

# **PAPER PROCEEDINGS**

**Papers of 7th Canadian International Conference  
on  
Advances in Education, Teaching & Technology  
2023**

**Unique Conferences Canada Publication  
Toronto, Canada**



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## Gender and Reading Comprehension Competence in Chinese Language

Dr. James, Opoku-Darko

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### Abstract

*Ghanaian students find it difficult to read and comprehend Chinese texts – the Hànyǔ Pīnyīn (official romanisation for Standard Mandarin Chinese). Empirical evidence have shown, among other factors, that gender may influence reading comprehension competence. Nevertheless, there was a dearth of empirical evidence on the relationship between gender and reading comprehension competence in Chinese language. This study, thus, using a quantitative approach, examined whether there was a difference in reading comprehension competence among Ghanaian students studying Chinese language, with respect to gender. Employing the random sampling technique, a sample of 520 learners from 12 Chinese learning centres were involved in the study. Data were collected using a Chinese Language Reading Comprehension Achievement Test (CLRCAT). The data collected were analysed using means, standard deviations, and the two-independent samples t-test. The results showed that, though male learners performed slightly better than their female counterparts in Chinese language reading competence, the difference was not statistically significant. It was concluded that for improved reading comprehension competence in Chinese language among learners, elements of gender should be considered in the instructional approaches. It was suggested that Chinese language teaching and learning is incorporated into Ghana's education system.*

**Keywords:** Gender, reading comprehension competence, Chinese language.

### Introduction

Chinese language has become a globally recognised language. It is one of the six official and working languages of the United Nations (United Nations, 2022). There are over one billion Mandarin Chinese speakers worldwide, making it the second highest spoken language after English (Statista Research Department, 2022). Moreover, more than seventy countries have officially incorporated Chinese language teaching and learning into their national education systems (China Global Television Network (CGTN), 2020). Specifically, in Ghana, the language is officially taught in some public universities, whilst some private universities and basic schools have adopted it as an extracurricular subject of taught (Nkrumah & Asamoah, 2022). However, it has been observed that many Chinese language learners could neither correctly read nor identify simple words written in simplified Chinese (*Pīnyīn* version) – such as *Lái*, *Zuò* and *Zhuó*, among others (Marks et al., 2021; Xie et al., 2019; Zhong & Adegah, 2022). If this problem persists unaddressed, Ghanaian Chinese learners can be denied of the benefits associated with achieving proficiency in Chinese language. For instance, court cases involving Chinese citizens are adjourned simply because of unavailability of interpreters (Ampofo, 2017).

Taking the foregoing into account, it is appropriate to identify the potential factors that may influence reading comprehension in Chinese language. Lakoff's theory posited that gender influences the level of language mastery of an individual. Trebits et al. (2022) argued that, depending on the context, females may perform better in some aspects of a language than their male counterparts. Considering these, a line of association could be drawn between gender and reading comprehension competence in Chinese language. Nonetheless, there is a modicum of empirical knowledge of the relationship between gender and reading comprehension in Chinese language. Most of the prior studies focused on how gender influences performance in aspects of languages other than Chinese language (Denton et al., 2014; Logan & Johnston, 2010). Even those that touched on Chinese language looked at areas such as attitude towards learning Chinese, Chinese language ideologies and perceptions of learners, and in different contexts (Nguyen, 2022; Nkrumah & Opoku-Darko, 2020). It was against this background that this study sought to determine the

relationship between gender and reading comprehension among Chinese language learners in Ghana. The following null hypothesis was tested:

*H1: There is a significant difference between reading comprehension competence of Chinese language learners, with respect to gender.*

*H0: There is no significant difference between reading comprehension competence of Chinese language learners, with respect to gender.*

This study will be significant to practice, policy and scholarship. Individual schools in Ghana, based on the findings of this study, may consider officially incorporating Chinese language into their curricula so as to benefit from the language use, and as well get to know ways and techniques to employ to teach students of different gender for quick and timely mastery of the language. The Ghana Education Service can use the findings to drive its educational policies concerning potential inclusion of Chinese language in the national curriculum. Furthermore, this study will serve as a pacesetter for future studies to be conducted on related topics, as it will contribute a worth of knowledge to the existing body of knowledge on Chinese scholarship.

## **Materials and Methods**

The quantitative research approach which uses quantitative data to describe phenomena and focuses on measurements and numerical analysis of data to provide description and explanation between/among variables (Wilson, 2017; Levitt et al., 2018) was employed. This followed prior studies (Marks et al., 2021; Xie et al., 2019). In terms of participation, a sample of 520 students (260 males and 260 females) from 12 Chinese learning centres were involved in the study, based on the number of students available at the time of the study. This sample size was very decent and representative of the student population of 912 (Denton et al., 2014). In respect of data collection, a self-administered Reading Comprehension in Chinese Language Achievement Tests (CLRCAT) was used. This instrument was divided into two parts, namely, demographic information, and Reading Comprehension Test. The test was developed by the author, with face and content validations provided by other two Chinese-native lecturers at the Confucius Institute at the University of Cape Coast.

Specifically, the CLRCAT was in two parts. The first part was to test the learners' reading skill, and they were made to read aloud a 300-word passage. Attention was given to correct pronunciation of words, taking cognisance of tones. The second part required the learners to answer five questions based on the passage read in order to assess their overall comprehension of the passage they have read. The total obtainable score for the reading comprehension test was 20 marks. Regarding gender, the binary (male = 1/female = 0) technique was employed as a measurement. This was in alignment with prior related studies (Denton et al., 2014; Logan & Johnston, 2010).

Regarding the actual data collection exercise, the test instruments were distributed among the learners who agreed to partake in the study. All the 520 learners fully took part in the test, and all the instruments were retrieved and found suitable for analysis. After processing the data into a form appropriate for analysis, a summary statistic was conducted on the demographics and performance in the test. The null hypothesis was then tested using the two-independent samples t-test.

## **Results and Discussion**

As indicated earlier, 260 females and 260 males took part in the study. Out of the 520 learners, 2% was between the ages of 17 and 20 years, whilst 98% was above 20 years old. The overall average performance in the test was 61.3% with a standard deviation (SD) of 23.6%. Specifically, on average, the male learners had a slightly higher score ( $67.8\% \pm 26.7\%SD$ ) compared to their female counterparts ( $65.2\% \pm 28.2\%SD$ ). The significance of this difference was tested using the independent t-test below.

**Table 1: Reading Comprehension and Gender (N = 520)**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. E. Diff.	95% CI of the Diff.	
									Lower	Upper
Reading comprehension	Equal variances assumed	0.21	0.65	0.87	518	0.39	2.64	3.05	-3.35	8.63
	Equal variances not assumed			0.87	509.1	0.38	2.64	3.01	-3.29	8.57

Source: Field survey (2023)

The Levene's Test in Table 1 has shown that there is homogeneity of variance between male and female Chinese learners, with respect to reading comprehension, at the 5% significance level ( $P = 0.65$ ). This implies that a t-test could be computed (Kim, 2015). The independent t-test revealed that there was no statistically significant difference between male and female Chinese learners, with respect to reading comprehension competence; hence, failure to reject the null hypothesis that "*There is no significant difference between reading comprehension competence of Chinese language learners, with respect to gender*". This was shown in the mean difference of 2.64 which fell within a 95% CI of -3.35 to 8.63 which includes a zero, with  $t(518) = 0.87$  and  $P = 0.39$ .

This finding might be due to the fact that both the male and female learners involved in the study were taught by tutors who used similar teaching materials and resources, and this might have had the same level of influence on the reading comprehension competence in Chinese language of both male and female learners. It could also be that the learners were exposed to similar techniques of studying reading materials. Though inconsistent with the assertions of the Lakoff's theory (Lakoff, 1975), this finding agreed with the findings of a number of prior studies (Denton et al., 2014; Logan & Johnston, 2010). This finding might be inconsistent with the Lakoff's theory due to possible contextual characteristics, such as the fact that the theory has mostly been applied in English language context. On the other hand, its agreement with Denton et al. (2014) and Logan and Johnston (2010) could be attributed to the fact that these studies focused on learners just as the present study.

## Conclusions and Recommendations

This study sought to determine whether there is any difference in reading comprehension competence between male and female Chinese language learners. The results showed no significant difference, implying that irrespective of the gender of a learner, competence in reading comprehension in Chinese language could be enhanced, and neither male nor female learners would be disadvantaged. However, taking into account the average performances in reading comprehension competence, it was revealed that, though the male learners performed fairly better than their female counterparts in the reading comprehension competence, their aggregated average was well above 50 per cent.

Taking this finding into account, it was suggested that tutors at the various learning centres encourage group studies among both male and female learners as they would be able to make up for each other's weaknesses and learn from one another as well; especially reading comprehension in which, though not significant, the male learners appeared to be more competent than the female learners. Moreover, the Ministry of Education, through the Ghana Education Service (GES), should consider incorporating Chinese language into the education system of Ghana.

One limitation to the study was the fact that apart from gender, other factors could influence learners' competence in reading comprehension in Chinese language. Since these factors were not considered in the present study, further studies can be taken to incorporate factors such as age and academic background of the learners.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Because of the nature of the study, and in the absence of any involvement of medication, no formal approval of the Institutional Review Board of the local Ethics Committee was required. Nevertheless, all subjects were informed about the study and participation was fully on a voluntary basis. Participants were assured of confidentiality and anonymity of the information associated with the survey. The study was conducted according to the guidelines of the Declaration of Helsinki.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Conflicts of Interest:** The author declares no conflict of interest.

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## **Sensory History: An Approach towards teaching history**

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### **Abstract**

*This study aims to highlight the perceptions of the Secondary Teachers Education Programme (STEP) teachers towards implementing the sensory history approach and the factors that affect their choice for the same while teaching the Muslim Societies and Civilizations (MSC) module Volume 2 in Religious Education Centres (RECs) in Mumbai, India. STEP teachers are professionally trained teachers that obtain their degrees from the Institute of Ismaili Studies (IIS) and the University College London - Institute of Education to teach the globally implemented IIS secondary curriculum across Ismaili RECs. For the purpose of this study, the conceptual understanding of the term 'sensory history' has been derived from several disciplines such as anthropology, sensory studies, psychology and history. For this study, various data collection methods were employed, namely, pre-research questionnaire, semi-structured interview and semi-structured observation, in order to understand the overall perceptions of the STEP teachers about the sensory history approach. The findings reflected multiple understandings of the term sensory history approach and its effectiveness in the class. Teachers perceived sensory history as an approach that is equivalent to experiential learning, involves the use of multiple senses and is an effective tool to increase student engagement in the classroom. Additionally, the findings also highlighted various factors like the scope of the curriculum, the availability and optimum utilization of resources that affect the choice of implementing sensory history approach in the classroom.*

**Keywords:** *sensory history, senses, experiential learning*

### **Introduction**

*'I hear and I forget, I see and I remember, I do and I understand'.  
Confucius, 479 BC in (Vaillancourt, 2009, p. 272)*

Like Confucius, various scholars have debated on the importance of experience in order to help students learn better. Both Dewey and Kolb have claimed that experiencing enables students in creating new knowledge resulting in their active engagement during the process. Similarly, the sensory history approach is one of the approaches that can be used by teachers in order to maximize the experience of learning and overcome the challenges of teaching history which is usually considered to be boring and an irrelevant subject by most of the students.

In order to explore this aspect, this research paper aims to explore sensory history approach that can be used by teachers in order to maximize the experience of learning and overcome the challenges of teaching history which due to a lack of relevance frequently fails to elicit as much attention as any other subject by most of the students (De Oliveira, 2008). The study aims to explore the role of senses and the extent to which Secondary Teacher Education Programme (STEP) teachers use sensory history approach while delivering one of the eight modules of the Institute of Ismaili Studies (IIS) secondary curriculum- Muslim Societies and Civilizations (MSC) Volume 2 in the context of Mumbai, India. This enquiry particularly focuses on STEP teachers' perceptions about the 'sensory history' approach and will highlight the factors that motivate or demotivate them to use it in the classroom.

## **Background and Nature of the Study**

This research took place in a Religious Education Centre (REC) in Mumbai, India from the period of January to April 2019, wherein MSC Volume 2 was taught to grade 7 students aged 12-13 years in the second term of the academic year. These RECs aim to provide religious education to the Ismaili Muslim students on a voluntary basis. The secondary classes are conducted by professionally trained STEP teachers after their study at the IIS, University College London and the Institute of Education in London. The secondary curriculum that the STEP teachers implement on the field, is a globally implemented curriculum designed by the IIS. It aims 'to engender in the youth a broad-minded outlook that enables them to be grounded in their own Ismaili tradition while also being educated about the wider historical and cultural contexts in which this tradition has been expressed' (DCS, 2013, p. 6). Keeping in mind the broader aims of the IIS, this research focuses on the following main and subsidiary questions:

### **Main Research Question:**

What are STEP teachers' perceptions about sensory history approach to teach the MSC Volume 2 in Mumbai, India?

### **Subsidiary Questions:**

1. What are the perceptions of STEP teachers about sensory history approach in general?
2. What factors affect the choice of STEP teachers for implementing sensory history approach?

## **Literature Review**

### **Defining 'Sensory History'**

There are a number of multi-disciplinary research that has been conducted in order to understand the history and role of senses. Essentially, the term 'sensory history' has derived its meaning from various disciplines such as anthropology, sensory studies, psychology and history. Historians refer to sensory history as the 'history of senses' or 'history of sense perception' interchangeably (Smith, 2007a, p. 4). In addition to the history of senses, Smith (2007b), an American historian, considers sensory history as an inclusive term. He argues that sensory history not only includes the evolution of senses but also plays a vital role in constructing meaning from the social and cultural aspects of the past through senses. He clarifies that in order to understand these aspects of the past, one should first understand the terms 'production' and 'consumption' of senses and the distinction between them (Smith, 2007b, p. 841).

Sensory production can be defined as producing something that can duplicate the past. According to Hoffer (2003), an American historian, sensory history can make the receiver experience the 'approximate past' by reproducing the past through re-creations, re-enactments and travel to historical sites. For example, a teacher may re-create an ancient city by bringing in artefacts or taking students to visit the ruins of that city. However, the teacher may be unable to re-create the 'exact' experience of that ancient city possibly due to unavailability of resources or due to the difference in the 'actual past' and the past understood and perceived by the teacher. Similar to the historiographers who have to make use of their imagination to interpret the past and write history by keeping their biases to a minimal level, teachers too might have to limit their biases and try to teach the topic from a neutral stance as it may influence the experience of the students.

On the other hand, sensory consumption means consuming something as it is; as it was produced in the past. For example, consuming the sound in the present in the same manner as it was produced in the past without any changes. Smith (2007b) argues that although it is possible to produce or re-create the past, it is not necessary to consume the past in the same manner as the people in the past experienced it. This argument is also supported by Rath (2005) who also believes that the past holds a different experience for

the people of contemporary times. In my opinion, Smith and Rath's arguments seem to be valid as the understanding and the way one consumes the past for a person from the 11th century will be different by a person from the 21st century. However, according to Howes (2008), an anthropologist, a teacher can attempt to present the past through senses by situating it in the cultural context of that time.

In addition to this, it has been observed in the past that one sense has gained prominence over the other senses during a particular period of time. For instance, Smith (2007a) highlights that the use of visual sense was more dominant during the 15th century. This is because of the print revolution and invention of the telescope, the microscope and the camera that took place during this period (ibid). Nonetheless, historians like Howes and Smith agree on the inter-sensoriality of the senses which means 'the multi-directional interaction of the senses and of sensory ideology' (Howes, 2005, p. 9). They believe that senses work in cooperation with each other and not in isolation, which can in turn, help to experience the past effectively (Smith, 2008). Hence, while employing sensory history approach, a teacher can make use of multiple senses in order to re-create the past and help students consume it by situating the social and cultural context of that time period.

## **Methodological Design**

### **A. Qualitative Research**

The research methodology adopted for this research was qualitative in nature. According to Denzin and Lincoln (2013), qualitative research is an in-depth study in natural settings to interpret or make sense of the data collected from multiple sources. The focus of the researcher is to discover and interpret the meanings held by the participants about a given situation rather than bringing in his/her own meaning to the research (Creswell, 2014). The qualitative research methodology was best suited for this research as it is not based on numbers but rather is based on the STEP teachers' perceptions about sensory history approach.

### **B. Case Study Approach**

Case study is an in-depth analysis of a particular situation taking into account the context of the research (Robson, 2011) through the use of various research methods such as interview, questionnaire, observation etc. (Denscombe, 2017). Hence, this approach is employed as it is most suitable to understand the perceptions of STEP teachers in Mumbai, India towards the use of sensory history approach as it is a relatively less researched topic in the field of education. However, one of the criticisms of using the case study approach is the generalisation of the findings. According to Yin (2009), findings from a single case study cannot be generalised as it considers only few participants. Hence, the research findings relating to sensory history approach involving IIS curriculum can not only be generalised for the STEP departments globally, as the curriculum is taught in different contexts, but also any history curriculum that is taught worldwide.

### **C. Sampling**

Purposive sampling technique was adopted in order to collect the data for this research. According to Denscombe (2017), purposive sampling is the one in which the sample is selected based on the relevance and suitability of the research topic. This type of sampling was most appropriate for this research as it aimed to identify the teachers who are more or less likely to use the sensory history approach while teaching history through MSC module volume 2. Teachers who used sensory approach more than three times in an academic year were categorised as most likely whereas teachers who used this approach for less than three times in an academic year were categorised as teachers who less likely used sensory history approach.

### **D. Research Participants**

To maintain anonymity, pseudonyms have been used throughout the report. Amina and Asifa are the pseudonyms used for teachers who most likely used sensory history approach. On the other hand, Aly and Zara are the pseudonyms used for the teachers who less likely used sensory history approach.

## **E. Data Collection Methods**

### **a. Pre-Research Questionnaire**

The purpose of using a pre-research questionnaire was twofold. Firstly, it allowed selection of the sample to be interviewed later. Secondly, it gave an idea of the basic understanding of the teachers towards sensory approach and in turn, helped me to formulate specific questions relating to 'sensory history' approach in order to collect relevant data for this research. This pre-research questionnaire was responded to by 8 out of 9 teachers in Mumbai.

### **b. Semi-structured Interview**

For the purpose of this research semi-structured one-to-one interviews were used for collecting data. A semi-structured interview is a type of interview in which questions are predetermined by the researcher but are modified based on the different points that may develop in the process of the interview (O'Leary, 2017). Although the questions were predetermined, they acted as a guide to help me clarify or find more information in order to collect relevant data for this research. The limitation of using this method was to interpret the understanding of teachers on sensory history approach while noting the responses of the participants. However, to overcome this limitation and as suggested by Wilkinson and Birmingham (2003), by restating the response of the interviewee; wherever necessary; were restated in order to clarify my understanding to focus on the immediate responses of the participants (O'Leary, 2017). This was aimed at maintaining the accuracy of the data collected.

### **c. Semi-structured Observation**

Semi-structured observation was conducted in the secondary classrooms in Mumbai. Semi-structured observation is a kind of flexible observation in which the researcher prepares a checklist before the actual observation but is also ready to observe aspects that is not a part of this checklist (O'Leary, 2017). This method not only helped me to focus on the particular aspects that I was looking for through the prior checklist made but also provided me with the flexibility to observe things that were unintended. In order to implement this method, a prior checklist of things to be observed like learning environment, introduction of aims and learning outcomes, pace and structure of the activity, learning involvement and response and assessment techniques were adapted from the criteria for observation prescribed by O'Leary (2017). Overall, two semi-structured observations were conducted, in one lesson from each of the two teachers who were categorised through survey as most likely to use sensory history approach in their classroom.

## **F. Ethical Considerations**

The research was undertaken considering ethical considerations prescribed by the British Educational Research Association (BERA), 2018 in the following ways. The purpose of the research was to communicate to the teachers through an information sheet. A prior written consent to participate and record the interview, to be observed and process the collected data was taken from the participants (clause 8). Their right to withdraw their consent anytime during their study was communicated to the participants in the information sheet. Confidentiality of the responses was assured by using pseudonyms (clause 40) throughout the research.

## **Findings and Data Analysis**

### **1. STEP Teachers' perception about sensory history approach**



### **A. Use of senses**

The purpose of this study was to explore STEP teachers' perception of sensory history approach through their teaching practice. The findings of this study reveal that teachers perceived sensory history approach is based on the use of senses that help students to experience and learn about the past. This understanding was evident in my observation of Asifa's class where students tried to experience their visit to Cairo using different senses. The sensory experience was created by turning off the fan to make students experience the hot climate of Egypt. Further the students tasted dried fruits, smelled the spices, felt the cloth and saw different items like pots, jewellery that were being sold in the markets of Cairo. However, findings also suggest that all five senses, that is the sense of touch, smell, taste, sight and hear, were seemingly employed by the teachers to present the facts rather than re-creating the social and cultural aspects of the past. Additionally, though this approach encouraged students to engage in an experience, however, whether or not the students were able to consume the 'approximate' past, possibly the way it was consumed by people in the 10th century Cairo remains questionable. Hence, it can be inferred that STEP teachers had a partial understanding of the term sensory history which emphasised more on use of senses than the effective use of it in re-creating the approximate past. Teachers in their attempts to involve the students in the meaning making process may further stimulate their understanding through follow-up tasks that may challenge their understanding of the past. Nevertheless, these stimulation processes through sensory history approach did play a vital role to scaffold students' understanding of representation of the past.

### **B. Sensory history approach equals to experiential learning.**

During the multiple classroom observations and interviews, it was noticed that the majority of the teachers related sensory history approach closely with experiential learning. According to Amina, the research participant, experiential learning is a broader umbrella encompassing sensory history as a part of it. Experiential learning involves a process which includes 'sensing the environment, reflecting and acting in the new context' (Cunningham, 1997, p. 221). This process can also be understood by examining the widely used four stages of Kolb's model of experiential learning. The four stages of experiential learning are concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984). This means that the students at the first stage of experiential learning make use of all the senses in order to experience the environment. This is further supported by Andresen, Boud and Cohen (2000, p. 227), who recognise involvement of 'intellect, feelings and senses' as an important part of experiential learning. Similarly, sensory history involves use of senses through 'production' and 'consumption' in order to understand the cultural and social context of the past (Smith, 2007b). Both the former and latter notions affirm the use of senses as an important aspect, which was also seen during my observation of Asifa's class, to enrich and enhance students' learning typically representing the interconnectedness between these two constructs.

In addition, both sensory history and experiential learning further the meaning making process. This is supported by literature on sensory history wherein Smith (2007b) discusses that senses help in constructing meaning from the social and cultural aspects of the past. Certainly, students demonstrated the use of senses in making meaning of the historical context they were engaging with. Similarly, proponents of experiential learning also state that experiencing helps students to investigate and construct the meaning of the knowledge (Association of Experiential Education, 2014; McClellan & Hyle, 2012). In fact, it is this experience that the students were engaged with became what Miller and Boud (1996) terms "a means through which learners making meaning of the world". During this process of experiencing Zepke and Leach (2002) identify questions by teachers as a tool to help students interpret their experience and make meaning out of them. This was evident in Amina's classroom observation where she used questions as a tool to help students interpret the meaning of the image that was shown to the students.

Although parallels could be seen between the first two stages of experiential learning with sensory history approach, however, it is not possible to comment on the relationship between the third and fourth stage of experiential learning with sensory history approach as it was not observed during my research due to limited time and scope of this study.

### **C. Sensory history approach: A tool to increase student engagement.**

Teachers perceived that sensory history approach increases students' engagement. According to Zara, the sensory history approach is a novel idea as it gets students excited and increases their focus and ensures concentrated learning. As a result of using this approach she further elaborated that '*sensory history approach helped students to focus on it a little more and it also provided a base for interaction between groups... which I thought otherwise may have not worked as well and we would have easily lost those things which otherwise we are not losing because we are using this approach.*' (Zara, SSI, 18/02/2019) Teachers believed that the sensory history approach increases students' attention, interest and builds curiosity in them to know more about the topic. was also evident in my observation of Asifa's class in which students asked questions like 'how do you feel at night; hot or cold? Is it due to the river Nile? Is there much rainfall here? Do you have a caravanserai? Are the gates of the city enough to protect the city?' (Students, SSO, 09/03/2019) Through the implementation of sensory history approach, it could be noticed that the students were not only focused on what the teacher was presenting but were also asking questions out of curiosity to know more about the city. Further, students were more engaged in this activity possibly because it was not a usual way the class was conducted rather the teacher had brought in a lot of resources to see, hear, taste, smell and touch that created an ambience in which the student could experience that he/she was visiting the city of Cairo. Although some schools perceive use of multiple senses in a classroom as a mere fun activity (Classen, 1999), Howes (2005) believes that invoking multiple senses can help students to make meaning and sense of the information through senses. This can lead to an increase in student engagement in the process of analysing the information which was evident in Asifa's classroom observation mentioned earlier. Therefore, it suggests that while on the one hand sensory history approach allows students to experience the 'approximate' past with the use of senses, on the other hand, this approach is effective in combination with probing, scaffolding and questioning where in teacher plays a critical role in facilitating this process.

### **2. Sensory history approach- significant considerations**

All the participant teachers highlighted multiple challenges for planning and implementing sensory history approach. One of the factors which they unanimously highlighted was the limited scope of the curriculum. Teachers mentioned in their interviews that content was the driving force for their choice of sensory history approach. Zara in the interview response stated: '*when I feel the matter, the content, the module that I am teaching or the unit that I am teaching extends itself to using the pedagogy of the sensory history I would do it.*' (Zara, SSI, 18/02/2019) From the above response, it may be inferred that apart from the content alone the choice of sensory history approach may also be affected by two reasons namely, their experience of teaching the same content with a different approach and teacher's inclination and comfort towards a particular pedagogy. For example, in the pre-research questionnaire Aly, who less likely preferred using sensory history approach, ranked reading pedagogy as the most preferred pedagogy to be utilised in the classroom. Further he elaborated: '*I prefer conducting reading circle in the classroom because I feel that it is important to make students read especially in the context of India. And hence, I try to incorporate at least one reading activity in my classroom.*' (Aly, SSI, 13/02/2019) In addition to the nature of the content, the length of the content can also be a factor that may affect the choice of sensory history approach because implementing this approach requires a lot of time. Hence, there is a possibility that teachers may not be able to finish the curriculum on time.

Another consideration that was highlighted by teachers was arrangement and optimum use of resources for implementing sensory history approach in the classroom. In order to implement this approach effectively, it is important to consider the role of teacher for making optimum use of resources in order to recreate an approximate past. A teacher can try to re-create the past through reenactment, recreations and by taking students to the historical site (Hoffer, 2003). Further, since the limitation of teacher not experiencing the past first-hand exists, there is a possibility that the experience of the students might be influenced by the experience/ understanding of the teacher. Therefore, the teacher can try to minimise his/her own biases towards the particular topic and deliver it to the students.

## **Conclusion and Further Recommendations**

To conclude, STEP teachers perceived sensory history as an approach that is equivalent to experiential learning, involves the use of multiple senses and is an effective tool to increase student engagement in the classroom. Additionally, the findings also highlighted various factors like the scope of the curriculum, the availability and optimum utilization of resources that affect the choice of implementing sensory history approach in the classroom.

One of the recommendations is to look at the sensory history approach from students' perspective. It will be interesting to know to what extent students find this approach helpful if at all. In addition, although some studies like Reden (2015), Classen (2017) are conducted in the field of museum studies, further the applicability and advantage of using sensory history approach outside the classroom such as visit to a historical site, or a museum can be conducted. Further, several studies relating to virtual reality in education (Hu-Au and Lee, 2017), particularly in history education (Yildirim, Elban and Yildirim, 2018) have been conducted. Hence, to widen the scope of this study, the effectiveness of sensory history combined with virtual reality can be undertaken in future emphasised more on use of senses than the effective use of it in re-creating the approximate past.

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## Impacts of COVID-19 on Stress among Higher Education Students in Ghana

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### Abstract

Globally, the COVID-19 pandemic has affected human health and well-being including psychological and mental health, making it difficult to achieve sustainable development goal 3 targeting good health and well-being. Students are vulnerable to the mental health impacts of the COVID-19 pandemic, yet there is insufficient information on how the COVID-19 affects the psychological and mental health of students, particularly in sub-Saharan Africa countries including Ghana. This study addresses the gap by examining how students at a Ghanaian university perceive the impacts of COVID-19 on stress and associated consequences and challenges. A total of 66 final year students in the counselling psychology department from the University of Education, Winneba, Ghana were census for survey using a quantitative research approach. Results show that COVID-19 impacts on different dimensions of stress including anxiety stress, emotional stress, psychological stress, mental stress and sleeping disturbance. COVID-19-related stresses generate consequential health and financial threats, collapse of social relations and impact teaching and learning strategies. Results further show that COVID-19-related stress pose challenges to students such as difficulty in assessing teaching and learning resources and excessive spending on data for online classes. The study adds to the understanding of how higher education students are experiencing stress from the impacts of COVID-19 pandemic. COVID-19-related stresses have implications for educational outcomes and achieving the sustainable development goal 4, which targets quality education. The findings suggest the need to build the resilience of higher education students by developing robust interventions that can mitigate the spread of COVID-19 and associated perceived and financial stress for sustainable educational outcomes.

**Keywords:** COVID-19 pandemic, Mental health, University students, Sustainable educational outcomes, Ghana.

### Introduction

In our world today the novel severe acute respiratory syndrome (SARS-CoV-2) outbreak, also known as the Corona virus, which broke out in 2020 has left numerous untold impacts which emanated from the period of the pandemic. Based on the work of Arslan et al. (2021), it is reported that there is empirical evidence that countries experienced and are still experiencing the devastating effects of the pandemic, particularly on their economy, health, and education. This is demonstrated by lockdowns, travel restrictions, bans on social gatherings, and the requirement to follow health and safety protocols, including the "uncomfortable" practice of using face masks as a new way of life. Economic disruption, job loss, financial struggle, and social isolation were all associated with these impacts, and as a result, many people experienced stress as a natural reaction to such rapidly occurring adversity (Arslan et al. 2021).

Stress, as cited in Folk (2009, p. 551) is defined as the body's unspecific response to any demand. Everyone experiences stress at some point in their lives, regardless of age, gender, or circumstance (Currie et al. 2016), however it might present itself differently for each person. For some, it is evidenced through psychosocial problems in the form of depression and anxiety as identified in Arslan and Yildirim (2021). Other literature also present stress of financial nature as stemming from COVID-19 related occurrences like the worsening of financial situation of families as well as individuals as a result of unemployment, pay cuts and the laying off of labor. These tremendous changes brought about by COVID-19 to our practically monotonous way of life, both abruptly and gradually, significantly increased the levels of stress experienced by people and nations across scales and domains (Yildirim and Solmaz 2022; Arslan et al. 2021; Talae et

al. 2020). As a result, if its related problems are not discovered, acknowledged, and addressed appropriately, the stress caused by COVID-19 could lead to chronic psychopathology and harm a substantial number of people (Arslan et al. 2021). Thus, understanding the former will assist build tailor-made therapies targeted to reduce stress levels of students, which will in turn contribute to achieving holistic well-being of individuals, as the sources of stress vary despite identical stress reactions evoked by the body.

However, every impacted country's educational sector experienced stress symptoms owing to COVID-19. By the 18th of March 2020, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) reported that 107 countries had adopted national school closures related to COVID-19, affecting 862 million children and young people, or about half of the global student population (Russel et al. 2020). According to UNESCO figures, the crisis affected about 363 million learners globally, from pre-primary to tertiary, including 57.8 million students in higher education (UNESCO 2020b). Additionally, Cao et al. (2020, p. 00) present that the continual spread of the epidemic, tight isolation measures, and delays in the commencement of schools, colleges, and institutions across the country are projected to have an impact on the mental health of undergraduates. There had also been reports on the psychological impact of the pandemic on the general public, patients, medical personnel, children, and the elderly. According to UNESCO (2020a, p.00), the pandemic affected over 1.5 billion pupils and youth, with the most vulnerable students bearing the greatest burden of the damage.

Similarly, Ghana as a country was not was not left out in the discussion of these impacts on countries. Following the spread of the COVID-19 virus, there was a disruption in educational activities in the country, producing anxiety and fear among students from primary school to tertiary level (Owusu-Fordjour et al. 2020). With the closure of schools and institutions in Ghana, students on both sides got stuck and completely unsure of what to do next in terms of academics. This resulted in various types of stress among the youth, in addition to an inability to study well. The university students were the most numerous of these students. Although it is clear from the preceding that where COVID-19 is present, the negative stress on students' health, mental health, academics, and emotions is of particular concern. However, there is not much literature on the subject, thus it is vital to investigate the many types of stress that students experienced during the COVID-19 pandemic.

Meanwhile, all countries are working to coordinate efforts toward the global achievement of sustainable development goal (SDG) 4, which focuses on quality education. The country's contribution to achieving this goal may be harmed if we do not grasp the root causes of the country's low educational quality. The abrupt transition to distant learning, social isolation, and uncertainty about academic success and future possibilities have all led to increased stress among students. The need for focused support, mental health services, and appropriate coping methods is critical to mitigating the pandemic's negative effects on student well-being in Ghana's higher education sector.

In light of this, the researcher believes it is vital to investigate the effects of COVID-19 and the stress associated with it among level 400 sandwich students of the Counselling Psychology department at the University of Education, Winneba. Therefore, the objectives of this paper were to examine the stress symptoms among students of Counseling Psychology, examine the effects of stress among sandwich students of Counseling Psychology, and to examine the challenges encountered by sandwich students in as a result of COVID-19 stress. Stemming from the objectives, the research questions were: i. What are the stress symptoms among students of Counseling Psychology? ii. What are the effects of stress among sandwich students of Counseling Psychology? iii. What are the challenges encountered by the sandwich students as a result of COVID-19 stress? Addressing these questions will lay a foundation for further research into the link between COVID-19 and stress among students in other places of higher academic pursuit such as the Technical Universities and the Colleges of Education/Nursing in order to aid achieve sustainable outcomes in education.

## Method and Materials

### Data collection and Sampling

This study used a descriptive survey methodology in order to investigate the effects of COVID-19 on stress among level 400 sandwich students in the counselling psychology department. The researcher used a survey to collect data because it allows the researcher to establish respondents' perspectives on present practices for an easy description of the situation and to offer intelligent recommendations to improve the situation (Cohen et al., 2007). As a result, a questionnaire was designed as a data collection tool. This provided the researcher with the ability to sample population attitudes, which was especially appropriate given that COVID-19 stress was relatable at the time. The questionnaire enabled respondents the freedom to express themselves without fear, and it also delivered vast amounts of data at a minimal cost over a short period of time. The questionnaires were created based on the findings of the literature study and the research objectives. The census sample technique was employed to pick the respondents, so all 66 students in level 400 counselling psychology were used for the study.

The questionnaires were deliberately intended to be as brief as possible, with questions following one another in a logical and chronological order. The questionnaire was separated into sections corresponding to the many concerns being investigated, with the easier questions being asked first. Following that, the first set of questions was designed to elicit information on the respondent's demographics (i.e., gender, age, educational level in the department). The second section of the questionnaire dealt with COVID-19 stress among level 400 sandwich students. The third section of the questionnaire focused on the impact of COVID-19 stress on level 400 sandwich students. Part four discussed the efficacy of stress management measures.

### Data analysis

Data generated from the respondents were represented in tables and analyzed using SPSS. This was done determining the frequency and percentage of their responses and further interpreted to give meanings to the figures obtained.

## Results and Discussion

**Table 1 Respondents' Socio-demographic data**

<b>Gender</b>	Frequency	%
Male	33	50.0
Female	33	50.0
<b>Total</b>	<b>66</b>	<b>100.0</b>
<b>Age</b>	Frequency	%
20-30	64	97.0
31 and above	2	3.0
<b>Total</b>	<b>66</b>	<b>100.0</b>

**Source: Field Work, 2022**

From table 1, the respondents are both male and female with equal representation in the study. Both males and females constitute 50% of the respondents each with 33 respondents for both sides. It is also evident from the table that the majority of ages of the respondents in the study ranges from 20-30 years representing about 97%. The staggering minority constitutes approximately 3% of the study population with only 2 respondents. This interprets that the study population is youthful. This reflects the reports of UNESCO, 2022a.

### **COVID-19 Stress symptoms among university students.**

The diverse indications of COVID-19 induced stress which were obtained from the study are presented in Table 2. The most notable of them is the fact that the pandemic caused students to fear at the mere prospect that their final year of school had been delayed for a while and that when it had resumed there were so many limitations that learning was challenging. The likelihood of their not being able to understand what they are studying in order to write and pass their tests made this cause a great concern. This was also reflected in the students' levels of anxiety, with 64 out of 66 students, or 97%, expressing such problems. The findings from the participant replies are consistent with the work of Brooks et al (2020) that people mostly experienced fear, sadness, numbness, insomnia, confusion, anger, post-traumatic stress symptoms, depressive symptoms, low mood, stress, emotional disturbance, irritability and emotional exhaustion with some evidence proving that these consequences can be longer term also. This supports the fact that COVID-19 is having an effect on higher education, particularly for level 400 counseling and psychology students.

**Table 2 COVID-19 stress indicators among the level 400 sandwich students**

	Agree N (%)	Disagree N (%)
Anxiety	64(97.0)	2(3.0)
Sleeping disturbances	62(94.0)	4(6.0)
Psychological stress	63(95.4)	3(4.5)
Emotional disturbance	59(89.4)	7(10.6)
Decrease in academic vitality	45(68.2.)	21(31.8)
Panic concerning completion date	66(100.0)	0(0.0)
Mental stress	56(84.8)	10(15.2)

**Source: Field Work, 2022**

### **Effects of COVID-19 stress on students.**

Table 3 demonstrates that the effects of COVID-19 stress on pupils take many different forms. As 97% of the total responders, or 64 out of the 66, answered "COVID-19 poses a health threat to students," the majority gave a very accurate response. This is consistent with a component of the data (see Table 2) and a report that stated that many pupils experienced psychological issues as a result of the pandemic.

COVID-19 induced stress was also identified to consequentially result in posing financial threat to the students since the pandemic left many unemployed and a great number laid off. Therefore, the available financial resources being spent on purchasing of internet bundle in order to be able to partake in online learning as a result of the reduction in contacts as a preventive health measure. Also, a disruption in social relations through social activities was also realized from the study with about 90% of respondents being in agreement to the fact.

**Table 3 Effects of COVID-19 stress on level 400 sandwich students**

	Very True N (%)	True N (%)	Not True N (%)
Poses health threat	64(97.0)	2(3.0)	0(0.0)
Affects social activities	59(89.4)	6(9.1)	1(1.5)
Poses financial threat	60(90.9)	5(7.6)	1(1.5)
Disrupts learning activities	62(93.9)	3(4.5)	1(1.5)
Slows down academic activities	50(75.8)	12(18.2)	4(6.1)
Affects teaching strategies	66(100.0)	0(0.0)	0(0.0)



Affects assessment strategies	53(80.3)	10(15.2)	3(4.5)
Affects examination mode	49(74.2)	17(25.8)	3(4.5)

**Source: Field Work, 2022**

Again, based on the findings, COVID-19 was discussed to be strongly affecting teaching strategies for students with a numerical representation of 64 out of 64 which is 100% agreement (very true) to that effect. It is identified as affecting the learning activities of students representing 62(93.9%) out of the 66 students who partook in the study. The responses from the participants clearly indicated that the COVID-19 stress absolutely have some effect on the students in the University.

### **Resultant challenges of COVID-19 stress on students**

The findings in Table 4 show that the COVID-19 stress has a negative impact on the sandwich level 400 student's ability to succeed in the classroom. Participants reported having difficulty evaluating the information provided by lecturers in 66 responses, or 100%, and the same number of respondents reported spending too much on the data bundle for the online lectures. Additionally, 63 participants (95.1%) reported having difficulty evaluating teaching and learning resources. In a different approach, some respondents said in 60 (90.9%) of the responses that they find it difficult to write exams online.

**Table 4 Challenges COVID-19 stress possesses to the sandwich level 400 students**

	Strongly Agree N (%)	Agree N (%)	Disagree N (%)
Difficulty in accessing teaching and learning materials	63(95.1)	3(4.5)	0(0.00)
Excessive spending on data for online studies	66(100.0)	0(0.0)	0(0.0)
Challenge of writing examination online	60(90.9)	5(7.6)	1(1.5)
Challenge of accessing information from lecturers	66(100.0)	0(0.0)	0(0.0)
Challenge of accessing online portal for teaching	50(75.8)	14(21.2)	2(3.0)

**Source: Field Work, 2022**

### **Conclusion**

Stress brought on by COVID-19 is an obvious reality. Students in Ghana faced extraordinary difficulties as a result of the pandemic. In this study, we found that among the level 400 counseling physiochology students at the University of Education, Winneba, some of the varied indicators of this stress were mental health issues, poor academic performance, and emotional stress. This study found that the COVID-19 stress effects interfered with teaching and learning procedures in addition to having an influence on students' lives. Challenges including difficulty obtaining teaching and learning resources as well as information from lecturers have emerged due to these effects, among many others.

COVID-19 stress clearly has a considerable impact on higher education, and mitigation methods must be integrated. As a result, policy actions must concentrate on mitigating the virus's effects while also supporting the country in moving closer to long-term educational achievement. This would considerably contribute to developing a more welcoming, adaptable, and supportive higher education atmosphere in a post-pandemic society.

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## Strengthening Students' Knowledge of Basic Thermodynamic Concepts Using Structured Inquiry-Based Instruction

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### Abstract

*The study compared the achievement of Senior Secondary School Two (SSS2) chemistry students in basic thermodynamic topics between structured inquiry-based instruction and the traditional method of teaching chemistry. One hundred and nine sampled students were randomly selected from six secondary schools, who actively engaged in six weeks of structured inquiry-based instruction and participated in pre-test post-test were samples for the study. The structured inquiry-based instruction was constructed in line with the identified students' learning difficulties in thermodynamics. The inquiry-based instruction featured meaningful engagement in tasks, problem solving, group work, exploration, investigation, questioning, discussion and communication. The test was constructed to determine the students' critical reasoning in application, analysis, synthesis and evaluation of basic thermodynamic concepts rather than memorization of the concepts. The test and the structured inquiry-based instruction were validated by two chemistry educators and the test reliability coefficient was highly positive using pre-test post-test technique. The study identified students' learning difficulties in thermodynamic concepts. The result showed that, the structured inquiry-based instruction improved students' achievement in thermodynamic concepts. There was a significant difference in the students' achievement between the traditional method and inquiry-based instruction using paired t-test statistical method in favour of inquiry-instruction. The study recommended provision of learning resources and chemistry teachers' adequate knowledge of learning pedagogy and chemistry contents in implementing well-structured chemistry curriculum.*

**Keywords:** *Inquiry-based Instruction, Learning Difficulties, Students' Achievement, Thermodynamic Concepts.*

### 1.1 Background to the Study

Thermodynamics in chemistry is the study of the relations between heat, work, temperature and energy. Thermodynamics is concerned with transfer of energy from one place to another and from one form to another. Energy transformations accomplish both the physical and chemical processes. Chemistry is the study of the nature of matter; its compositions, properties, uses, transformations and energies that accomplish the transformations. Chemistry gives explanations to everything in the physical world we live in. Chemistry is central and basic foundation for all sciences and technology. It has links with medicine, industries, earth, and everyday life activities. Chemistry is relevant and have made essential contributions to human life, society, industry and civilization.

The study of Chemistry starts from Senior Secondary School in Nigeria and its major objectives are to develop students' interest in chemistry, science, technology and mathematics, acquire basic theoretical and practical knowledge and skills in Science, Technology and Mathematics (STM) and adequately prepared students for further studies in chemistry and chemistry related courses among others. The contents of chemistry are organised around four themes of the chemical world, chemistry and environment, chemistry and industry and chemistry and life. The chemistry curriculum is structured around these themes to address the three major issues identified as globalization, information communication technology and entrepreneurship. The globalization, information communication technology and

entrepreneurship are the major factors that shape the development of nations worldwide and influence the today's world of knowledge.

The Nigerian Chemistry Curriculum is packaged with contents that will lead to self-actualization by the students. The curriculum contents are to be taught with practical activity in order to inculcate the learners with the spirit of enquiry (Federal Ministry Education, 2007). If the chemistry curriculum is effectively implemented, it will enable the learners to achieve the maximum potentials in the subject and its various applications. The effectiveness of the chemistry curriculum implementation is relied heavily on the chemistry teachers' ability to facilitate learning of the contents and to motivate students to learn.

The learning of chemistry should be related to constructivism learning theories for effective implementation. The cognitive constructivists view learning as an active, contextualized and complex process of constructing knowledge from environment rather than acquiring knowledge by being told by the teachers. (Dewey, 1949; Bruner, 1967; Ausubel, 1968 and Piaget, 1983). Similarly, to social constructivists, knowledge is a human product which is socially and culturally constructed from experience (Vygotsky, 1978). For a child to know and construct knowledge of the world, the child must act on objects and it is this action which produces knowledge of these objects.

Learning is an active process that includes selection and transformation of information, decision making, generating hypotheses, and making meaning from information and experiences. Bruner opposed Piaget's notion of readiness (cognitive development/ maturity). Bruner believed that a child of any age is capable of understanding complex information. However, learner cognitive maturity is important to be able to understand the fundamental ideas in learning scientific concepts / topics

Bruner stressed that learners' construct knowledge from the environment and do this by symbolizing, organizing and categorizing experience / information using a coding system. The most effective way to develop a coding system is to discover it rather than being told by the teachers. Bruner believed that teachers are facilitators of learning.

Ausubel (1968) also emphasized that practical work creates a *discovery-reception continuum* as opposed to a meaningful rote learning experience. He argued that use of science process skills; measuring, observing, classifying and predicting are crucial for the development of fruitful understanding of scientific concepts, propositions for a meaningful use of scientific procedures, problem solving and applying scientific understanding to one's own life.

According to Vygotsky (1978), knowledge is not individually constructed but co-constructed among people. Vygotsky's Zone of Proximal Development (ZPD) was used to refer to the difference between what learners can do and what they could do with the assistance of others. Interactions with adults and peers in the zone of proximal development help learners move to higher levels of mental functioning within the classroom. Vygotsky believed that cognitive development is a result of speech and practical activities.

Quality education should be experienced and should be a necessity of life. The traditional teaching that is conventional employed in the delivering knowledge is authoritarian, strict, pre-ordained knowledge are not enough for students' understanding of concepts and principles in chemistry (Adeoye and Ajeyalemi, 2018). Inquiry-based learning is a student-centred teaching method. Inquiry-based learning is an activity-based learning and teaching process with multifaceted approach to teaching that gives students the opportunity to understand the processes of inquiry in science. Inquiry-based learning allows students to have meaningful understanding of scientific concepts and to acquire scientific skills in critical thinking, deductive reasoning, problem solving, creativity and communication (Adeoye, 2016; Ajeyalemi and Adeoye, 2018). The studies of Iryani, Iswendu and Patra (2021), Singh and Kaushik (2021) and Annisa and

Rohaeti (2021) also showed that inquiry-based learning signifies improvement on students' learning outcomes in chemical bonding modules, chemical kinetics and chemical equilibrium.

The structured inquiry-based learning in the study adopts approaches of meaningful engagement in tasks / practical work, problem solving, group work, exploration, investigation, questioning, discussion and communication to determine its effect on improving students understanding of thermodynamics concepts in chemistry.

### **1.2 Statement of the Problem**

Chemistry learning involves students understanding of chemical concepts, have abilities to present these concepts using signs, symbols, diagrams and use the chemical concepts to solve quantitative and qualitative problems. Many secondary school and university students experience difficulties with the understanding of fundamental concepts in chemistry. They hold inconsistent knowledge with chemistry concepts being taught (Kamisah and Nur, 2013 and Royal Society of Chemistry, 2019). Research findings have shown that chemistry students perceived certain chemistry topics difficult to learn and chemistry teachers also find it difficult to teach some chemistry concepts. (Adeoye, 2016 and Kyado, 2021). Most of the identified factors for the students' learning difficulties are abstract nature of chemistry, students' disinterest in chemistry, teachers' methods of teaching chemistry, lack of motivation from the teacher for students to learn and inadequate teaching resources. Students learning difficulties have resulted into students' poor performance in school examinations and consequentially reduce the manpower in Science and Technology.

Chemistry teachers hardly use practical activity to foster enquiry as recommend for the teaching of chemistry. The conventional method which involve the lecture method and teacher demonstration method are widely used in teaching chemistry. Hence, this study used structured inquiry-based learning to determine its effect in improving chemistry learning.

### **1.3 Purpose of the Study**

The purpose of the study is to identify the seemingly difficult basic thermodynamic concepts in Senior Secondary School Two (SSS2) chemistry curriculum, expose the students to structured inquiry-based instruction on the identified difficult areas and report the effect of this mode of learning on the students' understanding and performance in chemistry.

### **1.4 Research Question**

The research questions for the study are:

1. What are the learning difficulties the Senior Secondary School Chemistry Students in Form Two (SS2) have in thermodynamics concepts?
2. What is the effect of inquiry-based learning on the Senior Secondary School Chemistry Students Form Two (SS2) achievement in thermodynamics concepts?

### **1.5 Methodology**

The samples for the study were randomly selected from six Public Senior Secondary Schools in Oyo East Local Government of Oyo State, Nigeria. The chemistry students in Senior Secondary School Form Two constituted the samples for the study. The students in their intact classes in the randomly selected schools were used for the study.

The sampled students in each of the randomly selected schools were grouped into small discussion group of five members in a group. The structured inquiry-based instruction incorporated the basic components of inquiry-based learning composed of small group discussion, questioning, exploration,

experimenting, analysing, problem-solving and reporting were used to engage the students in thermodynamics concepts learning. The structured inquiry allowed the students take possession of their learning. The students learnt from their peers in the group, discussed their conceptions on some the basic thermodynamics concepts; forms of energy, energy conversions, endothermic, exothermic and enthalpy determination. The study commenced immediately after the students in the sampled schools had been taught thermodynamics by their chemistry teachers. The chemistry teachers with the researcher served as learning facilitators in the inquiry-based learning. They motivated the students to learn, setting up class activities, assigning roles to the students, ensuring students active participation in the learning, moderate their discussions, modifying students' inadequate conceptions in chemistry during the learning processes.

The research was for eight weeks; six weeks for the learning activities, a week for pre-test and a week for post-test. The structured learning and the thermodynamics test items were validated by two chemistry educators and found valid before use. The reliability of the test was determined using pre-test post-test technique with reliability coefficient of 7.89. The test was administered to the students before and after the learning activities. The students' responses to pre-test were used to identify and determine students' learning difficulties. Sequel to the determined learning difficulties, the structured inquiry-based instruction was developed. The scores of one hundred and nine (109) chemistry students that participated actively in the inquiry-based learning for the six weeks, that did the pre and post-test were analysed. The scores of the students were analysed using mean and t-test. The total score of the test was twenty marks.

### 1.6 Finding and Result

The following were the learning inadequacies that most SS2 chemistry students had before the treatment are:

1. Inability to identify types of systems in thermodynamics.
2. Concept of concentration of reactants on the enthalpy change in chemical reactions was not adequately understood.
3. Inability to determine the temperature rise of mixture and rise in temperature of neutralization of NaOH and HCl solutions.
4. Inability to determine the heat of dissolution of substances in  $\text{kJmol}^{-1}$  from experimental data.
5. Physical determination of endothermic and exothermic in reaction of substances base on temperature change was difficulty for the students.
6. Application of law of conservation of energy was not adequately understood by the students.

**Table 1: Students' Pre-test Post-test Scores and Paired T-values on Basic Thermodynamic Concepts**

Treatment	Mean Score	Standard Deviation	t (108) Calculated	t-critical
Pre-test	7.51	1.39	28.90	1.98
Post-test	14.17	2.0		

$\leq 0.05$  level of significance

### 1.7 Discussion of the Findings

The structured inquiry-based instruction has great improvement on the students' achievement in thermodynamic concepts with 14.17 mean score of the students while their mean score was 7.51 for the conventional method. The mean score of the students in inquiry-based instruction almost double their mean score on the conventional method. The students had mean gain score of 6.66 after the treatment. This

improvement in the achievement of the students in thermodynamics concepts after treatment may be that the students had moved from knowledge level of memorisation of chemistry concepts to higher reasoning levels of application, analysis, synthesis and evaluation in chemistry. The improvement in the students' achievement could also be that the inquiry-based instruction gave the students the opportunity to take control of their learning, actively participation in the practical activities and their discussions with their peers might have promoted their critical reasoning, reflection of the learning process, acquisition of correct conceptions in thermodynamics and interest in learning chemistry. This finding is supported by Singh and Kaushik (2021) and Annisa and Rohaeti (2021) who found that inquiry-based learning improved students learning outcomes in chemistry.

The further analysis of the students' scores using paired t-test showed significant difference between the conventional method and inquiry-based instruction at 0.05 level of significance for two-tailed test. The t-calculated value of 28.90. The t-calculated was greater than t-critical value of 1.98 at 0.05 level of significance. The result indicates that there is significant difference between the conventional method of teaching chemistry and inquiry-based instruction in favour of inquiry instruction. This finding is in support with the findings of Adeoye (2016) and Adeoye and Ajeyalemi (2018) that found inquiry-based learning to significantly promote students learning of chemistry concepts. The researcher envisages that the more of the inquiry-based instruction that chemistry students are engaged with, the more the students get accustomed to the inquiry-based instruction processes. This will result in significant learning outcomes in chemistry, not necessarily on the area of conceptual achievement.

## **1.8 Conclusion**

Inquiry-based instruction is a multifaceted method which requires adequate preparation for its use in the classroom. Chemistry teachers should be ready to motivate the students to learn in inquiry to improve the students' learning outcomes. In engaging students in inquiry-based learning effectively, chemistry teachers should structure the learning materials to incorporate the act of practical activities, questioning, problem solving, small group discussion, experimenting, exploration and recording which are essential components of inquiry in chemistry.

## **1.9 Recommendation**

Most of the students memorise scientific concepts without understanding the concepts and inability to use the knowledge to solve both qualitative and quantitative problems in chemistry. The curricula in science subjects are well structured but the implementation of the contents in inquiry is a huge problem for science teachers. Most science teachers find it difficult to organise and engage their students in inquiry because of their inadequacies in learning pedagogy and content knowledge of the science subjects. The following are therefore recommended:

- Qualified teachers in pedagogy and content knowledge areas should be employed to teach chemistry.
- There should be training and retraining for chemistry teachers in inquiry-based learning and other students-centred methods of teaching for students' active engagement in teaching and learning.
- Provision of learning resources in the science laboratories.
- Adequate supervision and monitoring of teaching and learning process by the educational agencies for proper implementation of the chemistry curriculum.

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## Effectiveness of Computer-Assisted Instruction for Learning English Language at the Manhean Community Primary School –Tema, Ghana

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### Abstract

*Despite the benefits associated with computer-assisted instruction (CAI) in teaching and learning basic school subjects, several basic schools in Ghana either do not have computer labs or appreciate the importance of CAI and how it can enhance the study of and performance in subjects, such as the English language. Besides, there is a modicum of empirical evidence on how CAI influences basic students' performance. This study therefore determined the effect of CAI on students' performance in English language at the Manhean Community Primary School in Tema, Ghana. The study was quantitative in nature, and employed the quasi-experimental design. A total of 134 out of 200 respondents were selected using the purposive sampling technique, based on the respondents' level of knowledge in the use of computer. English Language Achievement Test (ELAT) was used for data collection. Mean, standard deviation and the Analysis of Covariance (ANCOVA) were used for data analysis. The findings showed that CAI was better than the conventional instruction method (CIM). It was also revealed that there is no significant difference between mean scores of males exposed to CAI and females taught using CAI. Furthermore, the results indicated no significant interaction effect between gender and methods of instruction on students' performance in English language. It was concluded that, to that enhance students' achievement in English language, CAI should be given more attention. It was, thus, recommended that basic school teachers should be pre-exposed to CAI during their training programmes so that they can be effective in the classroom, afterwards.*

**Keywords:** Computer-assisted instruction, English language, Manhean Community Primary School

### Introduction

Recent advancement in technology has changed the way many things are done, including teaching and learning (Gongden & Gongden, 2019). Virtually, all levels of education have incorporated technology into their systems due to its flexibility, interactivity, creativity and innovativeness (Oka, 2014; Pelletier, 2019; Webster, 2014). Specifically, schools have resorted to the use of computer-assisted instruction (CAI) in their teaching and learning activities. CAI involves the use of tutorials, drill-and-practice, simulation, computer visualisation of complex objects, and computer facilitated communication between students and teachers, as well as problem solving approaches to current topics (Abonyi, 2005; Igwe, 2003). Özmen (2008) also termed CAI as the use of computer to expedite and improve instruction. According to Özmen (2008), there are many terminologies for CAI, including computer assisted learning, computer aided instruction, computer based education, computer based instruction, computer enriched instruction, and computer managed instruction, among others. Though CAI has been argued to make academic work simple and flexible, there is a limited empirical evidence of how effective it can be to learning various subjects, such as English language, in the basic schools (Pelletier, 2019).

Also, studies on the comparative effectiveness of the conventional method of instruction and CAI are still at the burgeoning state (Davies, Hancock & Condon, 2003), making it unclear which of these methods to adopt for higher instructional effectiveness (DeRue, Nahrgang, Hollenbeck & Workman, 2012). Moreover, the extant literature has shown that the effectiveness of CAI in students' performance is gender-based (Davies, Klawe, Ng, Nyhus, & Sullivan, 2004); however, little attention has been given to the interplay between CAI effectiveness and gender. It should also be mentioned that the constructivism learning theory underscores the link between technology integration into learning activities and

performance (Eddy, 2004; Piaget, 1980). These suggest that the effectiveness of CAI in comparison with the conventional instructional method, effect of gender on CAI effectiveness, and the interaction effect between gender and instructional method (i.e., CAI and conventional) on students' performance should be investigated.

The present study carried out this investigation at the Manhean Community Primary School in the Tema Metropolis of Ghana where the students were exposed to both instructional approaches (i.e., CAI and conventional). The focus was on the use of these instructional methods for English language teaching and learning activities, as prior related studies either focused on mathematics (Atta, 2015; Sedega, Mishiwo, Fletcher, Awuitor & Awudetsy, 2017) or biology (Tolbert, 2015; Yusuf & Afolabi, 2010), despite the fact that proficiency in English language is required for easy comprehension of concepts taught in other disciplines taught in the basic schools in Ghana (Sedega et al, 2017).

Specifically, the following hypotheses will be tested:

- There is no significant difference between the effectiveness of CAI and conventional instructional method (CIM), in terms of students' performance in English language ( $H_{01}$ ).
- There is no significant difference in the performance of students taught using CAI, with respect to gender ( $H_{02}$ ).
- There is no interaction effect between gender and instructional method (i.e., CAI and conventional) on students' performance in English language ( $H_{03}$ ).

The outcome of the study provides numerous benefits for students, teachers, and policy makers, as they will be exposed to vital information about the use of CAI and how they can strategically integrate it into the existing conventional methods of instruction to enhance students' performance. The findings will also make available empirical information on how CAI can be used to promote classroom participation, interactivity, confidence, inclusion and performance among basic school students. Furthermore, this study contributes immensely to literature, as it expands instructional methods knowledge base to English language and gender issues.

## **Materials and Methods**

The quantitative research approach which uses quantitative data to describe phenomena and focuses on measurements and numerical analysis of data to provide description and explanation between/among variables (Wilson, 2017; Levitt et al., 2018) was employed. The quasi-experimental design was used. This followed prior studies (Hibshman, 2005; Mills, 2001). In terms of participation, a sample of 134 (67 males and 67 females) out of 200 students, determined using Yamane's (1967) formula, was involved. The selection was done using the purposive sampling technique, based on the respondents' level of knowledge in the use of computer. The participants were put into two groups – experimental and control. The experimental/treatment group was made up of 66 students (33 females and 33 males) and the control group was made up 68 students (34 females and 34 males).

For data collection, a CAI package and a teacher-made English Language Achievement Test were used. The CAI package on English language was a self-instructional and interactive set of test that lasted for an hour for an average student to complete. Specifically, the computer instruction package was utilised for the CAI whilst the teacher-made achievement test was utilised for the conventional instructional method. The tests assessed the students' ability to respond to multiple choice questions (20-item multiple choice questions each) on concord (subject-verb agreement) and coordinating conjunctions (FANBOYS – for, and, nor, but, or, yet, so) using the traditional methods and the CAI programme. Data gathered from the results of the achievement tests was used to compare the control and experimental groups for the determination of CAI impact on students' performance. The CAI programme used to respond to the test questions was developed following the procedures by Suman and Rinku (2013). The construction process is as follows:

- Deciding on subject area
- Describing entering behaviour
- Describing terminal behaviour
- Analysis of content
- Sequence activity
- Model selection
- Contents of media
- Designing the interface
- Programme editing and reviewing
- Programme testing and evaluation

The programme was developed using Hypertext Markup Language (HTML4), Cascading Style Sheets (CSS), Hypertext Processor Language (PHP), My SQL and Java Script. English was the medium of instruction for the subject; thus, the programme was fixed in the English language. There was a built-in assessment for the students. The programme was partitioned into five different screens for flexibility:

1. *Homepage*: This is the first page of the programme. The students have to click the start button to get the CAI package running (Appendix B).
2. *Content-page*: The content page is the page after homepage. All the available sections or 'specific question' numbers are displayed here. By selecting a section or question number, the students can navigate to the main page.
3. *Main-page*: The main page comes after the content page. This page contains the text-screen, popup-menus, frequently asked questions (FAQs) button, assignment button, and subtopic selection popup.
4. *Assignment-page*: The multiple-choice English Language Achievement Test for students' evaluation is contained on this screen. This is for the students' self-evaluation and practice.
5. *FAQs page*: The multiple-choice English Language Achievement Test for students' evaluation is contained on this screen. This is for the teachers' evaluation.

The data collected from the two groups (i.e., treatment and control groups) was refined and organised for processing and analysis. To test the study hypotheses, the analysis of covariance (ANCOVA) was computed. To ensure that extraneous variables did not affect the reliability of the results, a number of control techniques were deployed. One, a training exercise was organised for the teachers who assisted in the study to establish a common standard. Two, all complete classes selected were involved in the study to avoid *Hawthorne effect* (a *laissez-faire* attitude that arises when students realise they are being used for experiment). All the classes took a pre-test, but the post-test was restricted to only the intact classes chosen for the study. Three, the treatment and control groups were not picked from the same class to ensure that the students in these groups did not exchange ideas and information. This was carried out in order to reduce blunders that might result from interaction among the participants in the two groups which might lead to *John Henry effect* (the spirit of competition triggered in students on realising that they are being used for experiment that requires comparison at the end). Finally, the same test was used for both pre-test and post-test, but the items were reshuffled for the post-test in order to avoid errors of memorisation.

## Results and Discussion

As indicated earlier, 67 females and 67 males took part in the study. Out of the 134 students, 10% was below the age of 10 years, 60% was between the ages of 10 and 16 year, whilst 30% was above 16 years. 32.8%, 33.6% and 33.6% were in Basics 4, 5 and 6, respectively. The test statistics are presented in tables 1, 2 and 3.

**Table 1: ANCOVA of students' performance by instructional approach (i.e., CAI & CIM)**

Variation Source	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	10656.903	1	10656.903	91.451	0.000	
Intercept	653383.948	1	653383.948	5606.933	0.000	
<b>Instructional methods</b>	<b>10656.903</b>	<b>1</b>	<b>10656.903</b>	<b>91.451</b>	<b>0.000</b>	<i>H<sub>0</sub>1</i> rejected
Error	15382.149	132	116.531			
Total	679423.000	134				
Corrected Total	26039.052	133				

Note: Average performance of students exposed to CAI = 78.75±9.13SD, and CIM = 60.91±12.23SD  
Source: Field survey (2023)

The results in Table 1 were based on the first hypothesis that there is no significant difference between the effectiveness of CAI and conventional instructional method (CIM), in terms of students' performance in English language. The statistics showed  $F = 91.451$  ( $p < 0.001$ ). These statistics compared the instructional methods – CAI and CIM. Since the significance value was less than  $\alpha = 0.05$ , the null hypothesis was rejected. This implied there was a noteworthy difference between the performance of students taught using CAI (78.75±9.13SD) and those taught using the conventional methods of instruction (60.91±12.23SD). This finding was consistent with Nwafor and Oka (2018), but disagreed with Pramila and Harsha (2012) and Tolbert (2015) who found no difference between mean scores of students taught using CAI and those taught using the conventional methods. This disagreement might be due to the fact that they focused on students other than basic school students.

**Table 2: ANCOVA for treatment group only (i.e., students taught using CAI) by gender**

Source	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	11004.144	2	5502.072	47.940	0.000	
Intercept	25067.854	1	25067.854	218.418	0.000	
<b>Gender</b>	<b>347.241</b>	<b>1</b>	<b>347.241</b>	<b>3.026</b>	<b>0.084</b>	Failed to reject <i>H<sub>0</sub>2</i>
Error	15034.908	131	114.770			
Total	679423.000	134				
Corrected Total	26039.052	133				

Source: Field survey (2023)

The results in Table 2 showed  $F = 3.026$  ( $p > 0.05$ ). This p-value was higher than  $\alpha = 0.05$ ; thus, failure to reject the null hypothesis that there is no significant difference in the performance of students taught using CAI, with respect to gender. This signified that there was no difference in the average performance of male and female students exposed to CAI methods. This finding correlated with Nwafor and Oka (2018), Pramila and Harsha (2012), Tolbert (2015), as well as Traynor (2003)

**Table 3: ANCOVA for students' scores by interaction between gender and instructional method**

Source	Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	11004.144	2	5502.072	47.940	0.000	
Intercept	653199.868	1	653199.868	62.423	0.080	

<b>Two-way interaction (Gender&amp;Instructional method)</b>	<b>242.196</b>	<b>1</b>	<b>242.196</b>	<b>2.128</b>	<b>0.147</b>	Failed to reject $H_0$
Error	14792.712	130	113.790			
Total	679423.000	134				
Corrected Total	26039.052	133				

Source: Field survey (2020)

Table 3 displayed the two-way interaction results, and the test statistics showed  $F = 2.128$  ( $p > 0.05$ ). Since the p-value was greater than  $\alpha = 0.05$ , the study failed to reject the null hypothesis that there is no statistically significant interaction effect between gender and method on students' performance in English language. This finding was in line with the finding and conclusion drawn by Nwafor and Oka (2018) that there was insignificant interaction effect between gender and instructional methods on performance. The finding also aligned with that of Mudasiru and Adedeji (2010) who reported insignificant interaction between gender and instructional methods used, being CAI or CIM, on students' performance.

### Conclusions and Recommendations

Basically, this study looked at whether there was any significant difference between the performance of students taught using CAI and those taught using CIM. Though the findings suggested that those taught using CAI had upper hand over those taught using CIM, gender could not be a limitation on a student's ability to perform after being exposed to CAI. Moreover, gender could not impact instructional methods' effectiveness in any way, in terms of their effect on students' performance. Taking these into account, it could be said that the more students, irrespective of gender, are exposed to CAI, the better their performance in English language.

Based on the foregoing, it was recommended that CAI should be incorporated into the curriculum of teacher training colleges so that the teachers could teach their students after they have been posted to the classroom to teach. Basic schools in Ghana should also focus on the use of CAI or use it in conjunction with CIM. It should, however, be pointed out that the study focused on only the Manhean Community Primary School, and this might limit generalizability of the findings; hence, further studies should include several basic schools in Ghana.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

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## **Innovative Distance Learning Model of Teacher Professional Development in Afghanistan, Maldives and Nepal**

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### **Abstract**

*The paper aims to contribute to existing scholarship on different models of Teacher Professional Development (TPD) in South Asia, especially Afghanistan, Maldives and Nepal. An initial landscape mapping study which comprised primary and secondary data collection was carried out to understand TPD in these three countries and contextualise the MATPD intervention. The study being qualitative, data from semi structured interviews was analysed using a deductive qualitative analysis approach along with desk analysis of policy and research reports. The study highlighted the top-down approach that often neglects teachers' needs and classroom context. There is a lack of opportunities to work with teachers collaboratively and develop contextualised knowledge of their work and challenges. Lack of a research culture amongst teachers and teacher educators for their professional development was identified. Based on the findings, various features were included in intervention to support continuous professional development. This intervention, Multi-Modal Approach to TPD in low resource settings (MATPD) is an innovative and transformational approach to TPD that adopts a continuous form of engagement to ensure lifelong learning. It aims to empower the fellows to become confident practitioners and facilitators within their community to share their acquired knowledge, experiences, and skills with others. Hence, this project has implications for educational policies on scaling in the Global South.*

**Keywords:** *Teacher Professional Development, Innovation, Distance Learning, Mentoring, Action Research, Education Policy*

### **Introduction**

Teacher Professional Development (TPD) in the Global South is critical for enhancing the knowledge, skills, and competencies of educators. The challenges faced in TPD are also similar across South Asia due to the existence of low resource contexts. Hence, three countries in South Asia, namely Afghanistan, Maldives and Nepal have been chosen for scaling the innovative TPD intervention model. This innovative model draws and uses the strategies and structures tried out in low resource contexts in India at Centre for excellence in Teacher Education (CETE), Tata institute of Social Sciences, India.

### **Challenges for TPD in South Asia**

However, this endeavour is accompanied by several challenges and pertinent issues that warrant attention. One of the primary challenges is the lack of adequate resources and infrastructure to support effective professional development initiatives (Sarangapani, 2021). Insufficient funding, limited access to technology, and inadequate learning spaces hinder the implementation of comprehensive and sustainable programs (Singh, 2021). Additionally, contextual factors such as cultural diversity, linguistic variations, and varying levels of teacher education and training pose additional hurdles to designing and delivering effective professional development programs in South Asia (Ramchand, 2021). Furthermore, addressing the specific needs of teachers in remote or marginalised communities and ensuring their participation and engagement remain significant issues in promoting inclusive and equitable professional development.

There is an urgent need to address the gaps in the professional development of teacher educators and teachers in Afghanistan, Maldives and Nepal, particularly in response to the requirements of the evolving educational reforms in these countries. The geographically constrained nature of the three countries poses additional challenges in the delivery of training to teachers in remote islands and areas are delivered through online courses and training to develop competency in teaching new curriculum, in higher demand. Some of these areas limit the internet accessibility and even with internet access being accessible, the internet connectivity issues are experienced. Thus, overcoming these challenges requires a multi-faceted approach that combines policy reforms, resource allocation, and inclusive pedagogical practices, all aimed at enhancing the professional growth of teachers in the Global South.

## **Objective**

In this paper, we discuss the issues related to TPD in three countries from South Asia- Afghanistan, Maldives and Nepal and propose an innovative design for TPD considering the challenges and limitations faced in the three countries. We first discuss in brief the educational policy context of the three countries. We discuss the qualitative research methodology in Landscape Mapping Study using desk analysis of research reports and policy documents from three countries along with semi-structured interviews of key stakeholders in the education system. The findings from the study are discussed and a design for an innovative TPD incorporating features of distance teaching-learning through blended/hybrid coursework, practice-based approach, social learning opportunities through professional learning communities are integrated to provide a holistic and continuous professional development opportunity.

## Country Context and Professional Development Challenges

### **Afghanistan**

There are approximately 3.7 million out-of-school children (OOSC) in Afghanistan. It is estimated that 95% of children with disabilities do not attend school. There are multiple reasons for this situation, including poverty, damaged and inadequate numbers of classrooms, shortage of teachers (especially female teachers) and relevant learning and teaching resources, lack of inclusive facilities at schools, cultural norms which deprioritize education for girls and long distances to schools for many children. (Education Cannot Wait, 2018-2021). Due to this unprecedented human crisis, the education system has been hardly hit and the right for education for Afghan children and youth is at stake. Sadly, 1.1 million secondary girls have been barred from attending school without any further notice. This has resulted in a 60% decline in female enrolment in higher education (UNESCO, May 2023).

### **Maldives**

Maldives is an island nation consisting of a chain of 1190 islands with only 200 islands inhabited. The geographical nature of the country results in only 1% of the country to be land and the remaining 99% to be sea. The main means of transport within the country is by sea, although domestic air transport is also available to a larger part of the country at present. Therefore, transportation becomes a major challenge for the country. Even with such existing challenges, education is accessible to all the islands and there are 216 higher secondary education schools in the country which is a significant number for a country who received the Developing Country status only in 2011. According to the Statistical Yearbook (2020), a significant 3776 students were receiving higher secondary education in the year 2019 and out of these, 1439 students were from the outer atolls. The government plays a main role in education.

In 2017, the Maldives spent lower percent on education when compared to other countries in South Asia, out of which 13% is for scholarships, training, grants and subsidies (Ministry of Education, 2019). Furthermore, the breakdown of the MoE budget is unclear and it is important that the appropriate funds are



allocated based on demographic, enrolment and other policy goals such as improving the quality of education (Ministry of Education, 2019). Moreover, some of these policies are not implemented properly and there is a serious issue in monitoring and evaluation.

Additionally, efforts were made to provide support and training to teachers using a cascade model by mentors/ teacher coaches to assist in implementation of the new curriculum (Ministry of Education, 2019), the need for rigorous and systematic professional development is required to develop the limited skills of teachers so that quality of education can be provided.

## **Nepal**

Nepal is defined as a federal democratic republic after the replacement of the Interim Constitution of 2007 by the Constitution of Nepal 2015 and has three tiers of government: local, provincial, and federal. As per the census 2011, Nepal has a diverse ethnicity with 126 caste/ethnic groups. As per the Central Bureau of Statistics record from 2011, the overall literacy rate has increased from 54.1% in 2001 to 65.9%, with 75.1% of male literacy as compared to a female literacy rate of 57.4% (Central Bureau of Statistics, 2022). The disparities in access to education for different groups remain a risk for the population and the country. This includes different gender groups, socio-economic groups, and linguistic groups. Given the prevalence of the growing private sector, the gap between the different groups is widening and presents a challenge to the country's education system (MoEST, 2021). In the context of Nepal, COVID-19 has had serious impacts on pupils' learning, social, emotional, and mental well-being (Dawadi et al., 2020).

There are a total of 36032 schools in Nepal: 28659 are government schools and 7373 privates with a total of 1,53, 275 teachers in government schools and 85,876 private schools respectively.

The net enrolment rate of girls and boys at basic level (1-8) is 95.7 and 96.5 respectively while at the secondary level (9-12) it is 55.7 and 59.4 for girls and boys respectively. (Flash Report, 2019). There is still a significant number of children who are out of school.

As per recent UNICEF MIS Data for the country, a total of about 387, 300 primary school-age children and 75,000 lower secondary school-age children were out of school. At the upper secondary level, the number of out-of-school children is 151, 900.

Professional development of teacher educators is not a key focus area for the policy makers, as it does not find a mention in the national educational policy and educational strategic plans. There is no budgetary allocation for the same. There is thus a lack of opportunity to develop the capacity of mid-level teacher educators and for them to work with teachers and develop a contextualised knowledge of their work and challenges. The TPD programs in Nepal are designed centrally through a top down approach, thus not adequately addressing the actual needs of the teachers and the classroom context. Action Research is an integral part of in-service teacher education mandated by policy guidelines. However, it rapidly falls out of practice once the training is over and teachers are back in classrooms as they merely write up action research reports to qualify for promotion. There are low levels of ICT skills and knowledge for classroom instruction and practice.

## **Research Method and Materials**

The study is of qualitative design. The data collection was done in a two stage "Landscape Mapping" process (Table 1). In stage one, we collected secondary research (desk research). The aim of collecting secondary data was to develop a holistic understanding of TPD in Afghanistan, Maldives and Nepal, The desk research data was supplemented with the primary (interview) findings- Stage Two. This approach enabled us to understand the gaps between policy and practice and accordingly design a contextualised model of TPD that is democratic, collaborative and facilitates co-learning to take place.

Table 1: Landscape Mapping Process

Landscape Mapping Process	
Stage 1: Secondary Research Review	Stage 2: Interviews with key Stakeholders
<ul style="list-style-type: none"> <li>● Secondary research (desk research) carried out which included reviewing varied secondary literature on the different themes (See Appendix I)</li> <li>● A total of 104 documents were reviewed.                             <ul style="list-style-type: none"> <li>· 34 from Afghanistan,</li> <li>· 27 from Maldives and</li> <li>· 43 from Nepal.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● In-depth semi-structured interviews were administered to a diverse cohort.</li> <li>● 26 participants selected through purposive, convenient and snowball sampling techniques in order to understand the experiences and perspectives of the policy makers and practitioners regarding TPD.</li> <li>● Stakeholders were selected based on their professional background, type of institutional affiliation (government, private) and gender (See Appendix II).</li> </ul>

The method chosen for data analysis is deductive qualitative analysis. To get deeper insights from the responses, coding of interviews was done using an inductive approach where the coding and the themes generated are directed by the research questions, literature review and the interview data. The phases of thematic analysis described by Braun and Clarke (2006) allow for a systematic way of seeing, as well as processing qualitative information using coding, facilitating a nuanced interpretation of patterns and trends.

### Findings from the Study

Based on document analysis of policies and research papers and analysis of interviews, the status of TPD in the three countries could be identified. The analysis helped in identification of the TPD initiatives and models that are currently in use in the three countries, the status of knowledge of teacher educators and teachers about the continuous modes of teacher professional development like action research, mentoring, social networks and supports for learning and use of ICT for fostering TPD.

### Teacher Professional Development in the three Countries

#### Afghanistan

There has been focus largely on pre-service teacher education in Afghanistan in the past years. In-service teacher education has been mostly supported by Non-Governmental Organisations or Donor agencies. The government led national professional TPD initiatives implemented in Afghanistan have included, the Education Quality Improvement Program (EQUIP I-II) and In-service education training (INSET I-V).

Credentialing Framework for Teachers in Afghanistan (2016) included provision of incentives for teachers to continue professional development throughout their careers and monitoring of teacher progress through Teacher Professional Growth Plan (TPGP).

The models of delivering TPD in Afghanistan have varied from in-service and pre-service teacher training to the use of ICT, short-term workshops, and research. Some of the platforms used in the delivery of TPD include Zoom, WhatsApp, webinars, television, and Radio. The teacher educators and the teachers in the system are not familiar with the concept of Action Research, and hence not used as a tool to aid professional development or enhance teachers' practice. Mentoring is a very new concept. Though not institutionalised formally within the education system it takes place informally through the Teacher Learning Circle (TLC) concept. This facilitates professional development through collaborative learning and reflecting on practice.

## **Maldives**

TPD is an important element in the mandate of the Ministry of Education and according to the PD policy (Ministry of Education, 2009b), schools are required to conduct a minimum of 15 hours of PD for the professional employees annually. PD is often seen as a responsibility of the school management rather than a lifelong learning process by the teachers (Moosa, 2018). According to Zuha et al, (2021), PDs are conducted in the form of workshops, courses, seminars and research mostly. Moreover, despite the number of hours required for PD, it was revealed from the findings that the themes for PD were rarely focused on teachers' pedagogical practices. The overall challenge identified was that the current practices for PD are insufficient and identified the need for more curriculum related training (MoE & HoE, 2019).

The National Institute of Education, Maldives, had conducted a series of workshops for teachers as reflective practitioners and action researchers in 2016. A total of three workshops with 122 teachers from 13 schools participated in this workshop. Even though the aim was to develop a research culture among teachers and raise awareness of its importance for teachers, it was concluded that teachers rarely engaged in doing action research.

Mentoring is a practice that is currently used in pre-service training to some extent, even though it is not so meaningfully implemented in in-service teacher training. Mentoring exists informally in schools and since there is no policy yet, NIE states that work on developing a policy is in progress.

Distance mode of education is necessary in the Maldives due to the dispersed nature of islands throughout the country and therefore, ICT plays a major role in this. To ensure continuity of education during the pandemic the MoE decided to implement dual modes of teaching and learning: online classes and telecasted lessons via television, locally known as 'Telekilaas'. Telekilaas sessions were developed and recorded to be telecasted by the Public Service Media, PSM. However, these initiatives have focused on delivering the content to the students rather than developing the knowledge and skills of the teachers in creating digital content for active learning of students. Thus, there are challenges in training and motivating teachers to utilise ICT in education.

## **Nepal**

The country's National Educational Policy (2019) focuses on teacher professional development (TPD) and highlights the need for continuous professional development of teachers through modalities such as customised trainings, workshops, seminars, collaborative research, observation tours, reflections, teacher networks, mentoring, coaching. Professional development of teacher educators comes across as an insignificant space for policy makers, as there's neither a mention in the policy nor a budgetary allocation for the same.

In Nepal, professional development experiences are provided by The Centre of Education and Human Resource Development (CEHRD) under the Ministry of Education, Science and Technology. The certified training is provided through 7 provincial education training centres across the country. Every government schoolteacher in the system is required to undertake this training once every 5 years. The

training at the ETCs is provided by CEHRD master trainers and roster trainers. Roster trainers are experienced teachers and teacher educators in the system. They are recruited to support training, given the reduced training personnel at the provincial level.

The 30 days program is designed based on the TPD framework and teacher competency framework (2015), focuses on content, pedagogy and project-based tasks. The teachers are mandated to carry out Action Research, but its implementation is weak in practice as teachers do not engage in field practice. Action research reports are often plagiarised and put together as a deliverable rather than a tool for improving their teaching practices.

Blended approach to TPD is not a common practice and is very recent. Use of ICT gained momentum only with the covid-19 pandemic in the country and primarily used for the purpose of schooling using applications like zoom, messenger, google meet and PowerPoint. Teachers are not trained on how to use ICT thus have limited skills and competencies to use it constructively for teaching-learning.

There is ineffective translation of training skills and competencies into classroom pedagogical practices, change in beliefs and student learning outcomes. These could be attributed to low budgetary allocation for professional learning programs; centrally designed programs that are not need based and contextual, weak monitoring systems and lack of an institutionalised mentoring process enabling teachers to develop for themselves and take ownership of their own learning and lack of motivation to attend TPD trainings and implement practice-based action research to improve their teaching practice and beliefs about teaching-learning. The private school teachers are not part of any institutionalised formal training programs that the government offers and hence, have fewer capacity building opportunities.

## **Discussion**

The Landscape Mapping study has identified several gaps pertaining to the facilitation of professional development for teacher educators and teachers. There are inadequate opportunities for teacher educators to collaborate closely with teachers, hindering the development of contextually informed insights into teachers' challenges and work dynamics across the three countries. In addition, there are limited avenues for fostering the growth of communities among educators, impeding the sharing and augmentation of knowledge pertaining to teaching-learning processes and TPD. There is a necessity for cultivating a research-oriented culture among teacher educators and teachers, which can be realised through engagements in field-based research endeavours aimed at identifying challenges and formulating contextually tailored solutions. The study shows the need for an online or blended curriculum catering to teacher educators and teachers, aimed at enhancing their professional practices by incorporating reflective and collaborative skills to address the lack of access to quality teacher education in geographically remote areas. These countries employ top-down or centralised methodologies for TPD, it signals the urgency for the educational system to explore collaborative modes of professional growth, including mentoring and coaching. The teachers also need to be supported to advance the understanding of how student-centred and constructivist pedagogies can be effectively contextualised within the unique educational landscapes of each country, thus promoting meaningful student learning experiences.

The study has also revealed certain challenges specific to individual countries. Noteworthy among these challenges are the imperative to amplify the use of Information and Communication Technology (ICT) in remote regions of Nepal and to foster inclusive pedagogical approaches, particularly in the context of multigrade teaching on isolated islands in the Maldives. Moreover, the issue of gender inclusion emerges as a significant concern in Afghanistan.

Furthermore, the LMS has recognized several positive aspects. Encouraging trends are evident, such as the progression towards inclusive educational settings in Nepal and the Maldives, wherein efforts are being directed towards accommodating diverse learning needs. Additionally, the integration of ICT is

gaining prominence. Non-Governmental Organisations (NGOs) are also playing a pivotal role in supporting educational endeavours and facilitating the professional advancement of teachers in Afghanistan.

### **An Innovative Mode of TPD - A Multimodal Approach to Teacher Professional Development (MATPD)**

The findings of the LMS helped to identify the challenges and opportunities available for designing an intervention for TPD. Some of the work of the Centre of Excellence in Teacher Education has also helped to identify the design features necessary to support teacher educators and teacher PD in developing essential beliefs, knowledge and skills. These insights led to the design of MATPD for scaling TPD principles in the global south. Some of the principles are discussed in the next paragraph.

The MATPD intervention is built on principles of active learning, collaboration, reflection, expert coaching aims to develop reflective and collaborative practitioners through professional learning experiences of distance education courses, social learning, contextual and collaborative practice-based action research and mentoring by academic and field mentors. These characteristics have been found to contribute towards positive change in teachers' practice through earlier research (Hammond et al., 2017). This project attempts to provide opportunities to a diverse range of practitioners as fellows to engage in collaborative action research by providing opportunities for capacity building and funds through a South Asian teacher Educator fellowship. Fifteen fellows were selected in each country for the South Asia Teacher Educators (SATE) fellowship wherein they received capacity development workshops, online courses and conducted collaborative action research with teachers in their respective countries. The fellows were experienced teachers, Non-Governmental Organisation workers, government officials and teacher educators who designed TPD and mentored teachers during action research. These practitioners identified "problems of practice" in collaboration with teachers. Some of the fellows conducted two cycles of action research modifying the design of TPD or classroom implementation after collective reflection with teachers. The analysis of what fellows learn as a result of engagement in the intervention is underway

### **Conclusion & Recommendations**

The major findings pertaining to TPD in the three countries suggest that TPD needed to be strengthened by incorporating more opportunities for teachers and teacher educators to work collaboratively to solve the existing problems in their countries. Thus, the MATPD model addressed these limitations by providing avenues for teachers to engage in action research simultaneously being mentored by professionals. The action research studies also focused on important aspects of education such as ICT, inclusion and reflective practices.

### **Disclaimer**

The views expressed herein do not necessarily represent those of International Development Research Centre (IDRC) or its Board of Governors.

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## Appendix I

Sources	Documents
Ministry of Education website	<ul style="list-style-type: none"> <li>- Educational policies</li> <li>- Sector strategic plans</li> <li>- Annual Reports</li> <li>- Circulars</li> <li>- Impact study reports of effectiveness of TPD programs in the country</li> </ul>
UNICEF, other government ministry documents, and funding agency website etc.	<ul style="list-style-type: none"> <li>- Financial budget documents prepared by the government</li> <li>- Other related documents published by independent institutions</li> </ul>
Journal platforms	<ul style="list-style-type: none"> <li>- Journal papers on political-economic context of the country, school education system, teacher education, teacher professional development, action research, mentoring, distance education including ICT and inclusion</li> </ul>

## Appendix II

Country	Focus Area	Gender
Afghanistan	<ul style="list-style-type: none"> <li>- Curriculum Specialist</li> <li>- Senior Education and Research Specialist.</li> <li>- Programme Developers</li> <li>- Teacher Educators</li> </ul>	<ul style="list-style-type: none"> <li>- 5 Female</li> <li>- 2 Male</li> </ul>
Maldives	<ul style="list-style-type: none"> <li>- Independent Consultant</li> <li>- School Principal</li> <li>- Teacher Educator</li> <li>- Government Official</li> <li>- Leading Teacher</li> <li>- Official from Teacher Association</li> </ul>	<ul style="list-style-type: none"> <li>- 4 Female</li> <li>- 4 Male</li> </ul>
Nepal	<ul style="list-style-type: none"> <li>- Government Functionary-3</li> <li>- Teacher Training Institute-3</li> <li>- Non- Profit Organisation-3</li> <li>- Consultants-1</li> <li>- Aid Agency-1</li> </ul>	<ul style="list-style-type: none"> <li>- 3 Female</li> <li>- 8 Male</li> </ul>