the study findings of Devkota (1996). The teaching and learning materials and methods are the major parts of lesson plan and teaching activities. Teaching learning materials and methods must be effective, real and related to the lesson plan for teaching learning activities Sapkota (2007). The classroom teaching learning becomes more effective and lively with the help of appropriate teaching materials and methods. The teaching materials and methods may be varied, modified and improved according to the nature of the topic, level, need, interest and behavior of the students. In this study, very few traditional materials and methods and less effective materials and methods were used during teaching learning activities. Similarly, the ICT based audio visual material and methods are effective in teaching, but only few teachers had used such modern materials and methods during teaching learning which is consistent with the research of Agrawal (2009). Evaluation technique is the main aspects of the all teaching learning activities. It is helpful in the search of student capacity, attitude, knowledge and behavior in the subject matter. Therefore, different means of evaluation i.e. formative, summative, diagnostic, and so on should be used during and end of the classroom teaching and most of the teachers had used the proper evaluation techniques during teaching learning activities which is consistent with the research of Chataut (2016). Classroom setting and management is also the main part of teaching learning activities. It is helpful in conducting effective class and teaching learning activities. The most of the teachers had used the proper classroom setting and management during teaching learning activities which is consistent with the research of Sharma (2016).

### **Conclusion**

This study was concerned with the practices of teaching techniques and skills during teaching. It is found that the normal gap between male and female teachers in teaching profession due to less involvement of female teachers in higher education. Most of the teachers were in the middle age and they are doing satisfactory job in terms of salary, shifts, result and respects. The higher education and qualification are the main factors for college level quality teaching learning and most of the male teachers had only master level of education except female teachers. Most of the teachers had excellent teaching experience from ten to twenty five years with good result, motivation to the students and positive responses. All most all the teachers had salary as a main source of personal income.

Most of the teachers had good training in their respective subjects and they performed well as a trained teacher. The lesson plan plays important role and it is the backbone of the fulfillment of the objectives of any curricular activities. Only few teachers had followed the structured lesson plans and strategy during teaching learning. Some teachers had followed traditional methods of teaching and materials during teaching. The classroom setting and management is necessary for effective teaching learning and the most of the teachers had managed the classroom properly during teaching learning activities.

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# Misogyny in August Strindberg's *The Father*

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## ABSTRACT

*This paper attempts to discuss with the analysis of the play from the point of view of the author's misogynist slant disregarding other influences. Little use of social aspect will be made to the extent of its severe treatment to the protagonist by the female characters. The subversion and surrounding of the play will be studied and the particular attention will be to focus on the cause and circumstances on the misogyny whether it is associated with the theoretical perspective of naturalism or it is just the influence of the writer's biasness with females ambience.*

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**Key Words:** Misogyny, disparagement, naturalism, feminism, chauvinist, hatred, mockery, phylogeny and misandry.

## Background of Misogyny to '*The Father*'

Misogyny is an approach which begins with hatred for women by the authors or the protagonists to the female characters. It is the hatred or dislike of women or girls having central part of sexist prejudice and ideology and as such is an important basis for the oppression of females in male dominated societies. Misogyny is manifested in many different ways, from jokes to pornography to violence to the self-contempt and so on. Even myths and legends contain plenty of disparagement on women. Such examples are: Eve, Pandora, Delilah, Helen, Cressida etc. Strindberg's misogyny is a type of mania caused by his own marital status, mental disorder and other many more crises. None of this means that the concerned mental and emotional aspects of the author, references of disturbances were fictive, used in exaggerated form, and has sketched women of central role in the text dominating their intellectualism and ambition. It's a play of a kind of biography of the writer where women are responsible for their misfortunes but ultimately they themselves are found to be ruined being victims of naturalistic circumstances.

## Theoretical Framework

Naturalism is based on post Darwinian biology in the late nineteenth century which held the view that human beings exist in the order of nature. Emile Zola is the prominent advocate of this movement. In his preface to '*Therese Raquin*' he describes himself as a naturalist. His method was scientifically clinical and analytical. It holds the



view that men's lives and actions were determined by environment and heredity. The general theme of the naturalistic play is the characters portrayal / bond where they are trapped by heredity or surrounding rather than any other unusual circumstances. The author in this play has attacked the fixed social norms, familial terms and the value of society based on the orthodox principles. In fact, such typical inner quest portrays a tragic sequence in the naturalistic dramas and this is the prime essence of the play *The Father*. Apart from this, naturalism is still more visible in characterization where the writer looks a careful naturalist who attempts to make drama more scientific, philosophical and physiological with full respect to natural laws. Strindberg himself was trapped in familial surrounding exactly like the male protagonists in this play. In many references, the writer is closely attached with the captain's characterization. Bringing the context of *The Father* Strindberg himself says, "It is to me as if I were walking in my sleep; as if creation and life were mingled. I don't know whether *The Father* is a creative work or whether that was my real life" (Lucas's 338).

### Literature Review

Strindberg's play *Father* has elicited much criticisms. Many critics have attempted different form of interpretations in this play. The major issue of Strindberg's study in terms of *The Father* is realistic, naturalistic, autobiographical, character portrayal and misogyny. The protagonist Laura seems to be behaving excessively to dominate the *Father* leaving no any spaces griping him under her full control. The same reference could resemble in the following citation of Benjamin Constant as well. Benjamin Constant remarks, "I find her (Laura in *The Father*) odious, hideous, insufferable. I must break with her die.... She is an old attorney, her hair twined with serpents, demanding the fulfillment of a contract, in heroic verses" (qtd. in Lucas's 340).

Exactly, if we analyze the character of Laura from the outset of the text, we find her as she is no less than attorney like serpent and odious lady. Probably it's because of this reason *Father* hates Laura much.

The character of Mrs Laura up to more extent similar to some prominent characters like Miss Julie of Strindberg's play, Shakespeare's *Lady Macbeth in Macbeth* for her ambitious role to subdue the natural circumstances under her control.

Elizabeth says,

F. L. Lucas comments: *The Father* shares with Miss Julie the claim to be Strindberg's most famous drama. It is also one of the most typical being both extremely autobiographical and concentrated on the wickedness of wives" The same critic further highlights Laura seems to me stiff and wooden besides *Lady Macbeth* or *Victoria Corombonna* or *Hedda Golbler* (p.340).

It's a true observation of Lucas regarding the central character of the play Laura who is performing her role up to the highest extent applying every means to run the household circumstances as per her indication and control. Her wicked and cynical action is portrayed throughout the play in such a way that Father doesn't have any exit to act as per his choice.

Emile Zola writes: Its characters were too abstract- I like characters to have a fully documented civil status" He further says "Your play interests me very much. The philosophical idea is daring, and the characters are boldly drawn. You have traced the doubt of paternity with a powerful and disquieting effect. Finally, your Laura is the true woman in the consciousness and the mystery of qualities and faults-your piece is one of the few dramatic works to have moved me profoundly ( qtd. in Sprigge's..6)

Laura is a dominant character in the play and she is as such conscious and mysterious explored by Sprigge. Her role what she is going to do next is unpredictable in the text.

Friedrich Nietzsche says " I read your tragedy twice over with deep emotion, it has astonished me beyond all measure to come to know a work in which my own conception of love with was as its means and deathly hate of the sexes as its fundamental law is expressed in such a splendid fashion (qtd in Sprigge's..12).

The hatred on sexuality is the prime essence of the text. In fact Lauras hatred to her husband Captain is notable here in the text from the very beginning to the end. She hates his entire activities and wishes to have full domination upon him.

Eric Bentley remarks 'But even a brief comparison of Strindberg with other woman haters before him brings out, I think, he is extreme singularity. I know none of really like him, among misogynists before or since (qtd. in Sprigge's..7)

By the overall presentation of the Captain, it can be said that there are many more similarities in between Strindberg and the protagonist Captain. Strindberg himself is like the Captain as we observe his perception of misogynist in his biography too.

Lady Murasky adds "What is the good of trying to please woman? If they were not fundamentally evil, they wouldn't have been born as woman at all (qtd. in Lucas's ...327).

The character of Mrs Laura seems to be of no ordinary women's revelation in societies in terms of feminine features. She is dominating even to subduing other women in the play. If we analyze her inner character then it could be estimated that she possesses the traits of fundamentally evil character.

## **Purpose of the Study**

August Strindberg is a dramatist. Most of his plays have become enigma for modern readers which need to be well studied. Throughout his literary career, Strindberg expresses his personal idea in relation to the social life within the multiple categories and modes in literature of twentieth century. His expressionistic works are no less prominent than those of the contemporary writers. The play that I am going to analyze has a vital and problematic issue of many households. My study is based on Strindberg's *The Father* where I tried to focus on his treatment of female characters as an intellectual hatred of society; misogyny as an outcome of naturalistic circumstances, literature as a true reflection of the social community exposing them in dominant position and showing their emancipation which lead them to uncertainty and defeat.

## **Statement of the Problem**

Misogyny has a long and unclear interpretation since it has remained under the shadow by one of the particular 'ism' called feminism. Despite it, many critics have attempted different forms of interpretations of this term focusing on many aspects of the study. But still, it is not in practice as there are those other different 'ism' and the epistemological gazing behind this frame which have been to some extent be concealed. Some of the problems that I found while going through the texts are: Why can't the protagonist subdue his wife? Is not the writer willfully sketching the female protagonists in dominant positions? If the captain is not a father of Alice as Laura told is he no more father then? What may be the indication of the text that is entitled as *The Father*?

If the literary texts are not being observed from the alternative aspect such as misogyny then obviously, there can be the total blockage and blindness to see and interpret the text from multiple glasses. Thus, this could be a great loss to the critical and interpretive community in the days to come.

## **Research Questions**

I propose the following research questions:

- Why do misogynist aspects really contribute something in literature as an appropriate form of knowledge to the interpretive community?
- What are the underlying connotations behind this specific term from different authors?
- How is misogyny an outcome of naturalism in the play?
- How can obstruction and frustration of the authors due to familial and social surrounding form a literary creation?
- Why is not this issue considered from a serious viewpoint to connect naturalistic genre of literature?

### Analysis of the Father

The Father is a family drama. The couple father and mother debate in it over the question of their daughters' upbringing which is a struggle of principles and the battle of the sexes that moves throughout the play. It is constructed wholly from the title figure and goes on unfolding through his subjective point of view. The gist of the play hints that the father who is represented by captain is in the middle, surrounded by women Laura, his nurse, the mother-in-law and finally the daughter who actually forms a wall between the father and mother. More important is the recognition that the battle moves against the father (captain) by his wife who usually achieves a reflection on his own consciousness. The play depends on the unity of 'I' which is clear in some scenes when the captain is not on the stage. We see the family's reality through the father's eyes who abnormally scorns his wife and wishes his authority. The following lines of the text clarify the captain's sense of authority over women characters:

**Captain:** My mother in law wants to make the girl a spiritualist. Laura (his wife) wants her to be an artist. The governess wants her to be Methodists, Old Margaret, and a Baptist. And the servant girl wants her to join Salvation Army.

**Pastor:** you have too many women trying to run this house.

**Captain:** You are right. It's like going into a cage full of Tigers; and if I didn't hold a red hot iron under their noses, any minute they would tear me piece meal (12).

The captain is presented as the sole subject of conversation here. It is seen that even the scenes from which he is absent, the women are dominated through his activities. Laura's schemes are only visible in the foreground where the picture stands. She paints of him for her brother and the Doctor. Though, she is praised and warned at the same time, she doesn't understand and care it:

**Pastor:** You are a strong woman Laura, unbelievable strong like a fox in a trap, you would rather gnaw of your leg than allow yourself to be caught / Like a master thief, you have no accomplice, not even your own conscience/ Look yourself in the mirror you don't dare ....Let me look at your hand / not a sign of your blood to betray you –Not a trace of insidious poison / An innocent murder that cannot be reached by the law, an unconscious crime/ A clever scheme, a master stroke (46-47).

This is a type of intellectual insult. As such being foremost, Laura is influential in subduing the Captain (the Father) but later on she herself is obsessed. She is the first vampire like women presented in the play, who out of greed and envy obstructs the happiness of other. So, she is the author's hostile projection. It is a part of himself that he puts in to her as a form of monster on the stage. She is presented as such a horrible creature, who has Strindberg's own wish to be dominated and destroy. Her impact to the

readers and the impact which she makes in her own right seem to be an origination of the creator's psychological violence and eagerness. In fact, a living woman is a more neurotic personality than the Laura of the play. She is emphasized as the portrayal of a cruel woman in the sexual relationship as a stronger as well as the most destructive partner. She has controlled the household, subdued the familial authority and seems superior in every field, except the scientific observation of the captain. Apart from this, she demonstrates how brilliantly the Captain turns his own neurotic account of illness in art. The readers' first reaction of Laura's destruction of her husband may be simply to feel that this woman is not merely a killer but a sick rose as well. It is easy for us the readers to understand the author's hatred because of her abnormal portrayal. In fact, the misogyny is of women's cruelty on him. The following extracts of the text further interpret the points clearly.

**Captain:** Just one thing more a fact. Do you hate me?

**Laura:** Sometimes as a man.

**Captain:** it's like a race hatred. If it's true we are descended from the ape, it must have been from two different species. There is no likeness between us, is there?

**Laura:** What are you getting at?

**Captain:** In this fight one of us must go under.

**Laura:** Which?

**Captain:** The weaker naturally (43).

If the play is viewed with this approach, then this tussle of hatred is inevitable. In his life time, he was caught up in the web of females and like Captain of The Father has alternated between seeing women as evil vampires sucking out his manhood. Perhaps because of this, and being frustrated with the society, he (The Captain) is obliged to say:

“You have guided my destiny ill, you have made me and commissioned me to chastise, to overthrow idols to stir up revolt, and then you with draw your protection from me and disown me in an absurd way, telling me to creep to the cross and repent. When young, I was sincerely pious, and you have made me a free thinker. Out of free thinker, you have made me an atheist and out of atheist, a religious man. Inspired by humanitarian ideas, I have been a herald of socialism. Five years later, you have shown me the absurdity of socialism; you have made all my prophesies futile. And supposing, I again became religious. I am sure that in another ten years, you will reduce religion to the absurdity. Ah, what a game the Gods play with us poor mortals (qtd in Patrick's ...63).

Captain's motive for this has to do with the need to deny his total dependence upon Laura. The very factor through which he is presented seems to be small, dependent, consequentially envious and jealous. The reality also makes clear to him that he is too small and weak to serve his mother in this way and more important still is that she doesn't want him in this role. Through his childish perspective, he is permitted to feed, but that is all. The bitter sense of total dependence on her has also provided him in the most radical psychologically in difficult position.

**Captain:** Of course, you must keep our accounts. Our positions are most precarious, and if we go bankrupt, we must have accounts to show. Otherwise, we could be occurred of negligence (...15).

The Captain's growing jealousy and suspicions exaggeration by his wife's success in frustrating his career, eventually, leads him to violence for which he is declared like insane. At the end, when he is immobilized and becomes motionless in the strait jacket Laura claims her victory and seizes her prize: "My child my own child" (57). If we judge this expression and her position at the conclusion of the play, it is herself, not the captain is doomed. The captain from the very beginning is exposing the relation that has dominated his married life. In fact, it has resulted in total warfare between them and by it. The dispute over his daughter's education is shown at the climax. The struggle is the substance of the play, and it turns the entire household into an armed camp. Strindberg once clearly states that he symbolizes a masculinity which society is trying to invalidate and hand over to the third sex.. The entire surrounding of the household condition and Captain's aggression towards his wife has made him to identify the following remarks:

The house is full of women, all trying to mould the child (his daughter) of mine. My mother in law wants her to turn in to a spiritualist; Laura wants her to be an artist, the governess would have her Methodist, old Margaret a Baptist, and the servant girl a Salvation Army lass ....meanwhile I...I, who have more right than all the rest to guide her, an excluded at every turn. So, I must send her away (12). But despite this reaction, he is complexly dominated in the house. He specifically hates to all the women in the house because he is the only male character in the play almost all of the readers are obliged to believe that Strindberg, disguised as Captain, seems a real misogynist. The females rooted nature in the play is certainly a cause of the captain's complex torture and leads him in his destruction. The Captain is expressing his aggression explores his entire source of dissatisfaction towards the women:

'Yes' I do. I believe all you women are my enemies. My mother didn't want me to come in to the world because my birth would give her pain. She was my enemy. She robbed the embryo of nourishment so I was born incomplete. The first women I took in my arms was my enemy. She gave me ten years of sickness in return for the love I gave

her. When my daughter had to choose between you and me, she became my enemy. And you my wife have been my mortal enemy, for you haven't let go your hold until there is no life in me (54-55).

The entire text in a sense is warfare among the women and a man. The dialogue becomes like a duel. The play in a sense evokes the modern human conditions, women's intellectualism and its result as the perpetual trial. It deals with the problem of men women association and their entire attachment. The Captain struggles in order to ensure his triumph of life but sacrifices in order to defend for salvation. The Captain's death has become more useful because nobody dies being killed if its effect will remain powerful and immortal. Thus, it can be observed that misogyny is an outcome of naturalistic circumstances throughout the text. The protagonist Father as another form of Strindberg which he himself has quoted above is trapped elsewhere in the play among the grip of the females' characters from where his exit seems impossible. It is because of this reason Father seems to be a strong female hater in the play.

### Conclusion

The play is exclusively misogynist. The action and behavior of the captain against his wife is vividly rooted as misogyny of ferocious type is a specific stereotype of Naturalism. We see in the play elsewhere the protagonist's rigid indignation against women. This is implicit in the attempt to split the good from the bad. The play sketches that the writer has created his experiences in order to expose woman's nature and behavior which is similar to his own real life. The writer's familial surrounding is set up as a model where a real betrayal of women acts as a challenge. As such, having dramatized the hostility, which dismisses romantic love and with the references to his own life, the writer has brought all his insight to bear on man-woman relationship through misogynist approach in this play. It is the same woman, the mother who is friend and enemy, angel and devil, Madonna and whore and the splitting process is therefore bound to fail. He tried to find good in them but it never came as he expected. So, he appeared as a misogynist in this play placing and exposing women in prime form of hatred in this chaotic world which surrounds exclusively with naturalism and the characters are explicitly victimized.

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# Using Literary Texts in Teaching English as a Foreign Language

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## ABSTRACT

*The present study investigates the effectiveness of using literary texts in teaching English as a foreign language in Nepal. The objective of this study is to explore the multiple advantages of literary text in language teaching. Adopting a qualitative design, the study collected data from eight teachers from four private schools of Mahalaxmi Municipality of Lalitpur district of Kathmandu Valley. The data were obtained through semi-structured interviews and interaction with the teachers. After the interview and the Interaction, it was known that the literary texts were effective resources for teaching and learning English. They have been used for various purposes such as comprehension questions, vocabulary, various aspects, skills, and levels of language. Moreover, the study also identified some challenges, such as students' lack of sufficient exposure to literary texts and their prior knowledge, limited time and resources, the need for teachers to develop appropriate pedagogical strategies, exam-oriented mentality of parents, students, and administrators should be changed. The study concludes that incorporating literary texts in EFL teaching in Nepal can be a valuable resource for enhancing students' language learning outcomes, developing communicative and linguistic competence, and fostering their creative and critical faculties as well as intercultural understanding. It is expected that the paper will be very useful for the concerned teachers, students, administrators, and parents.*

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**Keywords:** Literature, linguistic competence, communicative competence, intercultural awareness, pedagogy,

## Introduction

Language is a tool for thinking and literature is a tool for critical thinking. This statement is very popular among scholars, so it shows that there is a very close relationship between literature and language. They are interdependent for their progress and development. The use of literature as a tool for language teaching has been an area of interest for scholars and practitioners for several decades, and it has been recognized as an important resource for developing learners' communicative competence, critical thinking skills, analytical skills, and cultural awareness (Collie & Slater, 2000; Cruz, 2010; Marasini, 2019). In the context of Nepal, where English is taught as a foreign

language, the potential of literature to enhance students' language proficiency and cultural awareness has received increasing attention (Bista, 2011; Regmi, 2022).

Since the early 20th century, Literature has been used in language teaching primarily as an effective tool for teaching students using examples of vocabulary and grammatical structures using the Grammar-Translation Method (Alan & Alan, 2007). However, as the communicative approach to language teaching emerged in the 1970s and 1980s, literature's role in language teaching significantly changed. In this approach, literature is used for providing authentic language input, so it became socially and situational appropriate and useful to develop linguistic and communicative competence to the learners (Collie & Slater, 2000).

Additionally, by using literature' learners' critical thinking and analytical skills can be enhanced, and learners develop highly intellectual skills like analyzing and interpreting the text appropriately, rather than only memorizing vocabulary and grammar rules (Marasini, 2019). Literature can also help students develop intercultural understanding and consequently promote cultural awareness exposing learners to different cultural perspectives (Cruz, 2010).

The task-based and content-based approaches further developed the use of literature in language teaching. In the task-based approach, literature is used as a means of engaging learners in meaningful tasks that require the use of language in context, developing learners' language skills, and promoting their communicative competence (Collie & Slater, 2000). In the content-based approach, literature is used as a vehicle for teaching subject matter content while also developing language skills (Collie & Slater, 2000).

However, the implementation of literature in language teaching also poses challenges. One of the primary challenges is the lack of appropriate materials, which may hinder teachers from effectively integrating literature into their curriculum (Timsina, 2021). Moreover, rote learning has been given priority rather than developing the learners' communicative and linguistic competence. Such practice may create problems for the effective use of literature as a resource for language teaching (Regmi, 2022). Therefore, it is very essential to provide teachers with suitable training for effective pedagogy to enable them to use literature impressively in their classrooms, promoting learners' cultural awareness, critical thinking, and analytical skills.

### **Purpose of the study**

The main purpose of this research was to investigate the effectiveness of using literary texts in English language teaching classes and, explore how a language teacher helps students develop their communicative and linguistic incompetence. Specifically,

how literature has been used by the teachers in English language classes in Nepal, and to explore their experiences, and perspectives regarding the use of literature in English language classes.

### **Research Questions**

To organize my study systematically and coherently, as the guiding principles, the following research questions were set to achieve the purpose,

- How have literary texts been used by the teachers in English language class?
- How does literature support the development of linguistic competence and communicative competence?
- How does literature help to teach language skills (listening, speaking, reading, and writing) aspects, (Grammar, Vocabulary, pronunciation, and language functions) and levels (phonology, morphology, semantic, syntactic, and pragmatic?)
- How can literature be useful to enhance higher-ability skills, like critical thinking, creative writing, and intercultural understanding?
- What are the problems faced by the teachers while teaching English in Nepal?

### **Review of Literature**

The researchers and scholars have been quite interested in the use of literature in the field of English Language Teaching (ELT). Literature is regarded as a significant resource for language learners as it provides authentic language input and enhances language skills such as listening, speaking, reading, and writing (Alan & Alan, 2007). Additionally, literature can enhance the skill of intercultural understanding, helping students reflect on various cultural beliefs, values, and traditions of a particular culture (Cruz, 2010).

Collie and Slater (2000) provide an important resource book that provides various activities and ideas for integrating literature in teaching language. Their book stresses the significance of creating a highly motivational learning environment that encourages learners to offer an appropriate situation for them to use language meaningfully in the contexts. Literature can be used to develop language skills, such as listening, speaking, reading writing as well as critical thinking, analysis, and interpretation, moreover, it can be used to explore the social and cultural context to make learning situationally appropriate.

Regarding the case of Nepal, the literature has been used in language teaching for a long time. Bista (2011) stresses the essential role of literature in developing students' communicative competence and intercultural understanding. He emphasizes

the significance of literature in providing learners with authentic language input that reflects the diversity of Nepali culture and society. Additionally, literature can be used to enhance students' analytical skills and critical thinking by inspiring them to ponder over the multiple themes, messages, and motifs inherent in the multiple layers of literary works. Gower and Pearson (1986) guide how to teach reading literature to language learners. They explore various approaches and methods for helping students understand and analyze literary texts. A key aspect of their book is demonstrating how literature can enhance language acquisition by exposing learners to rich, authentic examples of the target language.

Lazar (1993) also examines the role of literature in language teaching. Unique to this work is its focus on guiding teachers and trainers in developing effective literature-based lesson plans and activities. It offers concrete suggestions for selecting appropriate literary works, designing tasks, and linking literature to language learning outcomes. A strength is its practical orientation aimed at equipping instructors. Bassnett and Grundy (1993) take a broader view of the relationship between language and literature. Their text considers how literature both shapes and is shaped by the languages that produce it. In addition to discussing literature in language teaching, they analyze literary translations and survey the linguistic features of different genres. Their interdisciplinary lens provides useful sociocultural context regarding the dynamic interplay between a nation's literature and the language it is written in.

Similarly, Cruz (2010) stresses the importance of literature in ELT, asserting that literature can be used as an effective tool to promote intercultural understanding. He suggests that teachers can use literary works to expose learners to a range of cultural perspectives and worldviews, which can help develop their intercultural competence. Additionally, literature can be used to enhance learners' understanding of multiple aspects of various cultures.

Marasini (2019) conducted research on the use of literature in language teaching in Nepal and found that it is an invaluable tool for teaching language skills and (grammar, vocabulary, and pronunciation) in context. He argues that literature provides a rich source of language input that can be used to develop learners' language proficiency and communicative competence. Furthermore, the use of literature in language teaching can enhance learners' motivation and engagement by providing them with meaningful and authentic language input that reflects their interests and experiences.

However, despite the potential benefits of using literature in language teaching, teachers in Nepal face several challenges in implementing it in their classrooms. Regmi (2022) conducted research regarding the use of literature in language teaching in Nepal and discovered the various challenges faced by several teachers: including a lack of

effective training and sufficient resources, scanty availability of appropriate materials, and exam-oriented mentality of the students. Moreover, some teachers often prioritize rote learning over communicative competence, which can hinder the development of learners' language skills and critical thinking abilities. Timsina (2021) also identified several challenges faced by teachers in Nepal, including the lack of qualified teachers, inadequate resources, and a focus on rote learning rather than communicative competence. However, he suggests that the integration of literature in language teaching can help to overcome these challenges and promote language learning that is both meaningful and engaging. He argues that teachers can use literary works to develop learners' critical thinking, analytical skills, and cultural awareness, which can contribute to their overall language proficiency and intercultural competence.

In conclusion, the current research significantly advances the field by providing empirical evidence on the utilization of literary texts for English language teaching in the Nepali educational setting. While previous studies primarily discussed the potential benefits, theoretically, this study conducted interviews with teachers to gain valuable insights into real-world applications and experiences. The findings not only support existing literature on the effectiveness of literature in developing linguistic competencies and cognitive abilities but also shed light on Nepal-specific challenges faced by educators, which were previously addressed only briefly. By capturing both the advantages and nuanced barriers at the ground level, this research offers valuable empirical evidence that goes beyond theoretical discussions, providing practical guidance for policy revisions and pedagogical improvements within the Nepali context. The study validates existing theories while identifying localized applicability, limitations, and strategies to address them, and the mixed methods design strengthens the conclusions by triangulating teacher perspectives with established frameworks. Ultimately, this research makes an important original contribution through primary data collection, contextual relevance, and pragmatic recommendations, effectively addressing the gaps left by previous studies lacking local empirical exploration. By enhancing our understanding of literature integration in English language teaching, this research significantly contributes to the field and informs future practices.

### **Methodology**

The study used a phenomenological research approach to describe the meaning that eight English teachers derived from using literature in their language teaching. The research was qualitative as it aimed to explore the teachers' experiences and perspectives on incorporating literature into English instruction at the secondary level.

The researcher purposively selected eight teachers from four private schools of Mahalaxmi Municipality, Lalitpur District. To gain a reliable perception of the teachers' views, the researcher designed an interview schedule comprising eight open-ended

questions. The teachers were asked to share their experiences and perspectives on the issues of using literary texts in a language class.

The researcher visited the schools and respective subject teachers with the data collection tools. He briefly explained the purpose of the study and built rapport to facilitate familiarity and trust between researchers and participants. Then, the designed questions were asked to the teachers in a systematic order. On the basis of their answers, the data were collected. He edited and properly organized the collected data and interpreted them thematically.

## Results

The findings are based on the collected data from the eight open-ended questions. Among the eight teachers, only one of them gave her different views regarding the effectiveness of literature in teaching language. She does not enjoy literature in a language class as it cannot be used properly in real communicative situations. She argued that it is complex to understand the meaning and explain it and she was not interested in participating in the conversation. Actually, the real cause of her dissatisfaction was not identified. However, the other seven teachers expressed their views positively regarding teaching language through literature. The result is based on the data provided by those seven active participants.

In response to my question regarding the value of literature for developing listening and speaking skills one of the participants kept her opinion like this, "Literature provides numerous opportunities to 'practice listening and speaking through reading stories aloud, discussing what they read with classmates, acting out plays, and explaining their understanding to the teacher.' Engaging with literature in these interactive ways gives students plenty of chances to strengthen their communication abilities." In her opinion, we can see that literature can be a valuable asset regarding the enhancement of listening and speaking skills as it provides the chance to various sounds, pronunciation, stress, and intonation exposing the various genres of literature.

Based on my question one of the interviewees answered, "Literature greatly aids the development of reading and writing abilities in numerous ways. It helps students improve as readers through exposure to different genres and practicing comprehension. Literature also enhances writing as it encourages students to strengthen expression by analyzing texts and experimenting with literary devices in their own work." Overall, engaging with high-quality literature furnishes students with rich and authentic material to advance both their reading and writing skills." It is obviously mentioned that literature supports the development of reading and writing skills, I found that literature is very

beneficial in strengthening these abilities in several ways. Literature helps to improve reading skills by exposing students to different types of writing styles and genres. When students read various literary works, they get to practice comprehending what they read. This builds and improves their comprehension abilities. Literature also enhances writing skills by encouraging students to analyze texts closely. By studying how authors express ideas and use literary techniques, students learn how to strengthen their expression in writing. They can experiment with techniques like figurative language or descriptive details in their writing

Based on my question regarding the development of vocabulary using literary texts one of the participants answered, "Literature is an excellent resource for developing vocabulary due to the way it exposes learners to new words through enjoyable readings of paragraphs, discussions with peers, and analysis of literary elements. Engaging with various texts provides multiple chances to encounter, learn, and actively use unfamiliar terms in context."

Literature can be an excellent resource for developing vocabulary. When students read literature, they are exposed to new words in an enjoyable way through stories, discussions with peers, and analyzing literary elements. This gives multiple chances to encounter, learn, and use unfamiliar words in context. This helps students learn vocabulary in a memorable way.

In response to my question about literature, another participant replied, "Literature effectively supports grammar development by exposing students to a variety of texts that serve as models of 'correct grammatical structures, which helps strengthen their own command of rules through observation and emulation in the analysis as well as original writing'."

The answer obviously reflects the value of literature to provide effective support for the development of grammar. When students read different texts, they serve as models of correct grammar structures. This helps strengthen students' understanding of grammar rules through observation and applying them in their own analysis and writing.

"Reading literary texts requires analyzing themes and symbols in-depth, cultivating critical thinking as students must make inferences, recognize bias, and interpret concepts. Literature also presents multiple perspectives that prompt examining issues from different angles. Analyzing an author's craft hones analytical skills, teaching how language shapes meaning. Formulating and defending interpretations through discussions strengthens reasoning as students consider various viewpoints. Overall, literature epitomizes open-ended problems that cultivate flexible, higher-order thinking over simplistic answers."



Reading literature requires in-depth analysis of themes and symbols which cultivates critical thinking. Students have to make inferences, recognize bias, and interpret concepts. Literature also presents multiple perspectives that prompt examining issues from different angles. Analyzing an author's craft helps develop analytical skills. Defending interpretations through discussions strengthens reasoning. Overall, literature promotes flexible, higher-order thinking over-simplistic answers.

“Through its use of figurative language, poetic forms, and vivid expression, literature demonstrates language’s potential for creativity, imagery, and artistic vitality by depicting human experiences and natural beauty eloquently.’ By crafting words carefully across genres and cultures, literature ‘highlights language as a diverse, rich creative medium and fosters an appreciative view of its musical, imaginative possibilities beyond bare functionality.’”

Through literary devices like figurative language, poetry, and vivid expression, literature demonstrates language's potential for creativity, imagery, and artistic vitality in depicting human experiences and nature. Literature highlights language as a diverse, rich medium by carefully crafting words across genres and cultures. This fosters an appreciation of its musical and imaginative possibilities beyond basic use.

As I asked how literature can be an effective resource for creative writing one of the interviewees answered, “Students can be creative when reading literature by using their imagination to envision themselves as characters or predict future plotlines, exercising creative thinking. They can also draw or visually represent scenes from the story to express their own interpretations creatively. Responding to open-ended questions or making connections through original poems, songs, art or stories allows innovative expression of insights sparked by the literary work.” In the Answer one can easily perceive that

Students can use their imagination while reading literature by envisioning themselves as characters or predicting plots, exercising creative thinking. They can also draw or visually represent scenes from stories to express their own interpretations creatively. Responding to open-ended questions or making original connections through poems, songs, art or stories allows innovative expression of insights sparked by literary works. The school library lacks a sufficient number of simplified version books for students. This makes it difficult to incorporate literature lessons as there is limited reading material available at appropriate levels.

When I asked about the general problems regarding the use of literature in a language class, one of the participants enumerated the following problems

"We do not have enough simplified version books available in our library.”



"The limited class time period"

"Teachers are not receiving sufficient training"

"The exam-oriented mentality of both students and administrators hinders the focus on developing analytical skills through literary texts as the priority is on completing syllabus units."

"The poor salaries demotivate language teachers"

In spite of various advantages, there are several impediments to effectively incorporating literature into language classrooms. Constrained class periods make it hard to devote sufficient time for in-depth discussion and analysis of texts. The majority of the teachers lack proper training on creative pedagogies that develop critical thinking through literary study. Both students and administrators focus excessively on exam results rather than skill-building, lowering the priority of literature. Furthermore, low teacher salaries discourage developing literature-based lessons requiring extensive planning beyond textbooks. With heavy syllabi pressures and inadequate motivation due to poor pay, practices like insightful text dialogues and assessments get neglected. Overall, the constraints of time, insufficient training, exam priorities, and low incomes present hurdles to optimally harnessing literature's educational benefits.

### **Discussion**

The study found that literary texts were effective resources for developing various language skills among students. Teachers used activities like reading aloud, discussions, and role-plays around literary works to help enhance reading comprehension, vocabulary building, grammar learning, and pronunciation. Literature also supported the improvement of communicative and linguistic competence by exposing learners to authentic language usage. Moreover, studying literature effectively cultivated higher-order thinking abilities in students through developing critical analysis, interpretation, and examining different perspectives. This promoted flexible thinking. Literary works further sparked students' imagination and creativity, providing avenues for innovative engagement and creative expression of ideas. Engaging with literature additionally helped build cultural awareness by presenting diverse cultural themes, traditions, and worldviews through skillfully crafted language. However, some challenges in implementing literature-integrated pedagogy included limited teaching resources, time constraints due to the syllabus-driven curriculum, lack of proper teacher training, and an exam-focused approach that prioritized syllabus completion over skill-building, according to interviews with English teachers.

The findings indicate that when integrated strategically, literary texts can effectively enhance holistic language development among students. By exposing

learners to rich vocabulary, grammar and discourse patterns in an authentic manner through literature, linguistic competencies are nurtured. The interactive activities employed around literary works aid the development of critical language skills through a communicative approach. Moreover, literary analysis cultivates higher-order thinking abilities by promoting flexible creative thinking beyond rote learning. The results also demonstrate that literature fosters cultural awareness and appreciation by imparting intercultural understanding through skillfully crafted language. While challenges in implementation were reported, the overall positive experience of teachers interprets that with adequate resourcing and alignment to standards, strategic integration of literature has the potential to enrich learning outcomes and abilities. Addressing constraints remains important to realize this potential for a well-rounded enhancement of both linguistic competencies and 21st-century cognitive skills through the strategic usage of literature in ELT pedagogy.

The results meaningfully inform all the research questions. Regarding how literary texts are used by teachers to develop language skills, the finding that teachers employ activities like reading aloud, discussions, and role-plays around literature to impart diverse abilities relates directly. In elucidating how literature supports linguistic and communicative competence, the result that it aids these through authentic input in context lends support. The question of enhancing language skills, aspects, and levels at different levels is addressed by the cultivation of understanding syntax, semantics, etc. as well as higher-order thinking. That literature fostered abilities like analytical skills and cultural awareness by prompting interpretation confirms expectations regarding enhancing thinking skills. Additionally, the identification of challenges like limited resources and training needs associated with examining issues faced by teachers, thus providing empirical support for the hypothesized enriching role of literature in ELT by meaningfully addressing all objectives while also recognizing current limitations experienced as informed by teacher perspectives.

The results strongly align with prior research finding literary texts valuable for language learning, as seen in studies highlighting their capacity for teachers to develop skills through engaging activities (Collie & Slater, 2000), enhance cultural learning (Cruz, 2010; Bista, 2011), and support proficiency growth through rich authentic input (Marasini, 2019). However, this study uniquely validated such benefits empirically in Nepal's specific ELT setting beyond conceptual discussions, thereby addressing gaps. Moreover, unlike broad previous studies that did not examine context-specific challenges, it identified uniquely Nepali issues like scarce resources and time limits faced by educators, offering original localized insights. While echoing established literature recognizing literary analysis for improving higher-order thinking alike Marasini (2019), the mixed results provided a well-rounded analysis validating theory while also elucidating real practical constraints a valued contribution given the lack of prior

contextualized empirical understanding. Hence, the findings resonated key theoretical positions on literature's developmental role for language learners while differing through its applied research approach and illumination of on-ground implementation nuances in Nepal.

The study had some limitations that should be acknowledged, such as a small sample size of only 8 teachers from 4 schools, which restricts generalizability. Additionally, as a qualitative study relying solely on self-reported interview data without objective verification, responses could not be independently validated. The convenience sampling from a single municipality versus random selection also limits representing diverse contexts across Nepal. Moreover, excluding student and administrator perspectives leaves out valuable stakeholder viewpoints. The cross-sectional research design capturing a snapshot versus longitudinal exploration also constrains understanding changes over time. Known issues like self-reporting and social desirability biases with interviews were unaddressed as well. While providing initial understandings, these limitations related to the modest sample, lack of triangulation, selective sampling frame, omission of other stakeholders and cross-sectional design qualify conclusions and indicate avenues for improved methodological rigor in future explorations to develop more robust insights regarding this important topic.

The results have important theoretical implications, providing empirical support for conceptualizations of literature as an authentic resource that can foster communicative language teaching skills development, corroborating theories around its usage. The findings also validate schema theory by demonstrating how literary texts build cultural schema and intercultural understanding, an aspect previously underexplored. Additionally, results endorse transactional theory by illustrating literature promotes higher-order thinking by interpreting various sociocultural perspectives. Moreover, identifying contextual challenges offers framing that enhances sociocognitive theories examining external factors impacting skills enhancement using literature. Insights into holistic proficiency gains also align with skill-based language theories emphasizing literature's capacity. Furthermore, validating interactive learning through activities corroborates sociocultural perspectives on collaboration and meaning-making. Thus, the study offers empirical, cultural, and applied nuances enriching understanding within multiple theoretical frameworks analyzing this resource's potential and constraints, meaningfully furthering conceptualization of its role in diverse pedagogical environments

The results carry useful practical implications, such as providing insights that can guide the development of standards-based literature lesson plans and training programs for teachers to effectively employ interactive activities uncovered. Furthermore, understanding challenges indicates a need for adequate infrastructure support and resources for schools adopting literature-based pedagogy. The findings also validate

the literature's suitability for competency-based curriculum reform by authentically promoting multiskilling abilities. Additionally, the results support critically evaluating literary selections to ensure cultural relevance, learning objective alignment, and age-appropriateness. Highlighting multitudinous benefits provides the rationale for prioritizing literature's inclusion in education policies, funding initiatives, and professional development by stakeholders. Recognizing developed proficiencies also builds the case for assessing the literature's role in testing and evaluation. Finally, communicating these implications more widely helps actualize literature's full potential through refined implementation catered to Nepal's unique context, thereby strengthening applied literacy in meaningful and sustainable ways.

In conclusion, the key findings provide meaningful empirical support for leveraging literary texts in ELT within Nepal's educational context. Specifically, literature was shown to effectively develop diverse language and higher-order thinking skills when integrated into communicative activities, with teachers recognizing its cultural and cognitive benefits. However, resource shortages informing necessary support structures were uncovered. Significantly, the blended results validated theoretical frameworks while contextualizing real considerations, offering valuable contextualization. Coupled with practical implications like standards-aligned lesson planning and policy guidelines, the research confirms literature warrants enhanced inclusion into 21st century competency curricula given its rich, engaging ability to facilitate proficiency development. By addressing opportunities and challenges through an empirical investigation of literature's multilayered utility specifically for Nepal, this study fills important gaps and adds context-specific understanding.

Its conclusions underscore literature's elevated role through addressing both implementation and barriers as crucial for advancing literacy - a study significance that cannot be understated for meaningful development in the region. Based on the findings, recommended actions include developing standardized national literature curriculum guidelines and lessons aligned to learning outcomes and assessments to facilitate scalable implementation. It is also important to provide literature-based teaching training and resources through programs like in-service workshops, online modules, and mentoring to address the challenges uncovered. Additionally, funding school libraries and digital repositories for affordable access to suitable literary works reflective of diverse cultures would help. Advocating policymakers around integrating literature into high-stakes testing could further incentivize its regular use. Moreover, conducting large-scale mixed-methods studies across varied demographics and locales would help generalize benefits and uncover additional influencing factors. Encouraging collaboration between educators, authors, and experts to continually evaluate selections would also boost relevance and skills-focus. Leveraging community support through associations, institutions, and volunteer programs to provide supplemental resources

and activities like literature circles and competitions beyond the classroom could further enhance motivation and interactive learning. Comprehensive multi-pronged solutions addressing gaps through stakeholder involvement can strengthen literacy development in meaningful and sustained ways.

In conclusion, addressing the gaps identified through targeted, evidence-based interventions has the potential for a significant impact on literacy development in Nepal. While this study provides initial support for the literature's educational benefit, realizing its full promise demands addressing resource, implementation, and evaluation challenges hampering scalable progress. Standardizing guidelines, training programs, enhanced access to suitable works, and community involvement can help optimize literature pedagogy. Leveraging these strategies empowers educators and incentivizes lasting reform. Most importantly, recognizing literature's value through high-stakes assessment inclusion signifies its commitment to 21st-century proficiencies. With further rigorous investigation and multi-sector collaboration, literature is well-positioned to dramatically elevate literacy standards if its evidenced potential is effectively unlocked. Ultimately, prioritizing these solutions demonstrates the recognition that literacies must continually evolve to remain timely and transformational for all learners.

### **Conclusion**

This study explored the effectiveness of using literary texts in teaching English as a foreign language in Nepal. The findings revealed that literature is an invaluable resource that helps achieve the goals of communicative competence and critical thinking. It provides authentic contexts for learning language skills, aspects, and levels. Literature enhances learners' higher-order thinking skills and intercultural understanding. However, there are several challenges in implementing literature, such as lack of sufficient exposure, limited time and resources, the exam-oriented mentality of students, administrators, and parents, etc. To overcome these challenges, learners need more exposure to literary texts. Teachers require proper training for better pedagogical strategies. Curriculum and materials need to be developed. An integrated approach to curriculum and exams can foster a meaningful learning environment.

Collective efforts of teachers, administrators, students, and guardians are essential to maximizing the benefits of literature. Literature deserves a paramount place in EFL teaching for enhancing language proficiency and lifelong learning skills. Though the study was small scale, it provides insights into the situation of using literature for EFL teaching in Nepal.

Further research on a large scale is recommended to explore more advantages and challenges and suggest specific strategies for implementing literature. Stakeholders should work to bring literature to the core of EFL teaching thereby achieving the

vision of communicative competence, critical thinking, cultural awareness, and global citizenship. The study concludes that literature is an invaluable pedagogical tool if implemented effectively in the EFL classroom with a proper vision and collaborative effort. Its integration can enhance the language learning outcomes contributing to learners' holistic development.

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# Awareness of Breast Cancer among the Secondary Level Adolescent Girls Student in Kathmandu, Nepal

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## ABSTRACT

*The study entitled "Views on awareness of breast cancer among the secondary level adolescent girl" was based on descriptive research design and qualitative study with focus group discussion method. Only 8 adolescent girl students from grade XI and XII with in the Janamaitri Multiple Campus, Kathmandu were selected purposively for discussion. The student's views on awareness of breast cancer were analyzed thematically by FGD guidelines. It is found that the adolescent girls have positive knowledge and perception on breast cancer but diversity of knowledge of basic causes of breast cancer based on scientific as well myth. They had good knowledge on initial sign and symptoms on breast cancer but they do not have their own live experience about it. They were in the favors of breast self-examination practices but still ignorance in what, why and how it can be practices properly. They were not familiar on detection of sign and symptoms of breast cancer properly. Some have faced the live experience of breast cancer in their family members but they do not have their own live experience. They revealed that the proper health education and regular awareness program could prevent the secondary level adolescent girls from early breast cancer.*

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**Keywords:** Breast cancer, adolescent, awareness, perception, detection, prevention, breast self-examination

## Background of the Study

Breast cancer can be defined as a disease where a large number of cells grow inside the breast. It can be seen in different parts of breast but mostly in the ducts (Stephan, 2010). It is the widespread cancer in female both in the developed and developing world. The incidence of breast cancer can be seen increasingly in the developing world due to expansion of life expectancy, urbanization and using of western life styles (Singh, 1992). Although some risk reduction might be achieved with prevention these strategies cannot eliminate the majority of breast cancer that increases in the developing countries where breast cancer is diagnosed in very late stage of case with risk. So, early detection in order to improve breast cancer outcome and survival remains the cornerstone in breast cancer prevention (WHO, 2008).



Breast cancer is very much common among female population worldwide especially in the USA, China, Japan, Australia, India and some European countries. The breast cancer is still the most common cause of death among the women (Barnard, 2003). Breast cancer in female population has increased rapidly in the world. In 2008, WHO estimated 182,400 new cases of invasive breast are expected to be diagnosed along with 67,770 new cases of non-invasive breast cancer about 40,480 female are expected to die from breast cancer. The death rates of women are higher than any other cancer besides lung cancer in the USA. Breast cancer can be diagnosed easily than skin cancer among the females (American Cancer Society, 2008).

The recommended early detection strategies for developing countries are awareness of early signs and symptoms and screening by Clinical Examination in demonstration areas (WHO, 2008). Mammography screening is expensive and it is recommended for those countries with well health policies that can afford a long term program. Many developing countries that faces the double burden of cervical and breast cancer need to implement combined cost effective and affordable interventions to tackle these high preventable diseases (Anderson, 2008). Young female's cancers are generally more aggressive and results in lower survival rates. Making early diagnosis, treatment, prevention of diseases and promotion of self-care attitude fostered early in life, may pay lifelong dividends (Rosenberg, 2003). The adolescent period is the time of rapid change that provides teaching opportunities for shaping health behaviors into adulthood. For example, teaching breast self-care may encourage positive behaviors such as performing breast self-examination and seeking regular professional breast examination (Ludwick and Gaczkowshis, 2008).

Health behaviors can help empower females to take some strong responsibility over their health promotion. For younger females, education and awareness to gate way to health promotion behaviors which set the stage for adherence to clinical breast examination and mammography screening properly later in different stages of life (Rosenberg and levy-Schwartz 2003).

Breast cancer is a process of uncontrolled growth of abnormal cell that can develop in one of several areas of the breast and the ducts that carry milk to the nipple, the small sacs that produce milk (lobules) and the glandular tissue (Singh, 1992). Breast cancer is the most common cancer in female population. There are two types of breast cancer can be seen among the women such as ductal and lobular carcinoma. Breast carcinoma may be invasive and non-invasive. They have four stages-I, II, III and IV (Stephan, 2010).

Breast cancer is very common among the women in all over the world. It is assumed that 519000 females died in 2004 due to breast cancer so, breast cancer is thought to be disease of the world, a majority (69 percent) of all breast cancer death



occurs in developing countries. Breast cancer in female population has increased rapidly (WHO, 2008). Incidence rates vary greatly with age standardized rates as high as 99.4 per 100,000 in Eastern Europe, South Africa, North America, South America and Western Asia have moderate incidence rates but these are increasing. The lowest incidence rates are found in most African countries but with increasing breast cancer incidence rates (Barnard, 2003).

Nepal is one of the developing countries with specific geographical features. It is divided Mountain, Hills and Terai. In spite of having most of the health services facilities, accessibility is the major difficulty because of communication, transportation and other problems (Singh, 1992). Nepal has population of 29164578 comprise of different races and tribes, living in different geographical areas (CBS, 2021). Nepal Government is still developing the policies and programs in controlling the prevalent infectious disease, but giving less priority to the breast cancer. Nepal Cancer Relief Society (NCRS) predicted rough incidence i.e. about 40000 to 50000 people suffer from malignant diseases and the incidence is rising every year (Nepal Cancer Relief Society, 2005). Increasing number of cases of malignant diseases is coming to the hospital rather than in earlier stages because of lack of self-awareness about the early detection of the breast cancer (NCRF, 2009). The exact number of cancer cases couldn't be estimated with certainty due to the absence of proper center registry in hospital.

Nepal is a multi lingual, ethnic and cultural country with diverse environment condition (CBS, 2011). Nepal government is working with various socio-economic and health programs to control infectious diseases in the country. In Nepal the impact on the diagnosis, treatment and prognosis of breast cancer includes the low women empowerment, role of females, education and lack of cancer screening and prevention program (Singh, 1992). The exact number of breast cancer cases could not be estimated with certainty due to the absence of proper records in the hospital. Nepal cancer Relief society estimated rough incidence i.e. about 50 to 60 thousand people are suffering from malignant diseases with prevalence of 2.3 to 2.8 per 100,000 populations (Nepal cancer Relief Society, 2005).

### **Statement of the Problems**

Young female are in high risk of breast cancer with lower survival ratio in all over the world (WHO, 2008). The adolescence period of female is the time of rapid change and growth physically and emotionally as well (Hurlock, 1998). The adolescents need to get opportunities to learn about their health and wellbeing properly in the period of secondary level education. The secondary level education is the foundation of knowledge about the adolescent period, health status, personal health behavior, sanitation and hygiene practices, health awareness and the practices of wellbeing among girls student.

If they do not get chance of learning opportunities for shaping health behaviors into adulthood, that may harm their adulthood life, maternal health life and elderly life too (Sherchan & Upreti, 2018). The breast cancer can analyze as a burning health issue among the younger women in the world.

Younger female's cancers are generally more aggressive and result in lower survival rate. The adolescence period is the time of stress and storms. If adolescents don't get chance of learning opportunities for shaping health behaviors into adulthood, that may harm their adulthood life and there is a big problem of early detection, diagnosis, prevention, treatment and rehabilitation of breast cancer (Ludwick, 2001). The higher secondary level of education is foundation of academic career. If they don't get chance of learning opportunities about breast cancer awareness in this stage, they may be in high risks of their breast cancer related issues in future life. So, this study intends to find out the solution of some research questions such as; What is the existing knowledge on breast cancer related health issues among the adolescent girls student? What are their views on breast cancer as burning health issues among the younger women? How they practiced to detect the signs and symptoms of breast cancer earlier?

### **Objective of the Study**

The main objective of this study was to analyze the views on awareness of breast cancer among the adolescent girls student of secondary levels in Kathmandu, Nepal.

### **Research Methodology**

The study was completely based on descriptive research design with qualitative in nature. The secondary level adolescent girls student were the population of the study. Due to limited resources, time and budget, only Janamaitri Multiple Campus Kuleswar, Kathmandu has selected conveniently for study due to researcher's own teaching campus for secondary level students. In this study, information were collected through conducting of focus group discussion (FGD) during researcher's regular classes. The researcher has selected only 8 adolescent girls student including of 4 girls student from class XI and 4 girls student from class XII as samples by using purposive sampling method with the criteria of their smartness, frankly speakers, talented in the subject matters, fearless, honest & sincere in nature and regular in classes. The selected sample girls student were isolated from the class and placed on the meeting hall of Research Management Cell (RMC) with in the Campus premises and well informed about the research process and discussion. Only one session of discussion was conducted. The FGD guideline was developed by the researcher itself to include various themes as per need of the objective and research questions. Generally, the perception, causes, signs & symptoms, breast self-examination, early detection, diagnosis, prevention, health care management and role of education were the basic themes of breast cancer

awareness were applied in FGD guidelines. The views on awareness of breast cancer by the adolescent girl students were collected in normal Nepali language and then rechecked the views, translated all in English language, verified the themes, analyzed and interpreted the themes manually to draw the conclusion.

### Results and Discussion

In this section, the researcher has tried to analyze the data qualitatively collected from the focus group discussion (FGD). The views on Self-awareness of Breast Cancer among the Adolescents Girl Students were analyzed by using various themes regarding of Breast Cancer.

**Perception:** It refers to personal views or ideas on the concerned subject matters (Kothari, 2007). The participants were discussed on the personal perception regarding of breast cancer. The secondary level girl students had expressed their views and ideas in the following ways.

*“At first, I have studied the concept of breast cancer in my text books during the regular class of community health and diseases topics and I thought it is a non-communicable and curable disease”* (Participant-1: FGD).

*“At first, I got the ideas on breast cancer from my own family when my grandmother was suffering from this disease and health problems when she was hospitalized and dislocated of her left breast by the doctors then I thought it is curable and now my grandmother is all right and under regular medical observation”* (Participant-2: FGD).

*“At first, I got the detail ideas on breast cancer from a Television Talk Show Program by the Doctors. They said it is a widespread women health problem and it can be seen all over the world. It is a non-communicable, genetic at somehow, irregular breastfeeding to the infants and curable disease if timely diagnosed”* (Participant-3: FGD).

*“At first, I got the detail ideas on breast cancer from my relatives and mother during their intense conversation on breast cancer. I thought it is a dangerous disease and the woman can check own self it by regular touching their breasts if there is any hardness or inner pain”* (Participant-4: FGD).

The above ideas, views and results as perception on breast cancer among the secondary level adolescent girls present positive knowledge and perception at somehow. Various researches and information stated the same or similar in the concerned. The medical sciences text books, community health text books, public health text books and other non-communicable diseases based reference books revealed the same or similar.

**Basic Causes of Breast cancer:** It refers to the origin or the reason of any problems. Health is a dynamic state (WHO, 1948) and it can be occurred by different physical, mental and environmental causes in human body. The participants involved in FGD had several ideas and views on the basic causes of breast cancer.

*“The mothers do not breast feed her new born baby properly, they are in more risk of breast cancer specially the mothers do not release the colostrum milk properly they are in more risk of breast cancer”* (Participant-1: FGD).

*“I think the male sexual partner who played more with the female sexual partner’s breasts during sexual activities is the main cause of breast cancer later”* (Participant-2: FGD).

*“I think the excess use of tobacco, alcohol and drugs during pregnancy and lactating period may be the main cause of breast cancer among the women and the mothers”* (Participant-3: FGD).

*“I have heard with my mother and grandmother that breast cancer can be transferred from one generation to another generation by genetic cause. Because my grandmother is still suffering from breast cancer and my mother is very much worried with it”* (Participant-4: FGD).

*“I think wearing of tight bra by the women may be the main cause of breast cancer. The women often wear the tight bra to keep her breast strong in all ages that may be the main cause of breast cancer. Our mothers and we are more in risk rather than our grandmothers because we use tight bra but our grandmothers did not use the bra to cover their breast tightly”* (Participant-5: FGD).

*“Our physic, food behavior, environmental effects may be the main cause of breast cancer. The unhygienic food, street food and junk foods may create the breast cancer similarly, over hot and cold climate is also the causes”* (Participant-6: FGD).

*“I had heard that there are so many dead cells and harmful cells are deposited inside of our breasts and develop the tumor that causes the breast cancer”* (Participant-7: FGD).

*“I had heard the conversation of our grandparents that it is the result of our bad works of our past life and the god punishes us by such types of critical health problems”* (Participant-8: FGD).

The above ideas, views, concept and results as basic causes on breast cancer among the secondary level adolescent girls seem diversity. Some of the causes are tested, scientific and verified while some are based on myth, misconception and ritual. Various researches, medical sciences text books, community health text books, public

health text books and other non-communicable diseases based reference books revealed the same or similar but some ideas was based on misconception. So, proper education, information and communication are needed in this concerned.

**Early Sign& symptoms:** It refers to the initially observed situation of any diseases or health problems in our body. Gradually we feel some abnormal and unnatural condition or changes in our body due to unhealthy behaviour. The sign and symptoms of breast cancer can vary from women to women due to their physic. The participants stated following ideas on breast cancer.

*“I have studied that the shape, size and colors of breasts are changed due to breast cancer”* (Participant-1: FGD).

*“At first, the nipples are swelled and bad smell comes due to the breast cancer”* (Participant-2: FGD).

*“Initially the breast seems harder than other times and rashes come out”* (Participant-3: FGD).

*“Some women do not feel any sign and symptoms initially but gradually they feel pain inside and outside of whole breast and nipple as well”* (Participant-4: FGD).

The above ideas, views, concept and results as initial sign and symptoms on breast cancer among the secondary level adolescent girls present theoretical knowledge and perception at somehow. They do not have their own live experience about it. Various researches and information stated the same or similar in the concerned. The medical sciences text books, Doctor’s observation, clinical features, community health text books, public health text books and other non-communicable diseases based reference books revealed the same or similar.

**Breast self-examination:** It’s the first technique of awareness on breast cancer. Generally the medical practitioners suggest all the women about the self-examination of breast and it helps the women to find out the early problems. The women can use the mirror and observe individually the size, shape, colour, disorder, swelling, rashes, water, milky or blood fluid from nipple etc. Similarly the women can practice of soft and smooth touch, press and circular motion with the fingers to cover entire breasts from top to bottom and side to side to detect uneven tissues, lumps, spots, pains and abnormal changes in breasts. Following ideas are stated the participants on breast self-examination.

*“I use this practice regularly and I have learnt it from my mother, she always forced me to do this practice because her mother (my grand-mother) is already suffering from this problem”* (Participant-1: FGD).

*“No, I do not do this, I do not think that I have such types of problems ever”* (Participant-2: FGD).

*“Initially, I had this practice but now I feel boring to do this regularly”* (Participant-3: FGD).

*“Initially, I felt shy to do this in front of mirror and now I am feeling well to do this practice as life style and precaution”* (Participant-4: FGD).

*“Well I am hearing this at first time and I do not have any ideas of breast self-examination practices. Can anybody give me the ideas of this practice properly?”* (Participant-5: FGD).

*“Who will provide us the techniques of breast self-examination? Our health education curriculum does not support us to do it properly”* (Participant-4: FGD).

*“How we can follow this practice regularly? Who will provide us the knowledge and ideas for appropriate practices? We need the help from you”* (Participant-6: FGD).

*“Sometimes I use this practice but I cannot detect the problems, it means I do not have any problems or I am not able detect it properly”* (Participant-7: FGD).

*“I feel I have some problems in my breast, the sizes of my breasts are not equal and I have an excessive pain during my menstrual periods and some watery liquid came out from my nipple, please suggest me for solution, I am scared what to do and where to go for solution”* (Participant-4: FGD).

The above ideas, views, concept and results are obvious among the adolescent girls but they need to understand properly about breast self-examination practice. While some are practicing but not properly, some are ignoring the practices and some have not ideas on what to do? How it can be practices properly? The secondary level adolescent girls present theoretical knowledge and perception at somehow. Various researches and information stated the same or similar in the concerned. The medical sciences text books, Doctor’s observation, clinical features, community health text books, public health text books and other non-communicable diseases based reference books revealed the same or similar.

**Early detection:** It refers to observed sign and symptoms of any health problems. Breast cancer has some certain sign and symptoms. It can be detected by medical personals or subjects own self at home. If the sign and symptoms are detected early, the chances for treatment and survival are may be better. The participants on early detection state following ideas.



*“I have the ideas of early detection techniques and I use it by myself regularly at my home” (Participant-1: FGD).*

*“I practice the breast examination by myself but could not detect any problems yet” (Participant-2: FGD).*

*“Last year I found some problems in my breast and conveyed to my mother about the problems and then my sent me to the hospital for that, I felt shy to show it and to say it with doctor, but by god grace not any signs were detected as breast cancer” (Participant-3: FGD).*

*“We do not detect any sign and symptoms initially but internally the breast cancer can be occurred” (Participant-4: FGD).*

The above ideas, views, concept and results as initial detection of sign and symptoms on breast cancer among the secondary level adolescent girls present theoretical knowledge and perception at somehow. They do not have their own live experience about it. Various researches and information stated the same or similar in the concerned. They must follow the self –examination practice to detect the problems initially for better treatment.

**Diagnosis:** It refers to medical or clinical techniques to find out the health problems or diseases. The patients visit to the doctors or hospital with various health disorders, Doctors examine clinically and diagnosis the problems scientifically. In the breast cancer problems, the doctors suggest some clinical test, screening test and Mammograms. Following ideas are stated the participants on diagnosis of breast cancer during discussion.

*“The doctors will diagnosis the problems when we will visit to the doctors” (Participant-1: FGD).*

*“At first, we visit to the doctors with our health problems and the doctors diagnosis the problems with the help of clinical test or self-experience” (Participant-2: FGD).*

*“I went to doctor’s clinic to show my breast problems with my mother and the doctor suggested me for video x-ray and some bio-chemical test for diagnosis” (Participant-3: FGD).*

*“We have not visited yet to the doctors for test of breast health problems” (Participant-4: FGD).*

The above ideas, views, concept and results on diagnosis of breast cancer problems among the adolescent girls were obvious at somehow but the diagnosis is the scientific process of identifying the health problems.

**Prevention:** It refers to early protection of expected health problems before its occurrence. The famous philosophy in health sciences “Prevention is better than the cure” is the universal truth. Everybody should follow the preventive measures of health behaviour. The breast cancer problems also follow the same rules such as healthy and nutritious food behaviour, sanitation and hygiene, regular exercises, regular medical check-up, breast self-examination, avoid smoking and alcohol, proper lactation to child etc. Following ideas are stated the participants on prevention of breast cancer during discussion.

*“We use regular food items and materials as available in our home but do not have any basic ideas for prescribed food items to prevent us from breast cancer”* (Participant-1: FGD).

*“I use more green vegetables, fresh fruits and milk to prevent from infectious diseases and breast cancer as well”* (Participant-2: FGD).

*“I go for walk daily in the morning and do some physical exercises to protect my health but I do not have any ideas to prevent breast cancer with specific exercises”* (Participant-3: FGD).

*“Sometimes I use cigarette and alcohol occasionally, is it harmful for my breast related health issues?”* (Participant-4: FGD)

*“Sometimes specially in bathing times I apply my fingers on the breasts to massage softly to keep my breast healthy”* (Participant-5: FGD).

The above ideas, views, concept and results on preventive measures of breast cancer among the secondary level adolescent girls present theoretical and practical knowledge and perception at somehow. The medical sciences text books, community health text books, public health text books and other reference books revealed the same or similar as preventive measures of health and diseases.

**Health care management:** It is the process of protection of health status from different environmental agents, life style and healthy behaviour. Generally, the people are itself responsible for proper health or weak health status. The proper care and manage of our health properly can protect from different health problems for a long periods. The participants on health care management state following ideas.

*“I use healthy food item as available at my home to care my breast health”* (Participant-1: FGD).

*“I go for regular health check-up, if I feel any disorders in my breast health”* (Participant-2: FGD).



*“I follow the proper breast health care management rules such as self-examination, exercise, massage etc.”* (Participant-3: FGD)

*“I do not have any ideas that how to care and manage my breasts and keep my breasts far from diseases or cancer”* (Participant-4: FGD).

The above ideas, views, concept and results on care and management of breast cancer among the secondary level adolescent girls present theoretical and practical knowledge and perception at somehow. The medical sciences text books, community health text books, public health text books and other reference books revealed the same or similar as care management of breast health and diseases.

**Live experience (self or family members):** The subjects with problems of breast cancer can be seen everywhere. Most of the cases can be seen in the urban areas while they are living with high sound medical facilities. But their life style, culture, modernization, less lactating mothers, less active life, high fast and junk food practices and high consumption of alcohol and tobacco are may be the main causes of breast cancer. Following ideas are stated the participants on live experience of breast cancer during discussion.

*“My grad mother is also suffering from breast cancer I cannot see her pain and stress and I always cry to see her with pain and pray with god for relief and cure”* (Participant-1: FGD).

*“My relative has the problem of breast cancer and she always go for cameo therapy and the doctors have suggested for surgery and dislocate the breast”* (Participant-2: FGD).

*“We do not have any live experience of breast cancer related issues but we have seen the women with breast cancer in the hospitals”* (Participant-3: FGD).

The above ideas, views, concept and results on live experience of breast cancer among the secondary level adolescent girls present theoretical and observational knowledge and perception at somehow. They do not have their own live experience about it. Various researches and information stated the same or similar in the concerned. The medical sciences and Doctor’s observation revealed the same or similar.

**Role of education in awareness:** Education is the main way of awareness in every aspects of life. It plays significant role in development. Most of the school students get information and awareness from the courses and the curriculum during teaching learning activities. Similarly, the students get more information on the health awareness as well as the breast cancer awareness through education in their early ages

and educational periods. Following ideas are stated the participants in role of education on breast cancer awareness during discussion.

*“I have studied that the breast cancer is a common disease among the mothers in different ages and it can be cured”* (Participant-1: FGD).

*“Our teacher said that we should be careful on our personal hygiene and sanitation during menstrual periods”* (Participant-2: FGD).

*“I have learnt that we can examine our breasts in terms of size, shape, color, rashes, spots, lumps and fluids as normal and abnormal conditions”* (Participant-3: FGD).

*“We should follow the rules of prevention of every health aspects mentioned in our text books and probably we have tried except few cases”* (Participant-4: FGD).

*“Our health education teachers always encourage us about health safety & care and suggest us that we should go to the doctors if we feel health uncomfortable in any time”* (Participant-5: FGD).

The above ideas, views, concept and results on the role of education in awareness of breast cancer among the secondary level adolescent girls present theoretical knowledge and perception at somehow. Various researches and information stated the education is the power of knowledge. Different text books, courses, curriculum, community health text books, public health text books, other diseases based reference books and teacher’s advice also play significant role in basic awareness.

### **Conclusion**

As conclusion of the study, the secondary level adolescent girls have good knowledge and perception on breast cancer. Their concepts on basic causes of breast cancer seem diversity. Some of the causes are tested, scientific and verified while some are based on myth, misconception and ritual. They had good knowledge on initial sign and symptoms on breast cancer but they do not have their own live experience about it. They have good theoretical knowledge on breast self-examination practices but they need to understand properly about breast self-examination practice. While some are practicing but not properly, some are ignoring the practices and some have not ideas on what, why and how it can be practices properly. The views on initial detection of sign and symptoms seem low because they do not have their own live experience about it. They are still ready to prevent the breast cancer through awareness. They can care and manage of breast cancer properly by the knowledge and awareness. Few have faced the live experience of breast cancer in their family but they do not have their own live experience during the study. They revealed that the education play significant role in

awareness of breast cancer. In short, proper health education and regular awareness program is must to prevent the secondary level adolescent girls from early breast cancer.

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# Reciprocal Learning Mathematics through Honeycomb Patterns

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## ABSTRACT

*The purpose of this paper is to examine the mathematical ideas, problems, and solutions from the honeycomb patterns. This is a qualitative research design under an interpretive paradigm. I used interview, participant observation, small group discussions, photos, notes taken, and personal reflection for the data collection tools. The information was analyzed by participants generated text, activities, and experience of learning mathematics through the honeycomb patterns. The major themes that generated were algebra and students knowing of in-depth processes and solutions; algebraic and geometrical interpretation of 2D shapes with formulas; and geometrical knowledge of honeycomb patterns. The study showed that honeycomb patterns are the source for reciprocal learning of multidimensional area contents like algebra (quadratic and arithmetic sequence, hexagonal congruent tessellation, and geometry parallel lines, angles, and similar and congruent shapes together). What the students and the teachers need in reciprocal learning is the skill of observing patterns, redrawing, imagining, estimating, and logically intervening and shearing in them. The findings of the study can be helpful to teachers, students, and educators for reciprocal ways of learning, teaching, and training mathematics, connecting such patterns interestingly and meaningfully.*

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**Keywords:** School Mathematics, Learning, Honeycomb Patterns

## Introduction

Johnson et al. (2020); Pradhan (2017); and Rosa & Orey (2011) have focused on learning school mathematics linked with students' lives and their real-world experiences, like bee comb patterns, which triggered us in the direction of transformative pedagogies. The first attraction to our eyes was how beehive patterns can be applied by students and trainee teachers to learn and teach algebra and geometry. How do students and trainee teachers link various areas of mathematics concepts to the patterns made by honeybees when building their houses? How can students and trainee teachers generate local knowledge into global knowledge with proper understanding, thinking, and communicating mathematically on honeycomb patterns with reasoning in a creative way? The articles (for example, Acharya

et al., 2021; D'Ambrosio, 2006) also reminded us that his kind of pedagogy practice and teacher training have played an important role in student-centered learning, where students engage and observe themselves to learn new approaches and techniques. For this, a teacher is also a key person, and she/he should be able to support students and provide a meaningful way of learning to build the various skills to solve problems, generate big ideas, and connect individual ideas (Mawadah, 2015).

Many people have said that mathematics is abstract, it's difficult to study, and they think and believe it to be a hard subject (Lamichhane & Belbase, 2017). However, kinds of literature on ethnomathematics (for example, Mauluah & Marsigit, 2019; Parajuli & Koirala, 2022; Rosa & Orey, 2015; Rosa & Orey, 2018; Tarman, 2016) advocate that if mathematics teaching and learning are practiced linked with students' real-life activities, it will be a great response to so-called difficult mathematics and the resource for innovating mathematics learning as the complete package against spoon feeding (Chahine, 2021; D'Ambrosio, 2020). But by observing the practices, experiences, classroom and training activities, and classroom presentations of students, many questions aroused in our minds. Various literates on ethnomathematics have claimed that teachers can teach and students can learn mathematics easily by linking it with the contexts and nature in which they are already familiar with and have experienced in their life. Other pieces of Nepali and abroad pieces of literature (Pradhan, 2021; Pradhan et. al.; Sharma & Sharma, 2021; Widodo, 2019) say that against teacher-cantered pedagogies, students learn mathematics long-term in meaningful understanding by engaging themselves in nature under teachers' guidelines through an ethnomathematics perspective.

The various geometrical shapes, their properties, the quadratic sequence patterns, arithmetic patterns, algebra formulae geometrical exploration, and many more parallel lines can be learned by doing through observing honeycomb patterns as an example but such teachers training and students classroom practices making differences in the real-world problems with the process of solving them self hardly be seen in the context of Nepalese classroom practices. Learning by doing mathematics linked with honeycomb patterns and activities is very rare in the context of Nepal. So what mathematics content can students and trainee teachers learn by embedding honey bees' hexagonal patterns? How do students and trainee teachers explore their experiences and views in the process of learning various areas of mathematics linked to honeycomb patterns? We were very interested in researching that area.

This study aims to explore the answer to the research questions, such as: a) What mathematics contents can trainee teachers and ninth-grade students learn by using honey bee's hexagonal patterns? b) How do ninth-grade students and trainee teachers explore their experiences and views in the process of learning mathematics (algebra, geometry, and mensuration) through honeycomb patterns in the context of Nepal?

## Research Paradigm, Methodology, and Methods

Literature has suggested that quality qualitative research attends to a research paradigm, methodology, and methods (data collection and data analysis procedures) and should demonstrate internal consistency between them (Mukhles and Al-Ababneh, 2020; Saunders et al., 2009; Zaidi & Larsen, 2018). Therefore, in this paper, we have used an interpretive research paradigm under relativist ontology, subjective epistemology, and naturalist methodological procedures. This paradigm helps us to understand and capture our trainee teachers and students' subjective and multiple worldviews, thoughts, realities, and experiences in depth on how they learn and respond to mathematics (Chowdhury, 2014; Kelliher, 2011) through honeycomb patterns. It helps us to evolve and continue to observe their activities very closely, time and again, for the collection of sources of knowledge rather than rigid frameworks (Mukhles & Al-Ababneh, 2020; Zaidi & Larsen, 2018). The ontological stance of this study was that student participants constructed mathematical knowledge from various perspectives. They also interpret and make meaning in an inter-subjective way (Clark et al., 2022), exploring various ways of thinking about honeycomb structures by drawing diagrams and writing the steps of solutions.

Similarly, research methodology is the strategy, plan of action, process, or design and use of particular methods, linking the choice of methods to the desired outcomes (Crotty, 1998, p. 77). For this, we have used a qualitative research design to generate valid and scientific knowledge from the field (Korstjens & Moser, 2018). The research participants were the public school teachers in Pokhara Metropolitan City who are teaching in the basic label and ninth-grade students' who studied in private school and who can link mathematics with honeycomb creatively. Therefore, the reality is that how students and trainee teachers have experienced learning mathematics interaction among friends and teachers is linked with such patterns (Zaidi & Larsen, 2018). Therefore, this methodology allowed us to capture participants' individual and group experiences and world views on learning mathematical activities connecting honeycombs in the inductive process of knowing (Tomaszewski et al., 2020; Hartas, 2010; Willig & Rogers, Eds., 2017).

## Research Method

Research method is the technique or procedure of data collection that is used to gather information related to research questions and analyse the data opined by Al-Ababneh (2020; Johnson et al., 2020). Therefore, as the choice of research method, we used qualitative research for the collection and thematic analysis of the field data. To capture the multi-dimensional realities, it was necessary to choose the appropriate research sites, areas, schools, and potential research participants. We conducted the research with four students in grade nine of the academic year 2022 at the private



school. Similarly, four teachers among the 45 who participated in the capacity-building training for basic-level teachers conducted by Pokhara Metropolitan City were also consulted for their observation. The result of the project work with the 9th graders was also incorporated into it.

### **Tools and Procedure of Data Collection**

We used multiple sources for data generation (Denzin & Lincoln, 2011; Denzin & Lincoln, 2005). We also followed Fox, and Alldred (2023) for selecting an appropriate method and sources of relevant data and did data analysis accordingly. As they suggested, we adopted multiple data sources during the field visit such as interviews, participant observation, individual and group discussion, and informal conversation. We collected photos of the mathematics-generated text on the honeycomb. At times, we were careful and engaged them to capture the participants' realities on the issue (Forsey, 2010). We also took key points in the diary after observing their activities. In other words, these tools were administered carefully exploring the issues associated with the research topic and ideas collection (Al-Ababneh, 2020). We also participated and observed students' activities time and again very closely and how they explored, wrote, and presented the solutions sequentially in different rounds. We also built trust on collected information from individuals in a group. We took field notes and reflective notes as well. Besides, we accessed these students for the maximum time and frequently shared my ideas with them through face-to-face and digital communication. We used participants' observation, informal conversation, and observation of students 'and trainee teachers' activities and their generated text and diagrams on honeycomb patterns. It has brought the students 'and trainee teachers' experiences in learning mathematics through honeycomb (Korstjens & Moser, 2022; Saunder et al., 2009). As a qualitative researcher, we observed very closely and continuously how the students and trainee teachers learned mathematics through the honeycomb. As proposed by (Moser & Korstjens, 2018). We frequently engaged with my students and trainee teachers in a three-day training program in my role as a facilitator. We took photos of their activities as well.

### **Data Analysis**

As opined by Braun et al. (2016), thematic analysis for qualitative research identifies organizing large data and patterns ('themes') in a dataset and describing and interpreting the meaning. In the process of analyzing the field data, facts, figures, and diagrams produced by mathematics were cleaned up, reduced, sorted, coded, and processed to provide usable information. Additionally, we interpreted the data as qualitative research demands, developing the themes as we went along (Korstjens & Moser, 2022). In this study, we followed the six-phase model of thematic analysis suggested by Korstjens & Moser (2022). These are transcribing, familiarization of the contents of the field by reading and re-reading all data items, making notes, coding (theme development, revision, and naming as the core analytic work), organizing and

categorizing codes, coding data, reviewing and revising those candidate themes, and developing a rich analysis of the data and making finalized themes and writing up.

Each research participant's experience was transcribed and coded with more attention to constructing meaningful categories for learning mathematics by linking honeycombs. The coding of the transcribed data was focused on the final grouping of the codes and categories by merging similar categories into a broader, overarching final theme. Thus, we produced thick, evocative descriptions of personal and interpersonal experiences. Individual reflection is required for data analysis since it requires an awareness of the researcher's contribution to the formation of meaning throughout the research process (Johnson et al., 2020). Therefore, we reflected on our teaching, training, learning, and research experiences, beliefs, and knowledge of contextual activities. We were aware that our interpretation might contribute to this process of exploration of participants' meaning while constructing mathematical knowledge. In this manner, the connection between different areas of mathematical knowledge using nature honeycomb patterns was generated by analysing and interpreting individual students' drawn diagrams, working practices, written text in papers, and their views regarding the issue. While interpreting the data, we considered that there were multiple truths about social realities based on the participants' opinions.

### **Results and Discussion**

Honeycomb patterns that the students and trainee teachers observed and indicated the algebra, translation, symmetry, geometry parallel lines, and similar and congruent concepts of various areas of mathematics. Varghese & McCusker (2006) have suggested that they noted the support for learning and teaching mathematics based on local knowledge.

From it, students developed creative thinking skills, developing questions, communicating skills, and reasoning skills. Through social constructivist perspectives like group interaction, coordination, presentation, and sharing, collaborate for the construction of knowledge as an active learner by learning and doing. Then they figured out various areas of mathematics in the honeycomb. Such activities helped students to promote an environment where mathematics is applied in their career and life rather than just solving problems in books (Honegger, 2020). The ethnomathematics researchers (for example, Arisetyawan et al., 2014; D'Ambrosio, 2012; Mesquita et al., 2012; Rosa et al., 2016) revealed that learning this way, students did not only learn mathematics; they also learned various life skills that show the symbol of academic success (Honegger, 2020). In this light, we have presented below the original bee hive as seen in Fig. 1.





*Figure 1 : Honeycomb Patterns and Communities Activities*

### **Honeycomb Patterns and Students' Mathematical Learning**

Algebra is the generalization of arithmetic. In some cases, algebra can be shown through geometrical interpretation. Beehive is a geometrical shape with wonderful hexagonal patterns. However, we practice very little link with contextual activities. But some of the girl students noted algebra in the beehive patterns and learned to make questions with solutions in detail. The informants have generated algebra, some from banana leaf, some from kitchen arrangements of glasses, some from bamboo handicrafts, and some from honeycomb patterns.



*Figure 2 : Activity Based Learning Mathematics in Holistic Approach Through Honeycomb Patterns*

One of the girls, Sarita Sharma, in class nine, has done total mathematical activities like algebra, arithmetic, and geometry on honeycomb patterns. She generated a quadratic sequence, a sequence of terms using hexagonal patterns, its general terms and process of generating patterns, and a geometrical interpretation of the algebraic formula, which can be seen in figures 2, 3, and 4. However, two girls, Samjhauta and Sarita, and some boys found different congruent hexagonal patterns in triangular and rectangular shapes. They took out the portion with triangular shapes. Figs. 3 and 4 were drawn figures and field text that were generated. Boys informants made congruent hexagonal patterns of holes in a honeycomb. However, girl informants learned and redrew by cutting the small portions and rearranging them in sequential patterns. They also claimed the quadratic sequence formed by hexagonal patterns in Pascal's triangular shapes formed by holes is 1, 3, 6, 10, 13,... with a detailed process with the first term (a) = 1 and the second common difference (d) = 1, which can be seen in detail in Fig. 3 and Fig. 4.

### Quadratic Sequence with Solutions on Successive Hexagonal Patterns of Honeycomb

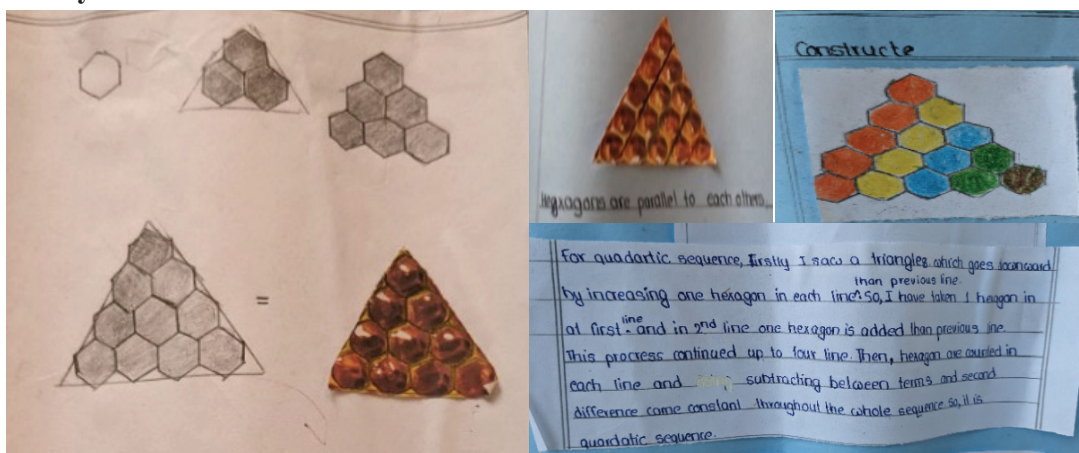


Figure 3 : Text Generated by Sarita, 9<sup>th</sup> February 2023.

The girl students Sarita and Samjhauta argued that “we did not only see the quadratic sequence in patterns; we also brought the overall process and the steps of the solution with the process.” When we observed their generated text, Sarita constructed the patterns of sequence, formed the triangular shapes, and found the quadratic sequence of regular hexagonal as 1, 3, 6, 10, and 15 with the second common difference of 1". In the same way, Samjhauta reflected on the overall process, presented steps, and derived its general term on the whiteboard through discussion with her group and classroom (see Fig. 4).

### Quadratic Sequence on Honeycomb Patterns

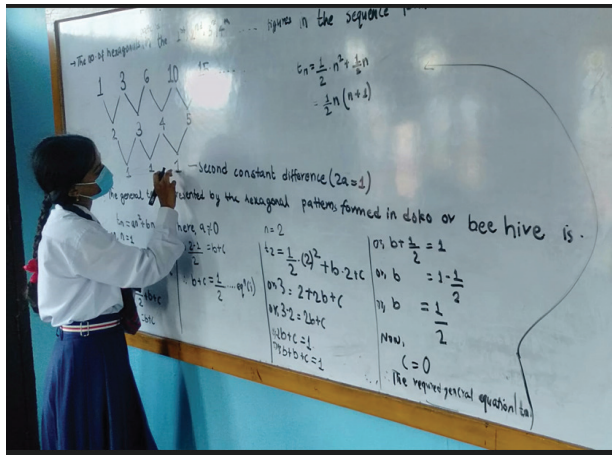


Figure 4 : Text Generated by Samjhauta, 12<sup>th</sup> February 2023.

We analysed all the writing texts of the students on the white board and charts of the students. From the analysis of their writing and drawing patterns, we came to know that they drew the patterns of diagrams of regular hexagons, wrote the sequence in specific orders, took the difference, and found the first difference and second constant difference,  $2a = 1$ . They also expressed the detailed process and got its general terms on a chart and whiteboard, as well as any number of terms, by using the following process: We knew from their written text that they let  $a =$  second common difference  $= 1$ , and they had written its general term  $(t_n) = an + b \dots\dots\dots(i)$ . Such activities go on from time to time, often in pairs or small groups. We noticed that the participants practiced, interacted, and perceived shared ideas in a small group for the construction of knowledge, listed and interpreted as presented above.

In this light, the above patterns, and below text are the reconstruction of the first Sarita and second detail process for a general term by Samjhauta of class 9 of a private school in sequence and series. They said:

*There are many congruent regular hexagonal patterns made by the bee in the beehive. They reconstructed using their patterns. After the reconstruction of the figure, they saw the different parallel and vertical sequences and series patterns of congruent hexagonal. They found the general term below. Apart from Sarita, Samjhauta also made the sigma notation. This notation can be connected with the figures of geometry, arithmetic, and algebra as well (Reading the text of Sarita, 11th February 2023).*

We tried to compare and contrast the participants' ways of conceiving and producing mathematics. As we found, Sarita has seen complex and abstract mathematical patterns generated in 'Honeycomb patterns', but Samjhauta (see Fig. 4) wrote an in-depth process step by step, making the sequence of hexagons sequentially in horizontal order. She also took the first and second differences. From the observation of several regular hexagonal pattern sequences that were generated by Sarita and Samjhauta, the process of knowing and generating information about sequences and series. They gave detailed patterns, problems, and solutions of combined proving questions of sequence with the patterns below:

- Search any number of sequence patterns and be confirmed that hold arithmetic/ quadratic/ geometric/ any and construct any one in your copy and the beehive.
- Add one more similar pattern either in your copy or in the original shape of honey comb
- Construct the number of sequences that were constructed by honey to make its house stay in each pattern.
- Decide by mental test whether it is holding arithmetic sequence or geometry sequence
- Find its general term with process
- Estimate it's any number of terms.
- Express the sequence in its corresponding series and express it in sigma notation too.
- List other possibilities of patterns with solutions steps.

Both the girls and other two boys were able to address all the solutions with steps of the above 8 questions answering them through honeycomb patterns in copy and presenting and writing on the whiteboard with right process using regular hexagonal patterns.

First, we saw that both Sarita and Samjhauta had expressed the no. of dots in the pattern in this way: **(can see Fig.2, 3 and 4)**.

1, 3, 6, 9,12, 15, 18,..... Both had shown the first difference and second difference of the above redraw figures on no. patterns in the above sequence. They mentioned the sequence as quadratic as she justified that as the second difference is the same i.e. 1. However teachers who enrolled in mathematics training said and listed arithmetic patterns after observing the honeycomb with out process **(can see Fig 6 right teachers activities)**. However, girls and boys students expressed with the process patterns generated general term of the quadratic sequence  $(t_n) = an^2 + bn + c, a \neq 0, \dots\dots\dots$  (i). We found as they assumed  $2a = \text{second difference} = 1$  by taking the help of ideas from the reference book.



or,  $2a = 1$

$\therefore a = \dots$  Also, he put as  $n=1$  in (i), then he found  $(t_1) = a \times 1^2 + b \times 1 + c,$

$1 = a + b + c$

or,  $2 = 1 + 2b + 2c$

or,  $1 = 2(b+c) \dots\dots\dots(ii)$

Also, he kept,  $n=2, (t_2) = a \times 2^2 + b \times 2 + c$

$3 = a \times 2^2 + (b+c) + b \quad [\because b+c = 1]$

Or,  $1 = a + b$  [ they took help from (ii) as well

$\therefore b = \dots$  They substituted the value of 'b' in eqn (ii),  $\therefore c = 0$

They concluded the general term as  $(t_n) = n^2 + n + 0 = n^2 + n$  in the formulae as algebra in a honeycomb pattern.

**Geometrical Interpretation Through Honeycomb Patterns**

Usually, the Geometrical interpretation of algebraic formulae of two-dimensional can be seen in a mathematical textbook in school. Students can interpret the areas relations of  $(a+b)^2 = a^2 + 2ab + b^2$  and  $(a-b)^2 = a^2 - 2ab + b^2$  considering squares and rectangles considering the length of one hexagonal = 1 units with the help of measurement of unit squares which we can see Fig. 5.

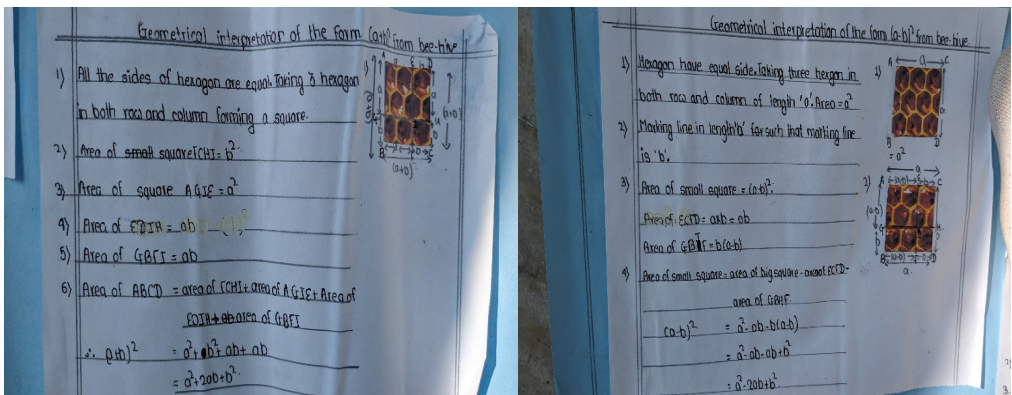


Figure 5 : Students Generated Formula Interpretation: Beehive Hexagonal Patterns

**Geometrical Knowledge from Honeycomb Patterns**

Usually, when the teacher is teaching, it is customary to teach guided by all bookish patterns, problems, and processes of solving. On the other hand, very few teachers and students only try to connect to understand and learn practically the various

contents of mathematics. However, our students in class nine perceived and generated the separate pattern of lines, segments, parallelogram properties, angles, and problems with processes and solutions found in different areas of mathematics in Honeycomb. They were all focused on generating the two different areas of geometry and algebra through patterns and shapes formed on honeycombs and holes. In our role as a mathematics teacher and researcher, we encouraged students and other teachers to create newer ways of teaching and learning. The diagrams, problems, and in-depth solutions they generated are shown in Fig. 6.

### Reciprocal Approaches of Mathematics Learning Through Honeycomb Patterns



Figure 6 : Students and trainee teachers field activities dated 2nd February 2023, 6th July 2023

### Students and Teachers on Reciprocal Learning Mathematics

Reciprocal learning is an approach in which students, teachers, and facilitators can work separately or in groups to acquire knowledge. This type of environment allows both instructors and learners to have control over the learning material. This approach facilitates conversation regarding the goals (Mafarja et al., 2023). When observation of trainee teachers' activities in training and students' activities in the classroom with patterns generated mathematics learning approaches, teachers were also found actively engaged with honeycomb patterns. They generated mathematical constants like sequence hexagonal patterns, angles, and congruent hexagonal shapes through different approaches, like poems, singing and dancing with music, and presentations in activities. They presented math into songs by adding music and dance (as you can see in Fig. 6 on the right side). Below is the field text from the group discussion.

### Students Group Discussion:

*One of the boys' student of class nine said: I saw congruent rectangles and hexagonal patterns everywhere in honeycomb patterns which exist in the translation and tessellation shift rule as well, congruent and similar triangles can be constructed. But Sarita and Samjhauta tested the parallel lines by drawing the lines on top and bottom of the hexagonal shape of the honeycomb. They said and shared their ideas in open conversation among classroom friend like that such a way of learning forces us to think creatively using our ideas and knowledge first (Group Discussion generated and observed field text dated 2nd February 2023).*

Suman with in group discussions to other friends also viewed the importance of home activities to learn mathematics creatively sharing and presenting with each other. They said after playing with honeycomb patterns for connecting school mathematics and sharing, discussing and interacting, and presenting in the group with this tool as follows:

*This way of learning changed our view on mathematics understanding and the way of writing, reading, and perceiving. We are happy and aware to read and learn mathematics from a broader perspective rather than just following problems and techniques in books individually. We felt that learning mathematics was practically connected to surrounding (15th February 2023).*

### Jasmin:

*I found that mathematics is not only possible to learn following the exact procedures in the book. I came to know from the group and individual engagement on bee comb. I am confident that bee comb patterns exist in algebra graphic patterns as well. However; one of the girls drew patterns, sequences, and solutions steps in detail on honeybee comb patterns considering one hexagon-covered area = 1 unit which can be seen in the original text of fig (Jasmin and Suman generated text, observation, and interview dated 18th February 2023).*

### Sarita :

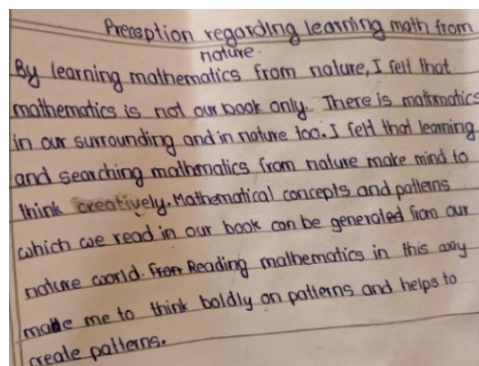


Figure 7 : Sarita Generated Field text dated 2nd February 2023



### Group Conservation with Students and Trainee Teachers:

*We need to understand that both teachers and students should also make us understand the mathematics concept well by relating our natural and societal activities visiting the real context They also claimed that learning mathematics using such activities helps us to construct new knowledge and increase our creativity making we are active rather than passive speaker and listeners. Such activities also thinking and reading and practicing broadly and help to create more mathematical information and patterns (Informal Conservation in Group dated, 20th February 2022).*

The analysis shows that honeycomb patterns can be used to learn almost plane geometry shapes, symmetry, and their properties, as well as an in-depth quadratic sequence with solutions, translation, and tessellation patterns and algebraic formulas. Similarly, the contents of quadratic sequences in hexagonal patterns are seen in honeycomb. While playing with patterns of honeycomb with my participants, we also saw the horizontal and vertical arithmetic sequence of hexagon patterns and types of angles and parallelograms. While observing profoundly, we can see many regular hexagonal square patterns. They were able to link the mathematics contents of algebra and geometry addressed by the CDC of the school curriculum with clear information through hexagonal honeycomb patterns.

The informants also felt much time was needed to think mathematically. They realized that this kind of learning approach demands teachers and students' brainstorming capacity through researching, learning, and doing. However, students feel that teachers need an additional facilitator to guide them in new directions. Fenstermacher and Richardson's (2005) understanding that 'learners are not passive learners and they don't come with a blank mind' fits well with this process. They said that such practices help to promote creative thinking, mathematical reasoning, and understanding math from a broader perspective. Maryati et. al. (2019) noted that learning through honeycomb patterns will be more productive and make meaning, promoting necessary discussion to work for knowledge creation rather than knowledge transfer. The Cultural Relevance of Mathematics Teaching (NCTM Standards) (2014) also suggested a similar argument: if students and teachers internalize mathematical knowledge in creative ways, they will be critical thinkers and hope to enhance critical awareness to link students' prior knowledge of cultural math with school math. This is why Lim, Tan, and Saito (2019) advocated that teachers act as the mediators of learning, which would provide students with opportunities to think and reflect by exploring mathematical ideas and justifying answers to problems that are capable of verifying their reasoning and thinking. How our students' participants constructed the knowledge as Lewis (2018) stated that teachers need to ignore spoon-feeding teaching and use problem-solving to expose students to cultural math.

Trainee teachers and boys' participants also claimed that they observed a linear arithmetic sequence of regular hexagons. They also noted that honeycomb hexagonal patterns are seen in parallel and perpendicular tessellation designs in the reciprocal learning approach. They said that they learned geometry, reflection, and the enlargement of similar and congruent concepts in a beehive. They also claimed intersecting lines, vertically opposite angles, and other types of angles by measuring protractors, which are shown in **Figs. 2–6**.

From the informal conversation and student participant observation, we knew that learning mathematics of linear and quadratic sequence, formulae expansion in plane, and geometry together from honeycomb patterns is easy for the students. The finding above truly matches D'Entremont's (2015) views. He envisioned that the design of meaningful patterns illustrated how to link mathematics knowledge to the learners' surroundings, which may be beneficial for students as learning resources in mathematics that can provide individuals with "big picture" explanations on how to link academic mathematics to the learners' living situations (Fitrianawati et al., 2020).

Focusing on the subject matter, Sunzuma and Maharaj (2019) and Albanese and Perales (2015) advocated that students' mathematics learning strategies that build on prior knowledge and experience enable them to improve their mathematical understanding and creative thinking with the right reasoning. Ernest & Albert (2018), Fouze & Amit (2018), and Rosa & Orey (2013) also stated that the social constructivist theory might have worked there in helping students learn mathematics that way. It also helped students learn brainstorming activities, draw real figures with reasonable representation, develop self-confidence, self-esteem, and a sense of belonging, as well as respect for communities' activities through mathematical thinking" (D'Entremont, 2015).

### **Conclusion**

The first conclusion of this study is that students can do research, go for brainstorming and collaborative undertaking, generate patterns, formulae, and processes of solving through accurate steps from honey bees' comb patterns. The second can also be concluded that students' learning, teachers teaching, and trainers processes of academic mathematics could be made easier through this reciprocal process. The third conclusion is that students know algebra, arithmetic, and geometry concepts through beehives at one stroke. Besides, they can develop, interpret, and test the given formulas by linking them with their bookish knowledge. The implications of this study are that students, teachers, and teacher educators can use honeycombs like hexagonal patterns to teach students, train teachers, and learn mathematics from the things around them.

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