RELEVANCE OF LEARNING SCIENCE THROUGH INQUIRY BASED PARTICIPATORY ACTION RESEARCH IN BASIC PUBLIC SCHOOLS OF NEPAL: A PROPOSAL

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ABSTRACT
Participatory action research (PAR) is a methodological stance based on the critical interpretivist philosophy. Classroom-based PAR offers a platform by which science teachers act as co-researchers, can contribute to the co-creation of knowledge and its production through classroom teaching and learning strategies. The purpose of this study is to transform the traditional science classroom pedagogy (chalk and talk approach) into inquiry based science teaching through meaningful students engagement activities in the school garden, hands-on activities by the improvisation of low-cost and no-cost materials and the use of information and communication technology (ICT) in the basic level public school system in Nepal. The research design is the PAR approach that will support for transformative learning. PAR advocates the ideas of critical reflection which means that it helps of being reflexive that helps to co-create the learning to ensure the participation of students, teachers and parents. It also attempts to answer the question: What role can PAR play in facilitating inquiry-oriented learning in the basic level schools in Nepal? It will help policy makers to incorporate inquiry-based pedagogy by the participation of students and teachers.
Key words
Co-creation, meaningful engagement, participatory action research, school garden

INTRODUCTION

The objective of this review paper is to provide comprehensive understanding of inquiry-based learning supported by the PAR approach through the development of higher-level sequential thinking involved in the co-creation of knowledge in science among the students of basic level schools in Nepal. Learning science at the basic level schools may have lots of challenges leading to monotonous teaching learning activities leads to culture of silence. This practice has established a central role in the basic school system in Nepal, which is the main hindrance of inquiry-based learning and teaching. In this connection, Williams, (2013) argues "higher-order learning skills such as asking questions, critical thinking activities and developing metacognitive skills can be developed through inquiry". Question asking practices in the basic level science classrooms provide an opportunity to collaborate, deliberate, communicate and co-create the new knowledge with peers. Usually, it provides an opportunity to learn science by doing it i.e., hands-on activities and sometimes learning science occurs by minds-off and hands-on. According to Wright (2015: 25), "PAR process can be exercised as a pedagogical strategy to promote representative, collective decision- making in which students contribute to an input in the direction of their learning". Wright (2015:

45) argues "the mapping activity highlights how learning was situated in the student researchers' lived experiences; students owned their expertise about their communities through the activities" (ibid).

According to National Curriculum Framework (NCF, 2007), "one of the goals of science education at the basic school system in Nepal is to provide students with the ability to formulate arguments, reasoning and critiquing in a scientific context". Understanding and progress in the development of scientific skills among the students is partially based on arguments, discourse and cause effect relationship. Williams (2013) states, "formulating arguments is a particular genre of discourse in which a central epistemological framework is formed as a result of scientific actions". Schensul (1999) argued, "it is reasonable to assume that imparting the meaning of scientific content and the essence of developing a scientific concept would be a way to formulate arguments". Similarly, Mayer (2004) argues, "concept of science is based on arguments; therefore, students should be provided with opportunities to talk science". In this aspect, as a co-researcher, I believe that the process of reasoning systematically in support of an idea and action in a scientific context should be an integral part of inquiry science learning thorough PAR approach.

The Vedic education system is still very popular in Nepal. In the Vedic system of education, science teachers ask questions and expect accurate answers (Acharya, 2016) and immediately evaluate the students' replies (Lott, 1983). But, now the paradigm has changed from the Vedic education system to student-centered learning in which the students work in small groups (especially 5 to 6 members), in which the students are exposed to scientific tasks (cause and effect relationship), ensuring them with an opportunity to become involved in a debate (collaboration) and to be supported or rejected by their arguments (falsification of the arguments with evidence). In this practice, sometimes with the teacher's intervention, the students have an opportunity to construct individual as well as group knowledge. This sort of co-creation of knowledge can be achieved by applying the PAR approach in classrooms in the context of Nepal. In this connection Vygotsky (1978) argued, "formulating knowledge in the collaboration of people is an example of constructivist socio-cultural knowledge". Students' meaningful engagement in the inquiry-based learning involves active participation in the learning process (Acharya, 2016); establishes their claims (Shrestha, 2009); adopt student-centered learning (Acharya, 2016); acts as a role model regarding the way they verify their claims, support the development of understanding the nature of knowledge among students, and adopt learning strategies through inquiry (Mayer, 2004) and gets them to participate in an authentic problem solving approach which will require the students to learn by inquiry. In this line, I argue that the students need to be reflective of their knowledge and understand how it was embedded in the brain box and reveal how it differs.

BACKGROUND

Active learning process always demands students' engagement in an active way that begins by asking queries, putting problems in front of peers and teachers but it does not simply present the established knowledge or facts by moving in a linear way to get knowledge. According to Lott (1983), this process can be assisted by a facilitator. In the inquiry based PAR approach, the facilitator is the science teacher as a co-researcher. In this connection, Mayer (2004) claims, "inquirers will identify research issues and questions to develop their knowledge for the solutions". Acharya (2016) further adds, "inquiry-based learning includes problem-based learning and is generally used in small scale investigations and projects, to do a piece of research from the ground level to understand the phenomena". Then my position is that, because inquiry-based instruction in science aims at developing psychomotor skills in the learners. At the same time, inquiry-based science helps in developing thinking skills. Basic level students have a wide range of interests in evidence-based reasoning and creative problem-solving ideas to reach a conclusion and thus it finally leads to inquiry-based learning science.

As a science teacher at a school in Nepal for relatively a long time, I believe that inquiry-based teaching attempts needs to focus on moving students beyond the general curiosity into the realms of critical thinking and understanding. For this, the science teacher needs to encourage students by asking questions and support them through the investigation process, understanding when to begin and how to structure an inquiry activity. In this connection, Williams (2013) argues, "we can run inquiry-based learning by applying case studies as well as group projects"; Acharya (2016) also claims that, "research projects and field visits provide unique ideas of the real field that help to understand science lessons", and these activities help to develop creativity in the learners.

The epistemology of inquiry-based science learning is tooted in an approach to teaching and learning science which reflects an understanding of how students learn science and the concepts as well as content to be learned. Matthew, K., Kirby, S. L., Greaves, L. B. and Reid, C. (2013) adds to this aspect of inquiry based leaning that the "belief of child centered pedagogy is important to ensure that students truly understand what they have learned" and not simply learn to "repeat content and information" (Freire, 1993). Moreover, the hands-on activities provide support for the development of higher order learning skills associates with the learners psychomotor abilities

based on observation, plan an experiment, ask relevant questions and hypothesis formulation and "analyzing experimental results at the end" (Colella, 2000).

Science teaching learning activities demand inquiry to explore the natural phenomena that can be linked to classroom activities. "Inquiry helps to identify and research issues and questions to develop the knowledge of students", (Diakidoy & Kendeon, 2001). This statement is in line with educationists like Jean Piaget, John Dewey, Vygotsky and Paulo Freire. Experiential learning advocated by John Dewey is linked to the active engagement of students to gain authentic experiences for meaning making and thus make meaning from it. It is also linked with Torbert (2003) who says "inquiry can be conducted through experiential learning", it is because inquiry through learning activities, inquiry engages students in learning concepts. In this approach, students try to solve questions by developing creativity through higher order thinking. It can be done by engaging students in the garden (Lisa, C., Martin, N. & Adams, O., 2015), laboratory and especially during the excursions.

In this context, Torbert (1981: 145) states:

…..knowledge is always gained in action i.e. linked in interactive classroom practices. This might lead a question to answer the validity of science ……., not how to develop a reflective science about action, but how to develop genuinely well informed action and how to conduct an action science.

Inquiry learning does not take place unless there is students' participation in an activity (Acharya, 2016). Meaningful engagement is necessary to inquire the learnability of students. So, PAR is needed to involve students in participation. Collaborative inquiry learning, emancipatory research activities, action learning through experience and contextual action learning are the forms of participatory action research as pointed out by Voss and Wiley (2006). I believe that the main focus of motivating pupils in inquiry based learning is to get students to understand the real world. Students learn best and participate more in the work when the opportunities are provided to them. Providing opportunities to the students in doing work in group activities inspire them to gain first-hand experience. As far as the concern of PAR is concerned, science teacher as a co-researcher acts and performs in a real-world i.e. at the community level, which helps to reach the aims to solve real problems. At the end, learners as the research participants make a schemas of open space to transform the preexisting knowledge with the new thought. By linking it with the literature, Wadsworth (2001) states, "action research is learning by doing that is when a group of students identify a problem, do something to resolve it and finally reflect". It provides the reflectivity as well as reflexivity among the learners for further learning cycles.

Basic level students'' failure in meaningful classroom activities for academic success has always been a worry for science teachers in Nepal, mainly because this 'lag' as an obstruction to 'passing the examination'. However, to my knowledge, there has been no research into students' meaningful participation in science classes in the context of Nepal. The major failure is due to the failure in consideration the cognitive aspect of learning (Acharya, 2017). Again, Acharya (2016) remarks "student fail to understand the content of science to develop science process skills without engaging them in their work. Then in such a situation, students naturally find classroom tasks in science classes difficult and against their interest. As a result, engaging in deeper cognitive processing resulting in meaningful understanding becomes hard to approach for them (Colella, Borovoy & Resnick, 1998).

In this connection, Duschal (2003: 16) states:

…..classroom teaching and learning focus on cognitive and behavoural aspect of science. Science teachers are compel to deal authoritative manner as they assigned the duty to teach but not as a facilitator to make students upgrade the grades,……satisfy their parents,…get higher scores in the documents……..and finally getting the job in the market.

LITERATURE REVIEW
Philosophical bases of PAR and its Epistemology

PAR is primarily based on action research which basically involves a cycle consisting of three elements: planning, acting and reflecting. But in PAR, the researcher acts as a research participant or simply a co-researcher participating in a mode the activities which is not accepted by action research. Master (1995) points out that authors such as Holter and Schwartz-Barcott (1993), Kemmis nad McTaggert (1998), Zuber-Skerrit (1992) have extended the scope and meaning of action research which was first initiated by Lewin.

Similarly, as McKernan (1988 as cited in McKerman (1991:8) claims action research originated in the last century can well be traced back to the "Science in Education" movement that took place in the late nineteenth century. In the mid-1940s Lewin theorized action research and characterized it as consisting of planning, action and evaluation in the form of a spiral of steps describing the result of the action (as mentioned in Kemmis & McTaggart, 1990). Literature indicates that Lewin's theory of action gradually gained it status as a widely acceptable method of inquiry which emphasized an active involvement of the real practitioners (McKerner, 1991). Thus, action research

has now come to the position as a widely accepted method of inquiry mainly among social scientists and practitioners doing some form of social practice.

advocated by Treleaven (2001) in the line of sharing power in the community, community-based PAR holds conventional research methodology on its head. PAR has certain some key commitments and values in its endavour which Graesser and Olde (2003: 151) describe as "beginning with the ontological possibility of a real popular science". PAR is the transformation of the teacher as the co-researcher that presents challenge in which the teacher needs to share his power among the students. It also helps to advocates local voices, local realities and local wisdom in the course of completing all the cycles. These key characteristics of PAR are in line with Bell (2001) and Lott (1983). In this line, McNeill, O., Lizotte, Krajcik, and Marx (2006: 12), "connection of participatory research movement with emancipatory social change at broader levels, and thereby, with goals to which all social research should aspire". PAR, according to Soloway, N., Kishbaugh, C. & Hayes, J. (1999), "democratic practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview". The history of PAR traced back to Lewin (1970 revised 1993) and then to Hall (1981) who characteristized PAR as an integrated activity combining with social inquiry and education with particular a focus on the oppressed. Lott (1983) noted, "rhetoric of community involvement with risk of co-option and compared this to authentic participation, where communities control the research process".

The first concept of PAR was used by McNeil, M., Nann, R. J. and Hawkins, J. (2006), "participatory action research to emphasize both authentic participation and relevancy of actions". PAR is practically referred by such terms as community cooperative inquiry, emancipatory work, appreciative open inquiry, and community-based participatory research (Graessser & Olde, 2003). Scholars like Wadsworth (2001) should be credited for "emancipatory practice"; "the life world" for Grasser and Olde (2003).

In law, PAR has set up and established a culture in which improvement in social and educational activities are sought through sharing with the oppressed and empowering them for decision making.

PAR CYCLE AND KEY COMPONENTS

The PAR cycle is based on the inquiry approach to co-creating knowledge that consists of continuous and reflective observation, reflexive co-researchers planning, immediate action and again reflexive observation, sharing with the participants, inner understanding of the phenomena in a dynamic way throughout the completion of the cycle. The cycle consisting of planning, acting, reflecting and observing helps to understand the different steps and the activities in the PAR process rather than implying a linear sequence necessarily occurs from one to another. It is because school is a complex adaptive institution having many socio-cultural factors associated with it. Multiple cycles within the cycle is the exploration in reflexively attained goal of the PAR cycle.

Meaningful Engagement: In teaching and learning, student motivation is paramount. Motivation manifest itself in such forms as curiosity, personal and collective interest, passion and attention. When this kind of environments it is best to assign tasks suitable for their level of proficiency. This helps to explore the degree of motivation needed for the hands-on activities. According to Matthew, et al. (2013), "it is believed that the concept of student engagement is predicated on the belief that learning improves when students are inquisitive"; "when students show interest in activities" (Acharya, 2016) yet it is negatively affected when students feel bored (Matthew, et al., 2013). The culture of impassioning in the work, disaffecting by the dialogic process tends pupils to back-gear from understanding science. Meaningful engagement in learning for sustainable change is one of the basis of the PAR approach to teaching and learning science. According to (Dong, E., Delgado, R. & Steferius, J. 2017), "students are engaged when they are involved in their work", and "take visible delight in accomplishing their work" (Marino, O., Bar-Gill, O. & Warren, E. 2010). Students' engagement of willingness, urge of doing work, desire of accomplishment and compulsion to participate develop higher order thinking. Alonzo and Steedle (2009) characterize PAR as "successful in the learning process promoting higher level thinking for enduring understanding" as cited in (Matthew, et al., 2013). In this connection, Acharya (2016: 3) depicts the Nepalese scenario as:

teaching science is based on the problems found mostly in the practice book and in the prescribed textbooks. Most of the teachers start their lessons with a problem from the exercise text book and select one of the problems, usually the first, as a model and show how to do a particular type of problem and demonstrate its solution showing how to solve it. Science text books are designed for a dogmatic approach resulting in the repetition of the same style of problems.

Co-researcher as insider: I envisioned my role in PAR as a co-researcher as an insider in the working community. In the PAR process and cycle, the researcher as insider has a direct involvement with the research" (Robson, 2002).

Knowledge co-creation through PAR contrasts with traditional notions of scientifically sound research in which "the researcher is an objective outsider studying subjects external to his/herself" (Denzin & Lincoln, 2003). According to Suri and Clark (2009), "outsider cannot do real research in PAR". But to be an insider, co-researcher needs to respect the knowledge (Skelly & Bradley, 2007), values (ibid), priorities and language and norms (Ozer, 2006) of the people on which the PAR is undertaking. PAR aims at producing knowledge from the social positions enacting social realities (Suri & Clarke, 2009) and connecting emotions by the co-researcher to generate knowledge (Skelly & Bradley, 2007).

Lived Inquiry: Research in PAR always demands a lived inquiry with the students, parents and community people. A lived inquiry is a social process that has the aim of augmenting knowledge by collaboration, resolving doubt by dialectical approach to solve a problem. In this regard, Acharya (2016) states, "inquiry-based learning is a form of active learning that starts by posing questions"; discussing on the problems not merely presenting "established facts or portraying a smooth path to knowledge" (Shrestha, 2006). PAR makes it easier for basic level students to solve problem by identifying learning possibilities and the issues and questions of research. Thus, leariong based on inquiry in the PAR process, usually small-scale projects, exists to get solutions to problems, and thus is also very close to thinking skills. According to Willams (2004), "inquiry is any process that has the aim of augmenting knowledge" and inquiry learning helps to solve problems (ibid) and also includes learning through experience and praxis (Dewey, 1938)**.** Parents experiential learning in school gardening (Lazonder & Harmsen, 2016), community people in life skills (Klahr & Nigam, 2004), teachers in increasing interest (Kuhn & Phelps, 1982) and head teachers in free of corporal punishment (Lazonder & Harmsen, 2016).

Authentic Listening: Draw the attention of the research participants for lived inquiry is one of the major components of PAR process. "Listening is to give one's attention to sound or action", (Willams, 2013). Listening is a technique that involves complex minds-on (cognitive), hearts-on (affective) and hands-on (psychomotor) processes. Effective processes include motivation by the teacher co-researcher to attend to others such as students, teaches as well as parents; cognitive processes include attending, understanding, receiving, and interpreting the classroom and social phenomena; and behavioral processes include responding with verbal and nonverbal feedback. In PAR, attentive listening is used rather than listening. Suri and Clarke (2009) states, "authentic listening is different from listening in relation with meaning within the meaning". Authentic listening in the PAR process proceeds with a chain of successive steps, one after another, in a logical form, listening attentively to what the other person is saying without interrupting; "feeding back the understanding of what s/he is feeling", (Suri & Clarke, 2009); checking with partner (co-researcher) to confirm that you have understood him or her correctly (ibid). According to Willams (1013), "authentic listening means genuine listening", in which the co-researcher will gain the reality from the participants.

Reflective Practitioner: In conducting PAR, the co-researcher and the participants need be reflective and reflexive in their work. The teacher as a co-researcher is a practitioner in the classroom activities. The reflective practitioner is different from a practitioner in the sense of the "ability to reflect on one's actions so as to engage in a process of continuous learning," (Write, 2015). As a PAR co-researcher and a teacher at the university, I envisioned that reflective practice is the experience not necessarily leading to learning but rather deliberation of reflection of the teachers and community people where experience is essential. In this respect, Miller (2007) says, "reflective practice is the ability to reflect on one's actions so as to engage in a process of continuous learning". The skill of listening develops the habit of the technique of critical engagement to the experiential knowledge, skills and embedded values, by examining practice reflectively and reflexively. This item leads to "developmental insight in completing the PAR process" (Skelly & Bradley, 2007).

Knowledge Co-construction: Co-construction in learning is a distinctive approach to PAR pedagogy in which the researcher acts as a co-researcher and emphasis is on collective engagement in a collaborative environment. In this line, Write (2015) adds, "partnership working among the pupil helps to co-create new insights". Knowledge creation is possible through the dialogue session in the problems during teaching learning practices. Collaboration needs the partnership among the teaching staff, parents and students so that creative learning environment can be developed at school. "Co-construction of learning deepens relationships and understanding between all learning partners and can lead to improve school" (Williams, 2007). In the PAR process, "identification and authentication of new knowledge through the participatory action research can be evolved" (Torbert, 2001). As a co-researcher in PAR, I believe that knowledge can only be reflected by the collaboration among the stakeholders.

Experiential Knowing: The knowledge gained through experience is called experiential knowledge. According to Lisa (2015), "experiential education is a philosophy of education that describes the process that occurs between a teacher and students that infuses direct experience with the learning environment and content". The experience of the farmers in school gardening; teachers in classroom activities; and students in collaborative learning help to apply the knowledge of the real field experience to transform classroom pedagogy from the chalk and talk method of inquiry based learning. In an inquiry-based learning classroom both educators/teachers and students purposefully involve themselves in gaining direct experience. In this connection, Olson, Key and Eaton (2015) focused "reflection in order to increase knowledge, develop skills, clarify values, and develop people's capacity to contribute to their communities". As a co-researcher, I will try to apply this knowledge to transform the pedagogy in learning science in the basic school system in Nepal.

Co-operative Inquiry: In my understanding, each student brings to with his/her some information, which he/she alone possesses and can add it to the collective knowledge base, used to solve a problem critically. Co-operative learning can develop a more positive attitude towards learning. I think in cooperative classrooms, teaching is more enjoyable for students and they joyfully can learn by fun. In this regard, Cunningham (1998) says, "facilitate effective and meaningful learning in science and encourage group work for the development of social attitude". This makes teaching more enjoyable rather than monotonous. It also develops positive attitude towards science and its use in daily life activities. Cooperative inquiry creates inquisitiveness among learners while completing the research cycle including four types of knowing. The first is the "propositional knowing" (Singer, J., Marx, R. W., Krajcik, J. & Chambers, J. C. 2000); "practical and experiential knowing" (Dewey, 1980); and "presentational knowing" (Duschal, 2003). These stages deepen and deepen in the experience among the research participants to co-create knowledge.

Transformative Pedagogy: Transformation is a process of complete change for the betterment. In the schools of Nepal, the traditional cultural practice of teaching learning exists. As a science education expert as well as PAR co-researcher, I believe that I have some roles to transform the lecture method of teaching to students centered method by engaging students in a meaningful way. Learning by changing of the self and the other is the key component of PAR. In this line, different researchers possess different understandings. "Transformative learning is the expansion of consciousness" (Loren, O. Warren, E. 2012); "transformation of the basic worldview and specific capacities of the self" (Cunningham, 1998); "transformative learning is facilitated through consciously directed processes" (Merizow, 1978). Jack Merizow developed transformative learning theory the first time. His theory provides a comprehensive but complex framework describing how students contrast and validate when they learn. Reflecting on the researcher's experience is due important in the PAR process. Changing the mental schemes like belief system and attitude, one should be very conscious throughout the PAR process.

Reflective Critique: Reflecting myself as a co-researcher in conducting PAR to transform pedagogical practices in the basic schools in Nepal, I may face unexpected problems webed as chaotic networks in the school. It needs to learn how to cope with complex environment of the school and to take action in a participatory way. The matter of concern is to engage teachers and students into dialogical action, capable of nurturing knowledge and change among them. This can be achieved by creating space for collaborative dialogue between the students and science teaches as well as with the co-researchers and supplementing it with the integration of reflexive writing practice. This forms the basis for sustaining participation and learning at individual and collective strata.
In the PAR approach to change our inner self and the community people it is necessary that we are reflexive. This leads to developmental insights. "Reflective practice experience alone does not necessarily lead to learning" (Herbert, 2018); then what is essential is deliberate reflection (Deway, 1980). Regarding reflexive practice, Graesser and Olde (2003z: 9) remark:
…….a person who reflects throughout his or her practice is not just looking back on past actions and events, but is taking a conscious look at emotions, experiences, actions, and responses, and using that information to add to his or her existing knowledge base and reach a higher level of understanding.
According to Lisa, et al. (2015), "reflexivity in PAR focuses on change". I believe that people participate to improve an understanding the world for changing in themselves. Reflexivity "emphasis on collaboration" (Miller, 2007). In the cycle of "research, action and reflection", reflexivity is a must (Olson, et al., 2015). PAR seeks to liberate participants to have a greater awareness of their situation in order to take action, although for some researchers the emphasis on liberation will be tempered (Morris, 2008).

METHODS AND METHODOLOGY

The research methodology of this study will be participatory action research (PAR) approach (Bhana, 1999) for transformative learning (Freire, 1970; Taylor, 2009). PAR emphasizes critical reflection so that ensures the participation of students, teachers and parents for co-creation of learning. Reason and Bradbury (2008) argues in the favour of the critical and inclusive engagement of stakeholders' major role in conducting PAR. All participants will be equally participating in the process. I, as a teacher-and-co-researcher, will be backing and ensuring the students to realize their abilities of understanding the situation. In this way, they will be taking the ownership of their own learning by finding solutions to the problems on their own.

According to Ahmad, (2016: 74),

…..when the participants control the process of knowledge production from problem definitions to creation of solutions, they are more likely to develop capacities that influence their future actions (Gaventa & Cornwall, 2001).Thus, raising critical consciousness among the stakeholders is important for community transformation (Freire, 1970). ….. used transformative learning perspective as a meta-theoretical lens to explore the extent to which the process provided participants with a chance to examine, question and review their perceptions and experiences.

It is to my expectation that the PAR activities that I plan to conduct in a few public schools in Chitwan and Nawalparasi districts will create an environment in which the stakeholders will develop abilities for co-creating knowledge in the form of inquiry by means of meaningful engagement, mutual learning, ownership and confidence.

In the course of my research, dialogue reflections will follow dialogue conferences. This will ensure sharing experiences and ideas (Ahmad, et al. 2016). This kind of practice is believed to provide as platform for development of an action plan addressing a democratic interaction between stakeholders. Some my strong foundations of my proposed practice will be under Deway's education as life itself, Kolb's (1984) experiential learning and Freire's (1970) 'harmonizing education'.

RESULT AND DISCUSSION

Transforming Traditional Science Teaching through PAR

A science teacher, I reflect that an essential facet of inquiry-based science learning is the importance of self-critical reflection. Morris (2008) points out that "critical reflection is granted too much importance for affective learning". I believe that enough attention by collaboration in learning activities helps to create significance difference in school going children. My worldview will be as a science teacher as a facilitator (co-researcher in PAR) among the students and the teacher. McNeill, et al. (2006) draw own attention to the fact that, after Reid, Zhary, and Chen, (2003: 103) critical reflection can only begin once emotions have been validated and worked through. The cognitive dimensions of critical reflection would be more active once the initial affective responses to the disorienting dilemma have validated and have begun to be explored by the facilitator's assistance with others and through reflective writing. Students would have transformed in activities such as self-reading, discussion, argumentation and conclusion of the studies matter in science (Acharya, 2016). They want to be engaged in designing and implementation of improvised instructional materials to learn science. This way transformative students' learning can reflect the deeper level of learning (Singer, et al. 2000).

As a result of literature review in this article, I have come to believe that in its most productive form empathy between teacher-researcher and students that energizes both teaching and learning in ways that are conducive to transformation for all involved is very significant. As a result of this review, the value of encouraging me and the co-researchers to write reflectively has emerged as an important dimension of transformative pedagogy. Developing a reflective attitude to learning especially through encouraging co-researchers to write reflectively, maximizes the likelihood that they will recognize the need for transforming limited frames of reference in favour of new ones. Conditions conducive to transformative learning may be fostered through fostering emancipatory learning environments and encouraging strategies such as keeping a reflective note.

Discovering the benefits of close reflection on my own practice, for my own professional development and for my students was one of the major personal outcomes of the literature review. Yet if reflective practice is to become a key dimension of professional development and transformation in the basic level schools, the need for teachers to dialogue with one another about their personal teaching experiences and to engage in collaborative inquiry should also be recognized.

My reflection on literature review and the process of engaging in the research process have led me to conclude that learning contexts based on interactive communion are ideally suited to fostering transformative learning in students. The realization of the essential nature of transformative learning has transformed my personal conception of what it means to be a science teacher. To teach is not so much to do, as to be, and to encourage and others to be courageous, authentic individuals, capable of exhibiting meaningful self-reflection and lifelong transformative learning.

In connection with the above lines, I as a PhD student with an inner sense of commitment to PAR. I seek to overcome its drawback: PAR is too long and takes long to complete many cycles to reach the reflection in the co-creation of knowledge. As a co-researcher, there is a need for the development of PAR research competencies in terms of methodology and approach, identify a research query through a baseline survey, need assessment as well as inland survey in the community prior to actively engaging among all the stakeholders. "The partnership with community people, teachers and the students is a must in PAR" (Ugwu & Soyibo, 2004). As a student and the co-researcher involved in the PAR approach at Tribhuvan University, I am planning to us a PAR by engaging students and teachers before implementing an actual research plan. After the intervention in the classroom pedagogy through the medium of science teacher training, I will engage myself as a participant to facilitate in the meaningful engagement of students in learning. After the observation and reflection in the transformation of science learning from the traditional chalk-talk approach to inquiry based engaging activities, intervention will be conducted by the use of information, communication and technology (ICT). My act of reviewing the PAR literatures has enabled me in terms of my reflections of knowledge and experience, assessment of my roles as a research participant to gain reflection of knowledge and experience, examine my roles as a research participant to gain awareness of the principles, ethics, and approaches along with my underlying assumptions and beliefs. I hope, I will be able to mitigate all sorts of shortcomings in me needed for the inquiry process.

My focus will be on emphasizing real participation and worthy action at the community level to conduct the PAR process throughout the cycles. Bell (2001) defines "combining social investigation, educational work and action" is related to my cooperative inquiry. My research is an exploration of inquiry-based science learning through meaningful participation of all the stakeholders for the co-creation of knowledge to transform classroom pedagogy in the basic schools in Nepal. Sharing this knowledge with all the co-researchers is to create "innovation and transformation is collective action" (Minner, Levy & Contusy, 2010). From my experience as a primary level science teacher to a university teacher and as a researcher in science education, I have come to know the significance of the PAR approach in conducting research to transform classroom pedagogy in the rural villages in Nepal.

In this connection, Siedel and Furtak (2012) claim, "cooperative inquiry begins with own look, think, and action cycles". Therefore, I would apply my knowledge gained through practical experience to new learning and discovery. Thus, I will act both reflexivity (insider) and reflectivity (outsider) in the inquiry process. Being reflexive as an insider in the local community and as a science teacher seeking transformation my interests lay within me to know participants collaborate and how communities participate in collaboration.

As a university science education teacher for relatively a long time, I came to appreciate the possibilities and challenges of science learning activities, the capabilities of students and the barriers in collaboration and the burden of low achievement of students in science. However, I know, as a member of an academic community I am transforming myself as academic scholar processing science education. Collela (2000) argues, "I am learning to see the world beyond local experience, opening up to broader perspectives", and I as a co-researcher try to find new ways to take up engagement. My query begins with classroom teaching and learning, to improve the situation by engaging students, parents and community people who have vital roles to complete the PAR cycles to transform from traditional to inquiry-based classroom. Being reflective as a participant, collaboration, teamwork and sharing power among all the stakeholders will the major concern. Torbort (2000) emphasizes, "deep kind of participative knowing, where the co-researcher is grounded in their experience as co-researcher". As a co-researcher within this inquiry based science learning context, drawing on my experience as a catalyst (reflective co-researcher) to inquiry-based science learning I will be an insider working with the students, teachers, parents and community people, thus co-creating knowledge in science education. This is how I intend to transform science classroom pedagogy in the basic schools in Nepal.

CONCLUSTION

PAR is a systematic inquiry to learn science and an action research methodology undertaken by the co-researcher which focuses on transformative changes in classroom pedagogy. PAR, as part of qualitative research, aims at fostering participants' collaboration and enables the co-researchers to co-create knowledge across practice together. Thus, PAR empower and supports capacity development building students (preferably basic level), teachers, parents and community people who participate. PAR is an educational process and an approach to investigate and a way and taking action (intervention) to address the problems and issues in (the basic level) schools. To transform science pedagogy in the basic level schools in Nepal, the use of the PAR approach is expected to be a useful paradigm to improve the situation of engagement in lived experience that may help to improve the curricula and science teachers' professional development, system planning and policy development at the national level. "PAR liberates research from conventional prescriptive methods and seeks to decentralize traditional research"

(Alonzo, & Steedle, 2009). In fact, it offers a dynamic and radical alternative to the process of gaining knowledge in a collective and self-reflective inquiry for improving or empowering a community situation through the modification and transformation of classroom pedagogy. It is because students and the schools are a messenger for transforming knowledge in society. I believe that the first step of social transformation starts with the classroom pedagogy.

ACKNOWLEDGEMENTS

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