Journal of Science Education
Volume: III, Issue II, 2021, 61–80

Science Teachers as Reflective Practitioners at Higher Secondary Level: A Demand for 21st Century Teaching

Farkhanda Tabassum*
Qurat-ul-Ain Hina**

Abstract

The study investigated science teachers' perceptions about the reflective practice at higher secondary with the reference of 21st-century teaching demands. The objectives of the study were: to differentiate science teachers' attitudes about the reflective practice based on gender at the higher secondary level. The sub-objectives were to differentiate the use of reflective practices on the basis of gender, to differentiate the male and female teachers' strategies for reflective practice, to distinguish the teachers, professional development on the bases of gender, and the barriers in the use of reflective practice based on gender. The research was quantitative, and it was a descriptive study. The population was comprised of teachers of higher secondary level from tehsil Murree. A stratified random sampling technique was used to select the sample which included 300 hundred male and female science teachers. The data was analyzed with the help of the mean score and independent sample t-test. According to the findings of the study, female science teachers were more interested in reflective practice and male science teachers required training for reflective practice more than female teachers. This study depicts the interest of male science faculty in refresher courses and workshops for the improvement of professional skills. It was concluded that female science teachers face more problems for following the parameters of reflective practice as compared to male science teachers. It is recommended that training workshops may be conducted by the administration of educational institutions to prepare the science teachers for meeting the challenges of the 21st century.

Keywords: reflective practice, gender difference, training programs, barriers, refresher courses

* Corresponding Author: Assistant Professor (Education Department) National University of Modern Languages Islamabad. Email; ftabassum@numl.edu.pk
** Assistant Professor (Education Department) National University of Modern Languages Islamabad. Email: quahina@numl.edu.pk

Introduction

The teaching-learning process is swapping speedily in the 21st century and growing complicated over time so it is the need of the hour to address this aspect of education. This article refers to teachers as reflective practitioners with the reference of the multidimensional world which is circled with globalization and technology (Beetham & Sharpe, 2013). The main focus of this article is to define the teachers' reflective practices as a fundamental component of their practices. Godinz (2018) defined reflective practice as the essential part of teachers' educational endeavors and professional development which is supportive in highlighting fundamental knowledge and academic collaborative activities.

Reflective practice refers to the idea to improve the work quality by thinking and observing critically by one's own self in the field of education and it has an effective role in teaching. As it is a mirror to check the performance critically for futuristic decision making. Glendenning & Cartwright (2011) have described that teachers' professional skills can be improved through practices of reflection and their teaching strategies can also be upgraded. Reflective practice is helpful to think about past experiences to support the future. Schon (1987) has defined the reflective practice as a means of dealing with teaching problems and getting an effective solution. Schon has identified two ways of reflective practice, firstly "reflection on action" that teacher performs after teaching through pondering about his previous work. So, he evaluates his experiences for better performance in the future. Secondly "reflection in action" is followed by the teacher during his teaching for the analysis of the present situation and to get the solution of the existing problems during teaching.

Joyce (2015) found a significant relationship between reflection and teaching styles of the teachers which means that reflective practice is teachers' intellectual activity for understanding own experiences to get solutions. Teachers develop the pedagogical tools to facilitate the students according to their learning needs and check how much these styles are constructive for achieving the academic goals. Reflection helps the teachers to get cognitive awareness about the educational structure and teaching pedagogies. This practice surely exerts a profound effect on the routine of the teacher because effective teaching is the thinking, aptitude, and behavior of the teachers towards the teaching profession (Akbari, Kiany, Imani & Karimi, 2008).

Zhenhui (2001) did research in the Asian context and concluded that instruction can be made effective when the educators reflect on students' academic needs and their own instructional styles because the correlation

between students' needs and style of pedagogy enhance the quality of education. Zhenhui (2001) further mentioned that the diverse learning needs and abilities of the student persuade the teachers to think about their existing teaching methods according to learning conditions. Due to learners' different understanding levels, it becomes very important for teachers to critically analyze their teaching on regular basis. Students' learning is based on their discrete characteristics of understanding new information. Some students can understand well with the help of the lecture method, others need an activity-based learning style, some of the students rely on visual presentations. So, it is clear that individual differences in the learning of the students convince the educators to reflect upon their instructional methods. They may be capable of effective delivery of content to the students according to their dissimilar learning abilities.

The problem under investigation in this study is that while some experts in reflective teaching suggest different tools for obtaining the data that teachers need in order to evaluate their own way of teaching (Tice, 2002), they do not fully discuss the effectiveness of the tools regarding the data that teachers need to obtain. For instance, it is mentioned that "each procedure has advantages and limitations, and some are more useful for exploring certain aspects of teaching than others. The reader [teacher] will have to decide which procedures are useful and for what purposes" (Tice, 2002). This is the problem that needs to be resolved during the process of this research.

Review of Related Literature

It is obvious that arbitrating the role of the teachers is very important for the learners from the school level to the university level. Both the male and female teachers perform the academic duties according to the cognitive approach towards the teaching-learning process. Antoniou & Polychroni (2009) have stated that female teachers are more solicitous about the teaching-learning process than their male colleagues. They comprehend the academic requirements of the students vigilantly because they show more concern towards the students due to their motherly nature.

According to Hayat & Bibi (2016), female teachers are more proficient in performance due to awareness about professional responsibilities and more concerned about their professional attributes. Their study proved that female teachers are more career-oriented and motivated towards the teaching profession, so they do reflective practice more than the male teachers for professional development. Lenka & Kant (2012) indicated that female teachers think about improving their teaching

strategies for a better standard of their instruction and for fulfilling the needs of the learners.

Ahmad & Shafqat (2015) have highlighted in their study regarding gender differences in the teaching profession in the Pakistani context that the teaching profession is mainly called the female profession and they are encouraged to adopt this job. The females want to excel in teaching, so they reflect upon their teaching methods and try to enhance their professional capabilities. On the other hand, due to the high level of unemployment in Pakistan teaching is the last option for the male members of society. Mostly they do not feel comfortable in the teaching profession, and they do not try to expand their skills for development.

This article highlights that the science teachers may get awareness about reflective practice but there are many hurdles that affect their reflective practices and they get demotivated. It is obvious that different factors have impact on teachers, reflection and practices. Lack of resources, behaviors of administration and senior staff, lack of encouragement, additional burden on the teachers apart from the teaching also create challenges in teachers' reflective practice. Therefore, it is essential that such problems should be resolved in the teaching field before the application of different strategies of reflective practice in a classroom environment. So, it can be defined that complex educational issues can be treated through reflective practice which can enhance the efficacy of critical thinking. The concept of reflective practices has been introduced in different fields for many centuries, however, it got valued in the field of education for the last few decades. It is fact that teachers feel barriers in applying reflective practice tactics in the teaching profession, so it is necessary for teachers to polish their pedagogical skills through reflective practice. Practically teachers are facing many problems in performing reflective practices. Inflexible schedules discourage the teachers to reflect upon their own performance. It is observed that the teachers' attitude towards teaching learning process can be updated with the cooperation of administration (Maloney & Campbell, 2002). Graham & Phelps (2003) have stressed that both in-service and novice teachers should be motivated to do reflective practice. They should be encouraged to adopt different strategies of reflective practice for academic progression and professional development.

According to Tajuddin (2012) practitioners need more professional training about reflective practice in Pakistan so they will be able to improve their pedagogical skills for academic environment. He further stated that due to lack of awareness many teachers are reluctant to follow the various steps of reflection in their teaching. It is observed that there are a few major factors including workload, routine work, and lack of professional training which

become hinder in promotion of reflective practice among the teachers in Pakistan, especially in public sector educational institutions. To cope with such hurdles, it is indispensable to provide cognizance about reflective practice through proper training programs to the teachers for mindfulness about expanding their teaching methods. The approach of reflective practice can be appreciated by the administration as the high standard of the teaching-learning process in educational institutions through providing the teachers opportunities to reflect upon their own activities. Training programs can be held in schools and colleges for the skill development of the instructors which can help them to learn various techniques of reflective practice for analysis and evaluation. Further, the teachers learn the problem-solving methods to raise the standard of the academic atmosphere of educational organizations.

Larrivee and Barbara (2000) stated that traditional methods of teaching are hurdles in the application of reflective practice. The teachers are unaware of the modern pedagogical skills, so they are not accomplished to link the class practices with educational theories. Al-Hashimi (2004) has stressed on this point in his research that a conducive environment is essential for learning from experiences and augmenting their professional practices. He further mentioned that teachers' collaboration with the authorities and colleagues can bring encouraging results.

Mustafa (2005) included various types of barriers in performing reflective practices in a classroom environment. Assessment of the teaching strategies provides feedback for improvement but many of the teachers are reluctant to be assessed. They also consider it risky to discuss academic problems with the administration. Mustafa further mentioned that novice teachers are not trained enough to use the techniques of reflective practice actively. The main reason behind the lack of application is that process of reflective practice the analysis and critical thinking about own experience which is not an easy task for inexperienced teachers. That's why they consider the reflective practice as difficult activity. He also added that the teachers revealed an inclination to get the training through other resources like workshops, seminars, and different professional development programs rather than looking in to own activities for improvement through reflection.

Al-Jabri (2009) indicated that the teachers are compelled to follow only administrative policies in the teaching-learning process in many educational institutions so they avoid making decisions based on reflective practice and they blindly follow the organizational rules and regulations. Al-Jabri (2009) has also stated that lack of facilities and non-cooperative behavior of fellow colleagues reduce the level of motivation of teachers to integrate reflective

practices with their professional responsibilities. The senior teachers are mostly habitual to following the same practices and they are reluctant to experience new approaches for improvement It is observed in Pakistani public sector educational institutions that mostly local educational culture follows external resources for professional development.

Davies and Samantha (2012) have pointed out that teachers faced some difficulties in doing reflective practice. They need to prepare themselves as reflective practitioners. He stated that sometimes teachers are inexpert to check their practices as critical thinkers, so it becomes difficult for them to evaluate their own performance. It is concluded that there is a need for continuous critical thinking to reinforce the professional development of the teachers. In developed countries, many types of research have been conducted in this context but in Pakistan, there is a great need to integrate reflective practice with science teachers' professional attitudes and teaching strategies.

Statement of the Problem

In the present research, the researchers were interested to analyze the reflective practices of the science teachers at the higher secondary level. Further, this was a gender-based comparative analysis. Thus, the focus of the research was to compare science teachers' perceptions about reflective practice, science teachers' teaching 'strategies, continuous professional development, and barriers in the use of reflective practice on the basis of gender in the context of Pakistani education system.

Research Objectives

1. To differentiate science teachers' attitude about the reflective practice on the basis of gender at the higher secondary level

a. To differentiate the use of reflective practices for science students' learning practices on the basis of gender

b. To differentiate the science teachers' teaching strategies for reflective teaching on the basis of gender.

c. To differentiate in science teachers' attitude towards continuous professional development for reflective practice on the basis of gender.

d. To differentiate the science teachers' need for training for reflective practice on the bases of gender

e. To differentiate the barriers in the use of reflective practice on the basis of gender.

Null Hypotheses

Ho.1 There is statistically no significant difference in science teachers' attitude about the reflective practice on the basis of gender.

Ho1 (a) There is statistically no significant difference in the use of reflective practices for science students' learning practices on the basis of gender

Ho1(b) There is statistically no significant difference in science teachers' teaching strategies for reflective teaching on the basis of gender.

Ho 1(c) There is statistically no significant difference in teachers' attitude towards the continuous professional development for reflective practice on the bases of gender.

Ho1 (d) There is statistically no significant difference in science teachers' need of training for reflective practice on the bases of gender.

Ho1 (e) There is statistically no significant difference in the barriers in use of reflective practice on the basis of gender

Research Methodology

The research in hand is based on the quantitative approach. Quantitative analysis demands the numerical analysis of data. As the researchers were interested to test the hypotheses through quantifiable data, so this approach was adopted. Further the research was based on comparative style of research by method. For this purpose, gender was taken as the major factor to compare the research variables of reflective practice, use of reflective practice for science students' learning problems, science teachers teaching strategies for reflective teaching, continuous professional development training for teachers' reflective practice, and barriers in doing reflective practice.

Theoretical Framework of the Study

The framework of the present study is based on the following major paradigms of reflective practice: -

1. Science teachers' attitude towards reflective practice.
2. Use of reflective practice for students' learning problems.
3. Science teachers' strategies for reflective practice.
4. Reflective practice for continuous professional development (CPD).
5. Need of training for science teachers about how to reflect upon teaching.
6. Barriers for science teachers in doing reflective practice.

The questionnaire for the present study was developed to explore secondary school science teachers' attitudes towards reflective practice. This questionnaire was based on the above-mentioned paradigms of reflective practice

Population

The population of the study was male and female science teachers teaching in higher secondary schools of Tehsil Murree.

Sample of the study

A sample of 300 science teachers teaching at the higher secondary level (intermediate level) was selected for the collection of the data. A disproportionate stratified sampling technique was used for the collection of data. Among these sampled science teachers, 206 (69%) were male respondents and 94 (31%) were female respondents. The disproportionate stratified sampling was used only because of the reason that the male respondents were more willing to contribute to the data collection process while the female respondents were not accepting the request to fill out the data collection tool.

The following table explains the sample distribution

Table 1.

Sample of the Study

Category	Group	N	Percentage
Gender	Male	206	69
	Female	94	31
	Total	300	100

Development of Research Instrument

There were 75 items in the questionnaire which were developed according to the main concepts of this research paper. Instrument validity was checked by the experts. Some statements of the questionnaire were reshaped, and some statements were deleted by following the opinion of the experts. The questionnaire contained a five-point scale (1= Strongly agree to 2= Strongly disagree). The scale of reflective practice had six subscales which were Teachers' Attitude towards reflective practice, Reflective practice for Students' Learning difficulties, Teaching Strategies of reflective practice, Reflective practice for continuous professional development (CPD), Need of training for reflective practice, Barriers in doing reflective practice

The reliability of the questionnaire was determined by Alpha reliability coefficient.

Table 2.
Reliability of Scale of Reflective Practice (n=300)

Scale	Subscales	Items	Reliability
Reflective Practices Assessment Scale		75	.935
	Teachers' Attitude towards reflective practice	1-0	.725
	Ref practice for Students' Learning difficulties	11-20	.852
	Teaching Strategies of reflective practice	21-42	.865
	Reflective practice for CPD	43-55	.872
	Need of training for reflective practice	56-64	.910
	Barriers in doing reflective practice	65-75	.803

Table 2 shows the reliability of subscales. It shows that the reliability of all subscales was above the accepted range i.e. 0.7.

Table 3.
Inter Scale Correlation of the Research Instrument about Reflective Practice (n=300)

Section	1	2	3	4	5	6	Total
Teachers' Attitude towards reflective practice	1						
Ref practice for Students' Learning difficulties	.613**	1					
Teaching Strategies of reflective practice	.495**	.664**	1				
Reflective practice for CPD	.463**	.567**	.706**	1			
Need of training for reflective practice	.250**	.317**	.379**	.224**	1		
Barriers in doing reflective practice	.227**	.124*	.247**	.247**	.042	1	
Total	.685**	.764**	.883**	.812**	.498**	.470**	1

**. Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 3 explains the inter-correlation among the subscales of the Reflective practices assessment scale. The highest correlation was between the sections related to the teachers 'strategies and the reflective practices assessment scale (.883**).

Results

Table 4.

Gender-based Difference in Science Teachers' Attitude Towards Reflective Practice (n= 300)

Variable	Group	N	Mean	t	df	Sig
Gender base Difference in Science Teachers, attitude Towards reflective Practice	Male	206	37.60	4.27	298	0.00
	Female	*94*	40.19			

Table 4 depicts the mean difference in the scores of male and female respondents related to science teachers' attitudes towards reflective practice. The mean score of male teachers was 37.60 and the mean score of female teachers was 40.19. The table reflects that female science teachers have higher scores towards reflective practice as compared to male science teachers. The t value (4.27) was statistically significant at 0.01 level of significance Therefore null hypothesis that there is statistically no significant difference in teachers' attitude about the reflective practice on the basis of gender is failed to approve.

Table 5.

Gender-based Difference in Science Teachers' Attitude Towards Reflective Practice for Students' Learning Difficulties

Variable	Group	N	Mean	t	df	Sig
Reflective practice for Science Students' Learning Difficulties	Male	206	39.13	3.07	298	0.02
	Female	*94*	41.13			

Table 5 shows the gender base difference in science teachers' attitude towards reflective practice for students' learning difficulties. The mean value of male teachers was 39.13 and the mean score of females was 41.13.

The table demonstrates a higher level of female science teachers' concern towards the use of reflective practice for the learning difficulties of the science students than male teachers. The t value was 3.07 which was statistically significant. So, the null hypothesis that there is statistically no significant difference in the use of reflective practices for science students' learning difficulties on the basis of gender was failed to approve.

Table 6
Gender-based Difference in Science Teachers' Attitude Towards Teaching Strategies of Reflective Practice

Variable	Group	N	Mean	t	df	Sig
Teaching Strategies of reflective Practice	Male	206	81.55	0.80	298	*0.423*
	Female	*94*	*82.57*			

Table 6 revealed the mean difference of male and female science teachers towards the strategies of reflective practice. According to the results, female science teachers' mean score was 82.57 and the male science teachers' mean score was 81.55. The t value .80 was not significant. So our null hypothesis that there is statistically no significant difference in science teachers' strategies for reflective teaching on the basis of gender was accepted.

Table 7.
Gender-based Difference in Science Teachers' Attitude Towards Reflective Practice for Continuous Professional Development (CPD)

Variable	Group	N	Mean	t	df	Sig
Reflective Practice for teachers' Female CPD	Male	206	45.76	3.78	298	*0.00*
	Female	*94*	*49.66*			

Table 7 reflected gender base differences in science teachers' continuous professional development (CPD). The mean of female teachers was 49.66 which was higher than the mean of male teachers which is 45.76. The t value was 3.78 which is statistically significant. So, the null hypothesis that there is statistically no significant difference in science teachers' attitude towards reflective practice for the continuous professional development on the basis of gender was failed to approve.

Table 8.
Gender-based Difference in Science Teachers' Attitude Towards the Need of Training for Reflective Practice

Variable	Group	N	Mean	t	df	Sig
Need for of reflective Practice	Male	206	*38.30*	3.74	298	*0.00*
	Female	*94*	*35.66*			

Table 8 showed that the male teachers feel the need for training for reflective practice more than female science teachers. The t value (3.74) was statistically significant.at 0.01 level of significance. The mean of male teachers was 38.30 which is higher than the mean of female teachers which was 35.66. So, the null hypothesis that there is statistically no significant difference in science teachers' attitude towards the need for reflective practice on the basis of gender was failed to approve.

Table 9.
Gender-based Difference in Science Teachers' Attitude Towards Barriers in Doing Reflective Practice

Variable	Group	N	Mean	t	df	Sig
Barriers in doing reflective Practice	Male	206	*35.46*	4.21	298	*0.00*
	Female	*94*	*39.19*			

Table 9 shows t value (4.21) was statistically significant at 0.01 level of significance. The above table depicts that there is a difference in science teachers' views about barriers in doing reflective practice on gender bases. The mean of male teachers is 35.46 which is lower than the mean of female teachers which is 39.16. So, the hypothesis that there is statistically no significant difference in the barriers in the use of reflective practice on the basis of gender was failed to approve.

Discussion

According to the findings, female science teachers are following the reflective practice remarkably and their score in the study is greater than male practitioners which depict that there is gender based difference in the performance of science teachers with the reference of reflective practice. Fitz Patrick and Spiller (2010) have detected this difference in their study

that reflective practice generates the high standard of attachment with the profession which brings about the high performance of the teachers in the class and female teachers show better understanding of reflection to explore a sustainable alternative to producing success in achieving the academic standards. Generally, females are more interested in teaching and the results of this study have proved it. They come into the educational field by their own choice, so they mostly focus on the innovations in the educational process. These findings are consistent with the study of Rashidi and Rashidi and Javidanmehr (2012) who also identified the difference in male and female practitioners' reflective practices for retaining quality education.

Poyraz and Usta (2013) also concluded in their study that gender-based differences exist in applying reflective practices in an academic environment. The results of the study demonstrate a higher level of female teachers' concern towards producing the relationship between the theory and practices to resolve the students' difficulties in achieving academic success. Quinton and Smallbone (2010) had rightly described that practical application of reflective practice in the classroom is quite helpful for solving the classroom difficulties of the students and they get information in a collaborative way.

The reflective teaching tools which are usually applied are teacher diary, peer observation, audio recording, and students' feedback. In order to prepare a diary, the teacher writes about what happens in the class after each lesson. The Science teacher can note his "reactions and feelings and can add what teacher observes on the part of the students". It can be done by answering some general questions that form a teaching diary. To benefit from the peer observation tool, the teacher asks a colleague to attend his class and collect information about the lesson. It can be done through note-taking or "a simple observation task." Audio recording of lessons is considered a suitable tool in obtaining data used for reflective teaching. "You may do things in class you are not aware of or there may be things happening in the class as the teacher you do not normally see." Recording of lessons can be useful in showing the teachers different aspects of their behavior. Students' feedback is a tool used for finding out the learners' opinions and perceptions about the teaching process, and teachers' efforts that "can add a different and valuable perspective." The data can be obtained through questionnaires (Tice, 2002, pp. 2-3).

The findings of the present study regarding the strategies for reflective practice are also supported by Mathew (2017) who described all teachers can follow the reflective practice to create a systematic analysis of themselves without any gender difference. It helps them to reach diverse

students in an appropriate way. It is obvious that the teachers can learn new techniques of teaching to improve the teaching skills through constant observation of own their classroom experience. Teachers can be trained more about reflective practice to enhance the teaching-learning process in a classroom environment. Educational development is connected with the training of the teachers so they can follow new strategies and tactics for students' academic achievements. The results show that male science teachers are more interested in teachers' training programs and training workshops than female science teachers The reason may be that male science teachers have more time and they can update themselves for the teaching-learning process.

The results of the study are in the line with the findings of Mulryan-Kyne (2010) which shows that teachers face problems in class while applying reflective practice. Mostly the teachers face hurdles due to the large strength in the classroom and the lack of support from the authorities also demotivates them for reflection. Naseer Al-Jabiri (2009) revealed in his study that the teachers face difficulty in reflection during the teaching-learning process and sometimes they cannot get a suitable environment for various activities. Individual differences of the students also become challenging for the teachers while getting feedback during lectures.

Our teaching techniques are upgraded and enriched through reflective practice which stimulates the real concept of teaching-learning progression.

Conclusion

It is concluded that female science teachers are willing to bring innovation to the educational process. For this purpose, they use different tools for reflective practice like writing diaries and making lesson plans and making portfolios. It is concluded that female science teachers use the reflective practice as a tool to help students with backgrounds and they also evaluate the learning difficulties in the classroom environment. Overall, the results of this study designate the same strategies of reflective practice in both male and female teachers. But female teachers like to use innovative ideas and means of technology for getting better results of reflection. It is also concluded that the male teachers are willing to obtain information about reflective practice more than the female teachers. This study depicts the interest of male science faculty in refresher courses and workshops for the improvement of professional skills. It was also concluded that female science teachers face more problems for following the parameters of reflective practice as compared to male science teachers.

Recommendations

It is recommended that workshops and training session of reflective practice may be arranged for the science teachers at schools and at district level. So, the teachers will obtain the learning experiences and understanding of students' learning difficulties through adopting new strategies after reflection.

The administration of educational institutions can make the strategies to stimulate the reflective practice in science teachers for academic achievement of the students.

As this study discovered gender differences and diverse barriers for teachers in applying reflective practice in their professional routine so an operative and resilient framework for the teachers' professional development can be established to stimulate up-to-date teaching learning process which is the need of hour.

The following techniques can be helpful for the teachers to develop the reflective practices in the professional life

1. Read - around the topics you are learning about or want to learn about and develop
2. Ask - others about the way they do things and why
3. Watch - what is going on around you
4. Feel - pay attention to your emotions, what prompts them, and how you deal with negative ones
5. Talk - share your views and experiences with others in your organization
6. Think - learn to value time spent thinking about your work

Limitations

There were few unavoidable limitations of this study. Firstly, the researchers collected the data from science teachers at schools of Murree (Pakistan) only due to time and financial constraints. Secondly, although the structure and educational system of almost all the schools of Pakistan is similar but the results of this study may not be generalized to the greater parts of Pakistan because there is massive diversity in schools of all provinces of Pakistan within rural and urban areas. More studies can be conducted in area of reflective practice by taking huge sample size from other regions of Pakistan to authenticate the results of existing study. Moreover, the studies may be conducted within the comparison of Pakistan with other countries in context of teachers' reflective practice at different levels.

References

Ahmad. A, & Shafqat. M. (2015). Comparative study to investigate the sense of teacher efficacy between male and female teachers. *Asian Journal of Management Sciences & Education, 4*(2). 29-35.

Akbari, R., Kiany, G. R., Imani Naeeni, M., & Karimi Allvar, N. (2008). Teachers' teaching styles, sense of efficacy and reflectivity as correlates of students' achievement outcomes. *Proceedings. The Electronic Journal for English as a Second Language*, *11* (1), 1-22.

Al-Hashmi, A. (2004). *EFL teacher's practices of reflective teaching in Oman*. (Master's Thesis, Sultan Qaboos University, Oman). INTED2015, 1688-1698.

Al-Jabri,S. (2009) *Post-basic School Teachers' Attitudes towards Reflection*. Leeds, England: School of Education, University of Leeds.

Antoniou, A.S. Polychroni. (2009). Working with students with special educational Needs in Greece: Teachers' stressors and coping strategies. *International Journal of Special Education, 24*(1), 1100-111.

Baraiya. M. (2013). The relationship between high school teachers' quality and students' achievement. *International Journal of Humanities and Social Science Invention, 2*(9), 50-54,

Bax. S. & Cullen. R. (2003). Generating and evaluating reflection through teaching practice. Principal lectures presented at Canterbury Christ Church University College in Kent.

Beetham, H., & Sharpe, R. (Eds). (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning* (2nd ed.). New York, NY: Routledge.

Craig, R. (1994). Reflection and imagination: A holistic approach to teacher education, Teacher *Education Quarterly, 21*(3), 39-46.

Davies & Samantha (2012). Embracing reflective practice. *Education for Primary Care*. *23(*1), 9-12.

Denton, D. (2011) Reflection and Learning: Characteristics, Obstacles, and Implications. *Educational Philosophy and Theory*, *43 (*8), 838-852.

Fitzpatrick, M. & Spiller, D. (2010). The teaching portfolio: institutional imperative or teacher's personal journey? *Higher Education Research and Development*, *29*(2), 167- 178.

Glendenning F. & Cartwright L. (2011). How can you make the best use of feedback on your teaching? In D. McGregor & L. Cartwright (Eds.) *Developing reflective practice: A guide for beginning teachers.* pp. 165-186. Maidenhead, GBR: McGraw-Hill = Education.

Godínez, J. M. (2018). How effective is the collaborative reflective practice in enabling cognitive transformation in English language teachers? *Reflective Practice Journal. Taylor and Francis Online*, *19(*4), 246–427.

Graham, A. & Phelps, R. (2003). Being a teacher: Developing teacher identity and enhancing practice through metacognitive and reflective learning processes. *Australian Journal of Teacher Education, 27 (*2), 11-24.

Hayat.T, Bibi, T. (2016) Gender Influence on Emotional Intelligence and Professional Development among Secondary School Teachers Science International (Lahore), *28 (*1),645-652.

Ilyas,M. (2014). Reflection in teacher education programmes in Pakistan and the UK: A Comparison. *Journal of Research and Reflections in Education* December, *8(*2), 132 – 138.

Islahi, F & Nasreen, N. (2013). Who Make Effective Teachers, Men or Women? An Indian Perspective *Universal Journal of Educational Research, 1(*4), 285-293.

Joyce, P. (2015). *Reflective practice: Methods and tools for supporting teaching, learning and professional development.* Wellington, NZ: AKO Aotearoa

Kulkarni. (2000). A *comparative study of male and female secondary school teachers with respect to their personality traits, competency and teaching effectiveness* [Doctoral Dissertation. Shivaji University].

Larrivee, Barbara (2000). Transforming teaching practice: becoming the critically reflective teacher. *Reflective Practice, 1* (3), 293-307.

Lenka, S. K. & Kant, R. (2012). Emotional Intelligence of secondary school teachers in relation to their professional development. *Asian Journal of Management Sciences and Education. 1(*1). 90-101.

L. R. Gay, Geoffrey. (2012). *Educational Research: Competencies for Analysis and Applications (10th Ed).* Florida International University. ISBN13: 9780132613170

Maloney, C. & Campbell-Evans, G. (2002). Using interactive journal writing as a strategy for Professional growth. Asia-Pacific. *Journal of Teacher Education, 30 (*1), 39-50.

Mathew.P. *(2017)* Reflective practices: a means to teacher Development *Asia Pacific Journal of Contemporary Education and Communication Technology (APJCECT),3(*1),126-131.

Mulryan-Kyne, C. (2010). Teaching large classes at college and university level: challenges and opportunities. *Teaching in Higher Education, 15(*2), 175-185.

Mustafa G (2005). Reflection in teaching. Learning and *Teaching in Higher Education: Gulf Perspectives*. Retrieved from: http://www.zu.ac.ae/lthe/vol2no2/documents/lthe02_02_03.htm

Newton, J. (2004). *Learning to reflect: a journey. Reflective Practice, Psychological Assessment*, 16*(*3), 155-166.

Poyraz, C., & Usta, S. (2013). Investigation of preservice teachers' reflective thinking tendencies in terms of various variances. *International Journal on New Trends in Education & Their Implications, 14*(12), 126-136.

Quinton. S & Smallbone T. (2010.) Feeding forward: using feedback to promote student reflection and learning – a teaching model. *Innovations in Education and Teaching International, 47(*1), 125-135. https://doi.org/10.1080/14703290903525911

Rashidi, N., & Javidanmehr, Z. (2012). The status of reflective teaching among Iranian EFL teachers: Gender, academic degree and educational background scrutinized. *Language a Literature: European Landmarks of Identity, 1*(10), 493-502.

Schon, D.A. (1987). *Educating the reflective practitioner: Toward a new design forteaching and learning in the professions* (pp. 22-79). San Francisco: Jossey-Bass.

Tajuddin, S. (2012) Aga Khan University Pakistan: Introducing Reflective Practice to Teachers in an English Medium Lower Secondary Private School in Chitral, *Academic Research International, 2(*3), 277-284.

Thomas F, Luschei. (2012) The Effectiveness and Distribution of Male Primary Teachers: Evidence from Two Mexican States, *International Journal of Educational Development,32*(1), 145-154.

Zhenhui, R. (2001). Matching teaching styles with learning styles for ESinstruction. *The Internet TESL Journal,7(*7). from http://iteslj.org/Techniques/Zhenhui-TeachingStyles.html.

Tice, J. (2002, May*). Reflective teaching: Exploring our own classroom practice. BBC/British Council Teaching English.* Retrieved from http:// www.teachingenglish.org.uk/ think/ methodology/ reflection/ shtml

Citation of this Article:
Tabassum, F & Hina, Q. A. (2021). Science teachers as reflective practitioners at higher secondary level: A demand for 21st century teaching. *Journal of Science Education, 3*(2), 61–84.