International Journal of Progressive Education, Volume 20 Number 5, 2024
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Shareholding Between Teacher`s Agency and Habit of Mind in Inquıry Physics Lessons During Pandemic

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Abstract

Teacher agency includes the ability of teachers to make meaningful decisions, take action, and influence in their professional fields. This qualitative study seeks to understand the relationship between teachers' habits of mind and their teacher agency by examining the nuances and issues that contribute to teacher agency within an inquiry physics lesson. Using qualitative heuristic study methods, data was collected through a retrospective verbal report and an in-depth interview with 8 physics teachers. Through interpretative phenomenological analysis, pattern and themes were identified that explain the experiences, perceptions and behaviours that support teacher agency. The findings suggest that teacher agency is a multi-faceted phenomenon that involves personal beliefs, institutional structure, professional development and collaborative opportunities. This study described teacher professional agency in four dimensions that are; being professional competence in the productive steps of inquiry lessons, inquiry pedagogy as a sign to create sense of professional purpose to maintain inquiry learning, updating teaching material and resources to maintain inquiry learning with the changes of educational system, and coping with the transformation of educational system. These dimensions elucidating the issues and factors that foster or hinder teacher agency, shedding light on the complexities and nuances inherent in this construct. This study supports teacher learning within the context of inquiry teaching and learning, empowering and supporting teacher professional development in inquiry teaching and learning. These understanding has important implications for educational policies and professional development initiatives, as well as school leadership.

Keywords: Habit of mind, agency, inquiry, physics, teacher

DOI: 10.29329/ijpe.2024.1063.3

Submitted: 28/12/2023 **Accepted:** 15/07/2024 **Published:** 01/10/2024

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INTRODUCTION

Teachers' quality often debated using students' involvement in scientific investigation, questioning, experiments, and problem-solving. Consequently, a lot of effort placed student in the middle of inquiry lesson (Riga, Winterbottom, Harris, & Newby, 2017) and observed for their positive attributes. These efforts fit with movement in critical thinking skills (Duran & Dökme, 2016), creativity skills (Wahyuni, Kosim, Gunawan, & Husein, 2019), inquiry skills (Firman, Ertikanto, & Abdurrahman, 2019), increase students' achievement (Fatmawati, Fayanto, Luh, & Heri, 2019) and positive development of student attitude and self-confidence (Khalik, Abdul Talib, & Mohd Rafi, 2018). Inquiry practices have gained significant recognition through the Education Blueprint 2013-2025 policy which emphasizes inquiry-based learning as the key pedagogical approach for teaching and learning (MEB, 2013). For examples for such movement, various approaches and models, such as the 5E model (Engage, Explore, Explain, Elaborate, Evaluate), PBL approach (Problem Based Learning) and PoBL approach (Project Based Learning) have been promoted to structure inquiry-based lessons in Physics. Therefore, it is expected that teachers have the capacity to improve quality of education either for professional learning or students' learning. The common phrase like "teachers as an agent of change" in any government policy require explanation on inclusive teaching practice.

Notwithstanding the immense recognition of the value of inquiry-based learning, there is no universal agreement on how it cooperates with teachers' learning. Changes in educational reforms require teachers to be agile (Kreijns, Vermeulen, Evers, & Meijs, 2019). This means, teachers must continuously adjust and improving their practices from obsolescence. Hence, improving teachers' quality has led to a concentrated concern of teachers' professional development (Opfer & Pedder, 2011). However, abroad agreements have quantified the failure to transform teaching practices. This is because the express epistemic agency is operationally deducted from students' achievement rather than teachers' own success. (Popova, Evans, & Arancibia, (2016), reviewed 171 professional development programmes identified that the programmes are outdated, overly theoretical, and fail to engage teachers in tangible and interactive ways that directly translate to practice. In this context, professional development is not a formal activity designed for particular objectives, but an experiential learning process which involves social interaction, individual reflection on teaching practices, and the development of professional expertise. Such an understanding implies the overlapping of learning and the practice of agency (Eteläpelto, 2017). Grosemans et al., (2015) distinguished four types of teacher's learning such as experimenting, reflecting, learning from others without interaction and learning from others in interaction. However, structural and cultural factors in schools are powerful lever to determine change in practice rather than the development programme (Pantić et al., 2022). Their roles shaped teachers' responses toward changes which can be either acceptance or resistance.

Thereby, more explanation is needed on how teachers inquiring into their own teaching practices. This approach nevertheless encourages more reflexive account among teachers during study to understand what they are doing while they are doing it (Kroll, 2005). This is referred as habit of mind (Ritchie, 2006) where teacher research practise can develop into a habit of mind, a way of thinking and acting, rather than an add-on to their responsibilities. Teacher constantly learns and improve by their own teaching practice. Previous studies (Yew Tee & Samuel, 2017) may have identified teaching practices among Malaysia teachers, but does not address teachers` capacity and capability to deal with new knowledge. In this study, it is found that the predominant teaching practices in Malaysian classrooms are very unlikely to help students improve higher-order thinking and "learning-to-learn" abilities. It is critical to note that when such practices are so consistent and widespread, system-wide issues must be raised. How pedagogical practice plays out in the class- room is shaped in significant ways by the larger social, cultural and political milieu. Thus, it is crucial to look up on teacher habit of mind in enacting the changes for inquiry teaching and learning.

Literature Review

Teachers form prior plan to organize teaching and learning activities as conscious acts motivated by underlying belief. Teachers core features of action often explored as teachers'

pedagogical knowledge (PCK) begin from Shulman (1987) works that intent to identify knowledge orientation in teaching. Studies among physics teachers reveals that having a PCK allow teachers to plan, teach and reflect on practices. This is when, teachers' PCK is made equivalent to professional knowledge referring to the Refined Consensus Model (RCM) of PCK. More studies resort to RCM to find an alternative answer related to teachers' enactment of curriculum during teaching and how its mediate students' participation (Carlson & Daehler, 2019). This is to allow deeper understanding toward different subset of teachers' knowledge; enact, personal & collective. The idea of this expansion is due to limited details on the interplay between different subset of knowledge from Shulman's model. On the other hand, others are referring this as teachers' belief about teaching and learning. Studies like Saputra, Suherdi, & Rodliyah, (2020) said that teachers carry their set of assumptions that dictate decision making and narrative with students. Some studies differentiate teachers' belief based on their preference for students centred and teacher centred (Tan & Caleon, 2023) while other look into how belief shaped physics instructional practice (Kedir, 2020). The keystone premise between RCM and belief is the 'situated physics teaching practice'. With raising interest on context specific explanation, questions related to how teachers frame their teaching practice shared similar interest with this study.

Inspired by RCM works on teachers' professional knowledge, it can be said that this model illustrates the interplay forces between personal PCK and teachers' reasoning while enacting PCK. This understanding is considerably look into influence of belief during decision making. From a social cultural perspective, this phenomenon requires an explanation beyond than exploring multiple influences. This is because enactment is an ongoing process of construction, and development must be explained to represent the interplay in true sense.

Inquiry is rooted from Dewey (1938) works that foster students learning with key knowledge and skills. Several justifications were highlighted in previous studies on why inquiry is commendable as physics teachers' PCK. Associating inquiry and students-centred learning in physics is among popular opinion that researcher tend to circulate to warrant for its effectiveness. Other science education researchers, look inquiry as an entry point for "understanding how science works" and "what is counted as science". From these views, inquiry can be classified as embodied knowledge of PCK when teaching physics (Strat, Henriksen, & Jegstad, 2023) (Verástegui Martínez & Úbeda Gómez, 2022). Teachers at this phase of their professional learning, may look at inquiry as either 'knowledge in practice' or 'knowledge of practice'. Cochran-Smith & Lytle (1999, p.273) differentiate between this knowledge as knowledge gained from experiences and knowledge gained from internal validation on the practice (Strat et al., 2023). Therefore, teachers PCK is far more complex for physic teachers since it involves knowledge of scientific practice and knowledge of nature of science. This is due to the explanation that physics teachers' enactment in inquiry class has never been absolute, because their practices may belong to several domains other than listed by PCK. Hence, PCK is not the only key nation to understand teachers' professional development. After reviewing PCK and RCM, none of these models explain the production of knowledge that teachers create during interaction of different elements in PCK or RCM. The literatures emphasize the procedural knowledge to make PCK or RCM works to craft physics knowledge. The interaction with different elements during professional learning is worth to be explored. This part of phenomenon is an area of interest for researchers who keen to understand the interaction that teachers made to the production of physics knowledge.

The need of agency for inquiry in physics is unique and studies shows that inquiry require discipline and commitment from teachers (Weinberg, Balgopal, & Sample McMeeking, 2021). Growing attention for teacher's agency in professional development (Imants & Van der Wal, 2020) stress the active role of teachers as curriculum maker. By using this argument, this study places the current interest for physics teachers' PCK into teachers' professional agency. Teachers' orientation toward knowledge as they become responsive to changes is known as agency or habit of mind. The concept of agency for change look into how teachers define their inquiry teaching to fit the ideal image of inquiry learning. Teacher agency is not what they have, it is more likely something needed to learn or precisely something they can achieve (Biesta & Tedder, 2006 cited in Priestley et al., 2015). This view of agency refuses at admitting the conservative ways of transforming teachers. Here, agency

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interest is ‘emancipation knowledge’ that are reflexive and creative. It is often observed when teachers are resolving the instructional dilemma, counter act to societal constraint and cope with educational changes (Priestley et al., 2015). This knowledge can be easily distinguished from pedagogical knowledge and belief as discussed earlier, although it can be intertwined during practice. Emancipatory knowledge exhibit as microteaching experiences during the intersection between belief and PCK. These scenarios are derived from critical process that led to formal expression of a problem, action plan taken and ways of improving (Voss, 2018). Habit of mind come into the discussion of agency as a way to illustrate strategic planning, which also known as performance of habit (Wagner, 2021). Therefore, examining agency will not only elaborate the doing part but also intelligent choice making behaviour exhibits by teachers in face of dilemmas in PCK.

Since agency looks into the nature of change, this draw attention to frequently PCK and RCM contexts that teacher try to achieve when practicing inquiry in Physics. The social nature of habitual thoughts and actions towards inquiry teaching require an explanation on teachers’ an inquiry habit of mind. In this paper, we illustrate “How physics teacher exercise professional agency that characterized inquiry Physics lessons?”

Theoretical Framework

Generally, there are two approaches of agency been illustrious in the literature (Goller & Paloniemi, 2017). Bandura, (1999, 2001) defines agency as the capacity to exercise control over the nature and quality of individual life. While Biesta & Tender, (2007) define agency as the result from the interplay of individual efforts, available resources and contextual and structural factors as they become together in particular unique situations (Priestley et al., 2015). In both meanings, agency is associated with making decisions, take initiatives and act proactively within situation, either in groups or as individual. This indicates that agency is about a single person or group who engage or interact with and within particular contexts (Imants & Van der Wal, 2020).

Drawing from Emirbayer and Mische (1998), teacher agency is a phenomenon that is socially and historically situated. This means that, studying agency allows to build understanding between the present and past by looking at how the present is exhibited. This imply that teachers reconstruct capacity mainly from the past, build aspiration for the future and featured by the available resources. In this study, there are two main areas of agency that will be scrutinized. First is the nature of teacher`s personal agency, and second is teacher`s agency practices within inquiry physics lesson. Grounded in a theoretical understanding of teacher agency framework by (Priestley et al., 2015), this model highlights the achievement of agency is always informed by past (iterational dimension), oriented towards the future (projective dimension), and supported by cultural, structural and material resources available (practical evaluative dimension). The iterational dimension is meant by how teacher make sense of their previous experiences in their teaching. Within this view, the iterational dimension focuses on the teaching experiences developed in the past and experiences during teacher education (background education) and how these aspects influence present actions. These aspects also include teachers identity as an inquirer – scan and focus, understand and explore, plan and implement, evaluate and reflect, and write and present (Konstantinidis & Badia, 2019). Acknowledge teacher as an agent of change, four characteristics of teacher as agent of change (lifelong learning, mastery, entrepreneurship and collaboration) proposed by Van Der Heijden, Geldens, Beijaard, & Popeijus, (2015) are taken into account to explore physics teacher agency.

Since teachers professional learning is examined from teachers` reflexivity accounts, decision making made during teaching is pivotal data entry in this study. The practical evaluative dimension of agency is where the activities of teacher make decision and take action occur. Therefore, the practical evaluative dimension; inquiry culture, teacher roles and relationship, inquiry physics classroom environment and resources, represents the activities of habit of mind during teaching and learning. The quality engagement of temporal relation between teacher, student, material and environment in inquiry physics lessons will be translated as a mediated process within teacher agency and inquiry learning. Whereas the projective dimension is meant by how do teacher make visible their visions of an ideal

practice in their upcoming profession. In this context (inquiry physics learning), the physics content, student aspirations and teacher aspirations are taken into account as the short term and long-term aspirations. According to (Bryk, 2015) reforms that based on inquiry cycle promote ownership of both the knowledge and process in which new knowledge about teaching and learning is acquired. It is important to encourage teacher inquiry and identify them as knowledge producers to help teachers take control of their own process of change (Rinke & Stebick, 2013; Day, 2000). To act adequately and intelligibly for a successful outcome, skills alone are not enough. One needs to have certain attitudes and dispositions to act accordingly. A habit of mind means having the agency to behave appropriately in tackling a problem. Therefore, an exploratory of teacher habit of mind over their inquiry teaching practice will give an insight on how teacher exercising agency and how teacher as an inquirer support their professional learning for lifelong learning. These components are used as a guide to explore how habit of mind teacher support their professional development.

A Habits of Mind (HoM) means having a disposition toward behaving intelligently when confronted with a problem to which the answer is not known (Costa & Kallick, 2008). In this context, behaving intelligently refers to problem solving behaviour that is constructed by experience gained through social interactions (Dewey, 1933 cited in Altan, Lane, & Dottin, 2019). When people experience dilemmas or uncertainties, the most effective actions are drawing out certain patterns of intellectual behaviour in order to solve the dilemmas or uncertainties. This is actually parallel to Emirbayer and Mische (1998) conceptualisation of exercising agency, where actors respond selectively to current established patterns of thoughts and behaviour, discover ways of communicating ideas and produce potential trajectories of actions. As discussed by Goller & Billett, (2014) and Goller & Harteis, (2017), agency has been interpreted as an individual antecedent, prerequisite or dispositions to make intentional choices, initiate actions and exercise control over their sense of selves and work environments. Therefore, in this study, the recurrence phenomenon of teacher agency is defined as teacher's habit of mind (behaving intelligently). Here teacher consider their prior and present experience to solve teaching dilemma through social interaction with students in the classroom.

This study is applying qualitative heuristic inquiry by Moustakas (1990), (Moustakas, 2015) as the research methodology. This methodology focusses on evaluation of meaning making draws In questioning researcher personal experience of the phenomenon and the fundamental experience of others who lived with this phenomenon. Thereby, using heuristic inquiry does not only limit at studying the respondent, but also researcher own experience with the phenomenon of agency. The lead researcher of this study is an experienced teacher for 14 years that has a direct encounter with changes in teaching strategies (21st Century Learning), medium of instruction (English to Bahasa Melayu), Physics curriculum (KBSM to KSSM), mode of assessment (exam oriented to school-based assessment), and mode of teaching (face to face to online learning). The subjective experience here is personal to lead researcher and the exploration focus on researcher's internal frame of reference. Here, the lead researcher finds others that shared similar experiences which is 10 physics teachers and addressed them as co-researcher in the process of data collection and analysis. Hence purposive sampling was to select teachers from in the regions of Pasir Gudang, Iskandar Puteri and Johor Bahru to complement the methodology purposes. Moustakas, (1990, pp.15-27) introduced six phases of heuristic inquiry which are initial engagement, immersion, incubation, illumination, explication and creative synthesis. Data were collected from the two cycle of retrospective verbal report, an in-depth interview and researcher journal. In retrospective verbal report, teacher was asked to do reflection on their inquiry Physics lesson based on 5R Framework of Reflection by Bain et al., (2002).

In this study, an interpretative phenomenological analysis (IPA) is embedded into heuristic framework. IPA analytical procedure begin by reading and re-reading, initial noting, develop themes, cluster themes, move to the next step and integrate cases (Smith et al., 2009). The heuristic inquiry guidelines of data analysis by Moustakas (1990) recommend that data should be analyse one-by-one respondent. Figure 1.1 presents the account of the heuristic process begins from Step1: initial engagement, Step 2: immersion, Step 3: incubation, Step 4: illumination, Step 5: explication and Step 6: creative synthesis in the step by step of IPA recommended by Smith et al., (2009).

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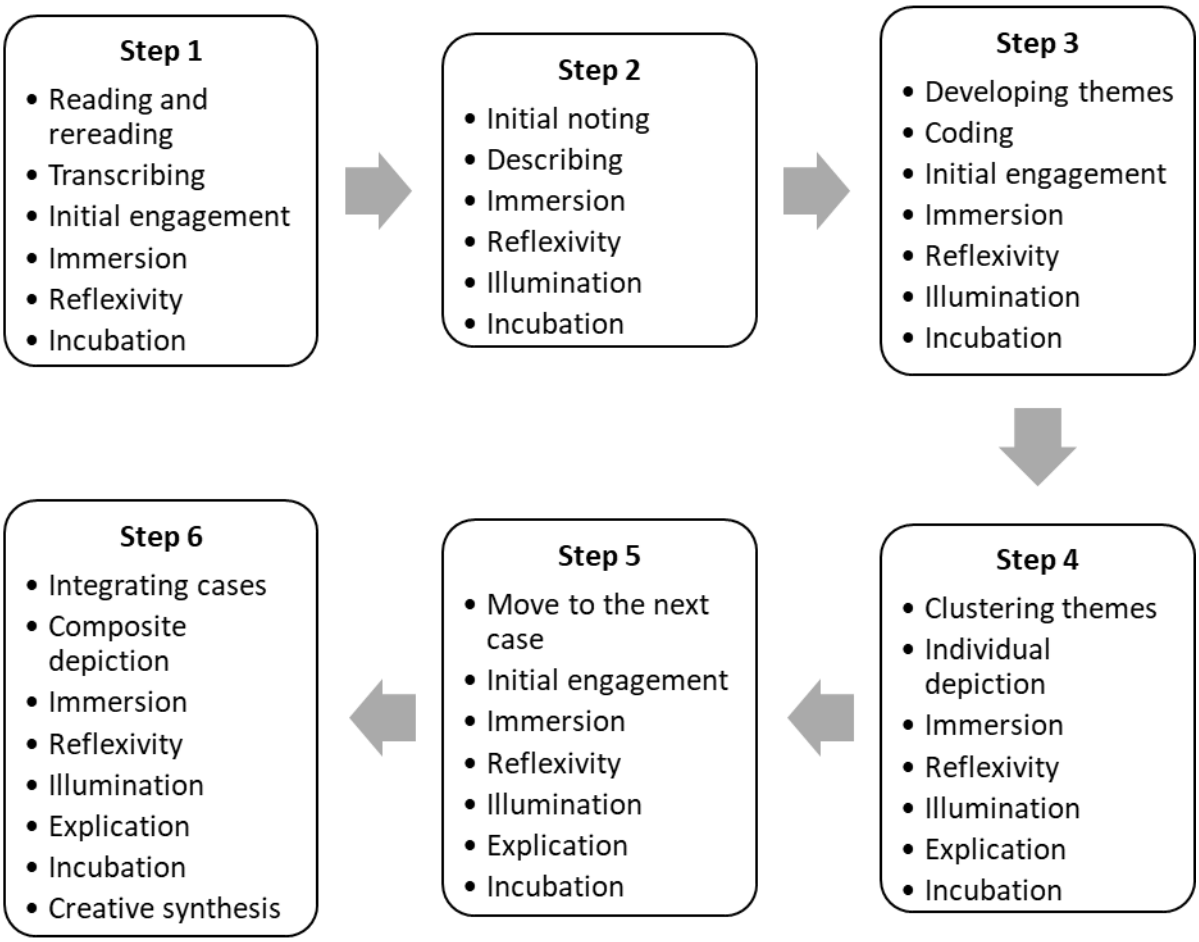

FFigure 1.1: IPA within heuristic framework

FINDINGS AND DISCUSSIONS

With regards to teacher's professional agency, the meaning of good inquiry lesson is interpreted in various ways. Describing "how" in this study is not limited to explain what actions taken during the course of exercising inquiry in Physics lessons, but also frame the realization process that led researchers encounter with her own experience as an inquiry teacher. In this study, the findings are able to distinguish between four themes of professional agency episodes exhibited while conducting inquiry class. For each theme, corresponding sub themes were constructed based on the specific description of teachers' actions, teachers` practices, teachers` resources, teachers` teaching materials/aids, teachers` learning, teachers` skills and teachers` values. The first dimension, 'being professionally competence" is reflected by teachers' tendency to presume specific outcomes from inquiry lesson.

Being Professional Competence in the Productive Steps of Inquiry lessons

With high rates of representation to gain confirmatory understanding, it exemplifies that teaching decision is decided at instance. To contextualized student understanding, further analysis through the lens of researcher was conducted. The act for students understanding is justify as an act to continually assess student with questioning to ensure knowledge development happened as planned.

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Co-researchers Point of view

Questioning, quizzes, and homework are methods used to obtained confirmatory understanding from student. For instance, R5 start her class using quizzes to assess student understanding of the previous concept to determine her next steps in inquiry Physics lesson.

Below is a summary of decisions making they made with this purpose:

1. R5, R9 and R23 give homework and exercises to reinforce the concepts covered in the Physics lessons. The feedback of the homework and exercises helps teacher to plan sequence of lesson in the following class.

2. R5 give a short task after video presentation to have a better control that will lead to student understanding.

3. R11 provided group task on Physics application, to evaluate understanding on the Physics concept application. Teacher also provides additional information in the internet by sharing links for student reference.

Along these agentic behaviour episodes, it was accompanied by questions to engage students. Usually, it is a simple and short questions focusing on certain concept or content. While students warrant teachers' decision making in class, however, the narration during this episode mirror to procedural professional practices when executing inquiry. This is mainly for their understanding to strictly abide by the cycle of inquiry model they learnt to be used in lesson. The mediating regulatory subject here although refer to student understanding however relies heavily on the expectation for teachers to provide evidence of academic performance. The nature of these agentic behaviour are the changes that teachers made according to their belief and practice norms to ensure that inquiry happened during lesson.

Lead-researchers Point of view

Reflecting upon this experience shared by the co-researchers, it is predictable and similar to my own experience on teaching inquiry physics lesson. The utilization of questioning, quizzes, homework, and exercises stands out as pivotal tools for gauging and reinforcing understanding. In this study, teachers are putting their pedagogical teaching skills into practices in inquiry Physics lesson by employing variety of assessment techniques and teaching strategies. Utilizing variety assessment techniques, teachers` able to monitor the student's progress and comprehension of the content. Quizzes, homework and exercises feedback not only informs subsequent lesson plans but also tailors the learning course based on student comprehension levels. This is not only beneficial for both the student and the teacher, but also promotes a flexible and adaptive teaching style. While group tasks and extra online resources, not only encouraging independent exploration but also foster deeper understanding on physics concept. These episodes of agentic behaviour reflect a conscientious commitment to pedagogical inquiry. While foregrounding student understanding, there is a palpable alignment with established inquiry models, underscoring the teachers' dedication to adhering to structured pedagogical norms. These agentic behaviours underscore a profound commitment to nurturing inquiry-based learning environments while substantiating the interdependent relationship between pedagogical norms and student understanding.

Inquiry pedagogy as a sign to create sense of professional purpose to maintain inquiry learning

In general, all teachers in this study are committed to provide continuous support, monitoring progress, and create resources since any learning are aiming to address misconceptions or gaps in knowledge. A variety teaching strategy such as group discussion, hands on activity, self-learning and presentation were conducted as part of inquiry activities.

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Co-researchers Point of view

Change toward more inclusive inquiry learning activities in response to changing learning ecosystem during pandemic is numerous. This can be seen from these agentic behaviours from:

1. R5 choose hands on activity to help student construct their understanding on the angle of reflection and refraction.

2. R6 used You Tube videos and simulation application in to provide virtual experiment activities.

3. R7 use real life phenomenon close to student life as example in purpose to generate initial idea of the Physics concept.

4. R6, R9 and R12 start her class by brainstorming student prior knowledge related to present concepts.

5. R5 and R6 shows extra effort on motivating student to join and actively participate in inquiry Physics online learning by integrating other application that provide rewards on student participation such as DOJO classroom and KAMI classroom.

6. R6 go extra miles by visiting the student house as she did not reply her call and messages. R6 even met and talk with the parents to understand their problem.

7. R5 and R9 on the other hand belief, by cheering up and rewarding the present student will attract the student to attend more classes in the future and participate actively in class activities.

8. R3 rewarding the active student in order to value student effort and also to attract other student participation.

To address inquiry lesson during pandemic, therefore the focus is contributed by students' participation and learning resources.

Creating an inclusive pedagogy where every student actively participates is has deviate the actual purpose of inquiry learning. Teachers understanding of change during pandemic encourage them to use technological tools as inquiry tools. They seek to support students learning and well-being, which make them to exercise agency to tolerate with variation of learning outcomes. This tolerance is what characterizing the inquiry lesson as inclusive. For instance, teachers critically evaluate and modify resources to align with students' level of understanding, ensuring relevance and effectiveness. Teacher adapts their instructional strategies to accommodate varying levels of prior knowledge, providing scaffolding and support to bridge the gaps and facilitate student learning development. Their agentic action to replans lesson with different instructions, provide additional resources, and implement strategies to build upon students' existing knowledge and skills indicating that teachers at this instance focus more on their self-agency. They are no longer abide by the norm as implementor of inquiry lesson but redirecting inquiry lesson for students' capacity building.

Lead-researchers Point of view

Reflecting on the invaluable insights gained from the co-researcher, I deeply inspired by the varied and creative approaches they have taken to navigate inquiry-based physics education in the midst of the COVID-19 pandemic. Even tough, we have similar aims of creating inclusive inquiry-based learning based on student and curriculum needs, the use of technology educational tools such as simulation application, video conferencing, online group discussion and online reward plays an important role during online learning. This demonstrates teacher commitment to reassure student participation in inquiry physics lesson despite of the teaching material and resources available for online teaching versus face-to-face teaching. This pattern reveals a distinct characteristic, similar to

others reported in the literature of online learning. While the incorporation of real-world phenomena to explain Physics concepts and application, presentation, questioning and brainstorming demonstrates a student-centred approach, promoting inclusion and participation. In addition, the integration of platforms like DOJO classroom and KAMI classrooms, to incentivize student involvement and participation is commendable. Teacher strategies for creating an appreciation and motivation culture through rewards are equally noteworthy, creating an environment conducive to long-term student engagement.

Updating teaching material and resources to maintain inquiry learning with the changes of educational system

As the education system shifted to online learning, teachers critically evaluate, modify, and upgrade their teaching material and teaching strategies suitable for the current context. In some cases, students' prior knowledge, abilities, or potential are lower than the teacher expectations. Teachers critically evaluate and modify resources to align with their students' level and constraints, ensuring relevance and effectiveness.

Co-researchers Point of view

In this case, all teachers are facing the same issue of available teaching materials and resources. As prepared teaching materials and resources are only for face-to-face learning, it may not be suitable for online teaching and learning. To accommodate this issue, several agentic behaviours practices among teachers are identified in this study. There are:

1. R3, R5, R6, R7, R9, R12, R16, R17, R19 and R23 modify and upgrade their slide presentations by adding more pictures and videos to help student visualise the Physics phenomenon or concepts.

2. R6 and R12 does video conferencing and record video of herself doing Physics experiment in school laboratory

3. R5, R6, and R23 incorporates simulation application to show real example of Physics phenomenon.

4. R12, R23 upgrades their instructional strategies to accommodate student levels

5. R5 replans lesson

The strategic changes and upgrades to their teaching materials, like adding more visual aids such as pictures and videos in their slide presentations, are indicative of a concerted effort to improve student comprehension by providing engaging and vivid learning resources. The integration of simulation applications is an example of their innovative approach to bridging the gap between theory and practical understanding. Adapting instructional strategies to meet varying student levels demonstrates a keen comprehension and responsiveness to their students' diverse needs and capacities. The teacher's initiative in rescheduling lessons is indicative of a dynamic approach, making sure that the content delivery is in line with their online learning environment. Taken together these agentic behaviours demonstrate a deep commitment to overcome the obstacles posed by the shift to e-learning. The teachers' effort to tailor resources, adjust methodologies, and use technology to improve comprehension and engagement demonstrate a strong commitment to providing effective and meaningful learning opportunities amidst the challenges of the online educational landscape.

Lead-researchers Point of view

The pervasive issue of inadequacy in available teaching materials for online education has led to a commendable display of agentic behaviours among educators. Reflecting on the incalculable

insights from the co-researcher, the proactive actions taken stand as testament to teacher unwavering commitment to student inquiry learning experiences. Teacher teaching strategies and teaching materials are mostly for face-to-face teaching and learning. As the education system shifted to online learning, teachers critically evaluate, modify, and upgrade their teaching material and teaching strategies suitable for the current context. Parallel to my own experience, students' abilities and potential are one key aspect taken into account when preparing teaching materials. Teachers critically evaluate and modify resources to align with their students' level, ensuring relevance and effectiveness. Teacher being reflective about their teaching strategies, teaching material and student readiness in conducting inquiry physics lesson unlocks another agentic behaviour of teachers.

Coping with the transformation of educational system

The Covid-19 pandemic has impacted the educational system in various way. The sudden shift triggered the need for teachers to quickly adapt and stay updated, embracing new teaching methods and incorporating technology. The deficiency of previous online teaching and learning practices give spaces for teachers to improve.

Co-researchers Point of view

As they are lots of resources available out there, teacher take their own initiative in learning. Teacher joins teachers' community in Telegram, Whatssup, Facebook and You Tube with the attention to learn and share their best practices. At the same time, there are also in house training, webinar and online courses organized by the JPN, PPD and also KPM. These are summary of decisions making they made with this purpose:

1. R3, R5, R6, R7, R9, R12, R16, R17, R19 and R23 adapt and adopt their teaching strategies to online teaching

2. R3, R5, R6, R7, R9, R12, R16, R17, R19 and R23 updates their teaching method by reflecting on their earlier teaching and learning practices in online learning.

3. R3, R5, R6, R7, R9, R12, R16, R17, R19 and R23 take initiative to learn by joining teachers' community

This theme resonates strongly with teacher agency. Their efforts to actively engage within digital communities demonstrate a hunger for learning and an eagerness to stay up-to-date with modern teaching methods and technological innovations. In addition, their proactive approach to engaging with their teacher communities demonstrates a collaborative spirit focused on sharing knowledge and ongoing learning. Teacher's thoughtful consideration of past practices to improve teaching methodologies coupled with their eagerness to adapt and improve their teaching approaches reflect a deep-seated desire to create an enriched learning space, despite the challenges that the pandemic has presented. Their commitment to professional growth and innovative teaching approaches not only benefit their pedagogical skills but also serve as a source of inspiration to the educational community as a whole.

Lead-researchers Point of view

Reflecting on the transformative journey embarked upon by these co-researchers amidst the tumultuous landscape shaped by the Covid-19 pandemic, it's truly inspiring to witness their proactive response and collective determination to navigate the challenges faced by the educational system. The abrupt transition to online learning necessitated a swift adaptation, compelling teachers to embrace novel teaching methodologies while integrating technology to bridge the gaps in previous online pedagogical practices. Teacher incompetency of online learning does not stop teacher commitment in creating an inclusive inquiry teaching and learning. The eminence of online resources available for

teacher learning is also mind-boggling. This presents a huge opportunity for teachers to exercise agency and growth their professional development.

CONCLUSION

The teachers' transition from strictly adhering to standards to exercising individual agency to support diverse learning outcomes in the midst of the pandemic is a testament to their resilience and flexibility. Their commitment to evaluating, adapting, and customizing resources to meet students' varying needs and comprehension levels speaks to their deep-seated commitment to inclusion. This focus on self-agency turns them from implementors into facilitators, placing students' capacity building at the centre of their work. Their adaptive instructional techniques, scaffolding and innovative approaches reflect a transformative shift in the way inquiry-based education is delivered, making sure that every student, no matter the challenges of the pandemic, has the opportunity to participate in inquiry physics lesson. In conclusion, this qualitative inquiry contributes a nuanced understanding of teacher habits of mind and teacher agency, emphasizing its multifaceted nature and the importance of fostering an environment conducive to empowering teachers in their roles. The implications highlight the need for further research and concerted efforts to support teacher professional development for enhanced educational outcomes.

Conflicts of Interest: No potential conflict of interest was declared by the authors.

Funding Details: This study was not supported by any funding agency.

CRediT Author Statement: The authors declare equal contributions to the following: conceptualization and design of the study, data collection, analysis and interpretation of findings, and preparation of the manuscript.

Ethical Statement: The researcher was responsible for the validity and trustworthiness of the study and gave careful attention to research transparency and obtaining informed and signed consent from participating teachers.

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