



Teachers Noticing Quality of Pedagogical Content Knowledge Based on Technological Integration of KARDS: A Qualitative Investigation

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Abstract

The present study explores Iranian EFL teachers' noticing the quality of pedagogical content knowledge and the suggested standards for integrating teachers' knowledge from teachers' standpoints. The participants included 15 female and male EFL teachers aged 34 to 45 teaching in universities and institutes in Tehran and Karaj. To collect the data, semi-structured interviews were held. It was a WhatsApp-based interview and the data were analyzed through content analysis. The results of data analyses indicated that the participants noticed the teachers' knowledge integration, technological integration, pedagogy integration, contextual gaps, reflection-based analyzing reasoning-based seeing. Most of the participants have a positive vision of technology and knowledge integration. The consequences of the study showed a shift from pedagogical standpoints toward cybergogy and heutagogy stances to maximize the teacher quality and pedagogical content knowledge. The interview procedure was the first phase of developing an integrated questionnaire to assess teachers' knowledge.

Keywords: Knowledge Integration, Pedagogical content knowledge, Teacher Quality

INTRODUCTION

Kumaravadivelu (2012) argued that the field of language teacher education is in need of restructuring and rethinking its core assumptions. The reason behind this need is globalization.

Teachers' noticing

There are different definitions of the term 'noticing' based on researchers' vision. Barth-Cohen et al. (2018) based their understanding of noticing on van Es and Sherin's (2002) definition, while Barnhart and van Es (2015) drew on Erickson's (2011) definition of noticing as 'what teachers attend to and use as evidence

from their experiences' (p. 85), particularly in relation to novice teachers. The two studies by Benedict-Chambers introduced the terms 'noticing critical features of instruction' (Benedict-Chambers, 2016) and 'noticing for teaching' (Benedict-Chambers & Aram, 2017). They described noticing as entailing 'three aspects: (a) identifying what is important in a teaching interaction, (b) using principles of teaching and learning to reason about what one sees, and (c) making choices about how to respond to the basis of an analysis of the observations' (Benedict-Chambers & Aram, 2017, p. 294).

These researchers explicitly stated that novice teachers should notice not only student thinking and scientific practices but also important

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aspects of their own practices. These include issues of practice related to ambitious science teachings, such as teaching moves related to student science content learning and the use of scientific practices (Benedict-Chambers & Aram, 2017) In terms of how the studies connected noticing and other theoretical constructs, BarthCohen et al. (2018) linked noticing with the development of particular reflective capacities of teachers focusing on the ‘social and cognitive dimensions of content learning’ (p. 84).

Similarly, Barnhart and van Es (2015) linked lesson analysis and reflection to noticing and contended that systematic analysis of teaching ‘requires the development of a variety of skills, including attending to what is noteworthy in classroom data, analyzing and interpreting that data with respect to defined goals, and deciding how to respond, what research refers to as teacher noticing’ (p. 84). Benedict-Chambers (2016) and Benedict-Chambers and Aram (2017) drew on the notion of ambitious teaching/high-leverage practices as offering a language and structure to support the development of noticing.

Teacher Quality

Darling-Hammond (2017) describes teacher quality as a package of personal traits, skills, and understandings that an individual brings to the teaching process. Teaching quality, separate from teacher quality, refers to robust and well-planned instruction that reaches a wide range of students, meeting and aligning the needs of students in a particular context (Darling-Hammond, 2017).

Though teacher and teaching quality are two separate dimensions of the teaching process, they are significantly interconnected and have a considerably high influence on student outcomes. The teacher's attributes such as strong content knowledge, pedagogical skills, and understanding of the audience, their differences, and difficulties significantly influence the teaching quality. Many other issues such as supportive learning for all learners, conducting teaching in a fair and unbiased manner, and promoting collaboration – not only with other professionals but among learners are crucial

characteristics of a highly effective and qualified teacher. Teacher quality is a challenging term with multiple implications, often reflecting the perspectives and interests of different writers, researchers, and policymakers (Strong 2012). Generally, much of the educational research literature surrounding the defining of expert or quality teachers have tended to focus on technical, observable phases of teaching (Collinson, 1999). This study seeks to examine the concept of teacher quality by situating it in a wider discussion about the purposes of education (Biesta, 2014).

Biesta (2014) has uttered a set of three purposes or aims for schooling- containing qualification (the teaching of skills and knowledge); socialization (concerning the ability to be with others in the world), and subjectification (concerning the awareness and development of the individual's character and potential).

Cochran-Smith (2001) provides a useful historical overview of the emergence of the term and its different usages:

1. Initial debates (the 1950s through the 1960s) about teacher quality were about the attributes that make up a good teacher. The key question was: what are the diverse psychological and behavioral attributes of a good teacher? In addition, what attributes contribute to good teacher education programs.

2. This was slowly replaced in the late 1960s to the late 1980s with a focus on effectiveness. The key issues were about the teaching strategies and approaches of the most effective teachers. What strategies should teacher education programs use in ensuring that trainee teachers are effective?

3. From the early 1980s to the late 1990s, the center became more on the knowledge of teachers. What should teachers know and be capable to perform? What kinds of knowledge, skills, and attitudes should teachers have?

4. From the 20th century and to the 21st century the most important question focuses on outcomes, specifically, the impact of teachers on learners. A more recent trend is to measure teacher knowledge (both subject and pedagogic knowledge) through testing teachers, rather than relying merely on qualifications and years

of experience as the chief gauges of teacher competence.

Quality pedagogy is applied by instructors who persistently engage in constant professional and personal development, reflect on their practice, and work cooperatively with others modeling the pleasure of the process of life-long learning. Assessments of teacher quality may possibly draw upon evidence gathered from observations of teachers' work that lead to the empowering of effective teachers. This evidence can be gathered from in-person or video-recorded observations of teaching, pre- and post-observation conferences with teachers, and samples of teachers' work with students.

Assessments of teacher practice may examine teacher quality for a single lesson or over an entire school year. Such assessments may be holistic or narrative in form but in rubric-based systems of teacher assessment like the Framework for Teaching (Danielson, 2007).

Knowledge Integration

According to Basil Bernstein's work on curriculum integration (Bernstein, 1975, p. 80), integration takes place when various knowledge contents "stand in an open relation to each other" and are "subordinate to some idea which reduces their isolation from each other".

Linn, Eylon, and Davis (2004) proposed the knowledge integration (KI) framework for learners. The Knowledge Integration framework

identifies effective instructional patterns to support students in developing a more integrated, normative understanding by building on their existing ideas and reflecting on their understanding. It involves eliciting existing ideas in students' conceptual repertoire about a target phenomenon, adding new ideas through instruction, prompting students to sort through their ideas by developing criteria, and helping students refine the connections among their ideas and transition toward a more normative, coherent understanding.

Curtis (2015) asserted the Queensland school reform longitudinal study (QSRLS) in 2001. University of Queensland produced a model of productive pedagogies to describe quality teaching. Four dimensions of intellectual quality, connectedness, supportive classroom environment, and recognition of difference are used in this model.

The line of the present study is connected to the concept of knowledge integration. In the connectedness phase, the model focuses on knowledge integration, background knowledge, connectedness to the world, and a problem-based curriculum. This dimension of productive pedagogy research considers the extent to which classrooms are connected to the world beyond its walls and the criteria demonstrate connections between bodies of knowledge and with the world beyond the classroom and school.

Productive pedagogy criteria	Explanation
Knowledge integration	This is when a teacher explicitly connects two or more sets of subject area knowledge, or where a holistic curriculum is evident and there are no subject boundaries that are readily identifiable.
Background knowledge	Within this element considerations and connections are made to such things as students' personal experiences, popular culture, media, community knowledge, and cultural knowledge.
Connectedness to the world	This relates to the extent to which a class demonstrates "value and meaning beyond the pedagogical context" (Hayes et al., 2006, p. 55) by working on real-world problems as well as utilising their personal experiences.
Problem-based curriculum	A teacher needs to present the class with problems that have no specified correct solution, thus requiring students to develop knowledge construction over a series of lessons.

Figure 1
Curtis (2015): connectedness criteria in a model of productive pedagogies

Recently, educational researchers have considered the integration of information technology in education (Bandhana, 2012), universal models of integration processes in engineering education (Tuba Pinar Yildirim, 2010), integration processes in teacher training (Richard Keith Rogers, 2011), and simulation of integration processes in education (Jacinta A. Opara, 2011). The concept of knowledge integration was noticed as a component of the quality of pedagogical content knowledge in the interview phase.

Technology Integration: Technological Pedagogical Content Knowledge

TPACK, representing technological pedagogical and content knowledge, has emerged as a theoretical framework targeting what knowledge is a prerequisite for teaching in the 21st century. It has involved much attention within the educational field (Willermark, 2018). TPACK establishes the development of Shulman's pedagogical content knowledge model (PCK) (Shulman, 1986). Shulman (1986) put emphasis on the prominence of integrating teachers' content knowledge with pedagogical knowledge. Shulman defined PCK as going beyond content or subject matter knowledge to embrace knowledge about how to teach specific content.

In Mishra and Koehler's (2006) development of the work, the aspect of Technological Knowledge (TK) was added. The work refers to TK as the knowledge of how to work with and apply technological recourses. The framework stresses the complex intersection of technological, pedagogical, and content knowledge within given contexts. The framework suggests that apart from considering these components in isolation, it is necessary to look at them in pairs as "Pedagogical Content Knowledge" (PCK), "Technological Content Knowledge" (TCK), "Technological Pedagogical Knowledge" (TPK), and finally, all three taken together, as "Technological Pedagogical and Content Knowledge" (TPACK)

A Social Constructivist Perspective of TPACK

Most of the research and scholarly work in describing TPACK has emphasized a cognitive

constructivist approach where teachers actively engage in transforming, organizing, and reorganizing their earlier knowledge for teaching in order to more efficiently guide student learning with suitable technologies (Koehler & Mishra, 2008; Mishra & Koehler, 2006).

Meanwhile, social constructivists have emphasized the significance of the social contexts of learning with the recognition that knowledge is reciprocally built and constructed in a social environment (Bearison & Dorval, 2002; Woolfolk, 2008).

With a Vygotskian social constructivist vision, knowledge is made through social interactions with others; this view represents a conceptual shift from a more Piagetian cognitive constructivist sight of knowledge development as a cognitive process where students organize and make sense of their explorations (Santrock, 2006).

KARDS

Knowing, Analyzing, Recognizing, Doing, and Seeing are five constituents of the KARDS model. Kumaravadivelu (2012) delivers a pictorial model for language teacher education, putting emphasis on how KARDS changes the learning experience from transmission of expert knowledge to the transformation of teaching practice" ((Kumaravadivelu, 2012).

Reflection

As suggested by Mann and Walsh (2017), a dialogic and collaborative approach to reflective practice should be promoted, as "professional development is fundamentally a social process" (p. 11). Dialogic reflection occurs when teachers reflect on their practices through 'discourse with others' (Mann & Walsh, 2013, p. 297).

Dialogic reflection refers to a less intensive approach that involves 'discourse with the self' to explore a given event or incident. It involves considering the decisions and judgments made and the possible reasons for these. Zeichner and Liston (1996) point out that Schön only focuses on individual reflection and does not emphasize the roles of others in

shaping the practitioners' views of their practices.

Zeichner and Liston (1996) and York-Barr et al. (2001) argue that in reflecting on teaching, teachers need to engage in discussions so that they have the opportunity to consider different perspectives in their reflection. This argument resonates with Mann and Walsh's (2013) view that reflection needs to 'take more account of spoken, collaborative forms of reflection' where they propose 'a more dialogic' and 'collaborative approach' to reflective practice (p.291).

York-Barr et al. (2001) refer to this collaborative approach to reflection as 'collective reflective practice'. Mann and Walsh (2013) suggest 'spoken and collaborative reflection is currently not recognized enough as there is too much focus on individual reflection' (p.295).

Research Questions

The following research questions were proposed based on the purpose of the study.

RQ1. What domains are noteworthy to notice for improving teachers' quality of pedagogical content knowledge?

RQ2. How do teachers notice components of KARDS with technology integration in their pedagogical content knowledge?

RQ3. What do you think about teachers' engagement and assessment based on the integration of Interview question 3) What is your vision toward the integration of teachers' knowledge? Positive /negative Give some solutions for maximizing the integration of teachers' knowledge.

METHOD

Participants

The participants of the present study were 15 EFL teachers studying at different language institutes and universities in Tehran. They were teaching English at the intermediate level of language and were selected based on convenience sampling. Persian was the mother tongue of all the participants and they ranged in age from 35 to 48 and were male and female EFL teachers. Table 1 displays the demographic information of the participants.

Table 1
Demographic information of the participants

Number	Gender	Nationality	Age Range
15	Female/Male	Iranian	35-38

Instruments

Semi-structured interview

In the beginning phase of scheming the semi-structured interview, extensive questions were organized on three main issues of the integrated design and the suggested answers. And, in the second phase, two EFL experts modified the questions, formed new ones, and placed them in a logical sequence.

The validity of the interview questions was confirmed in two stages. Firstly, the literature on studies associated with the integrated design was reviewed to cultivate an in-depth understanding of the interview questions and the corresponding interview procedures in regard to integrated design. Furthermore, the interview procedure was pilot tested on five participants, purposefully selected from those who were more experienced. Accordingly, the order of

the procedure questions was revised slightly and additional investigative questions were developed.

The final three interview questions with subcategory questions are as follows:

1) What do you think about teachers' engagement and assessment based on the integration of KARDS and TPACK to improve teachers' pedagogical content knowledge? 1.1) How do you analyze learners' needs and motivations, and autonomy? What kinds of technology-integrated micro strategies do you consider for analyzing learners, au` needs, motivation, and autonomy? 1.2) What is your vision toward doing coteaching with technology integration? What kinds of technology-integrated micro strategies do you use for doing team teaching and co-teaching? 2) What do you notice about the gaps to maximize teachers' pedagogical content knowledge? 2.1) Subcategory question: What are effective ways to observe your own classes and colleagues' classes? What kinds of technology-integrated micro strategies do you consider for observing your classes and your colleagues classes? Interview question 3) What

is your vision toward the integration of teachers' knowledge? positive/ negative Give some solutions for maximizing the integration of teachers' knowledge.

To amplify reliability concerns and enrich the trustworthiness of the interview outcomes two phases were taken. Primarily, the interview contents were coded by the two researchers independently (Dornyei, 2007). Furthermore, member checking was also used in which the extracted themes from five interviews were given to the participants to confirm the appropriate interpretation of the data (Hsieh & Shannon, 2005).

Research Design

This study used phenomenology, as a qualitative method, to address Iranian EFL teachers' integrated design and solutions. As Merleau-Ponty (1962) theorized, in phenomenology, the researcher transcends or suspends past knowledge and experience in order to know a phenomenon at a deeper stage.

Colaizzi (1978) and Streubert and Carpenter (1999) held that phenomenology is an effort to approach a lived experience with a sense of novelty to produce descriptive data. Bracketing is a process of setting aside one's beliefs, emotions, and insights to be more open or realistic to the phenomenon (Colaizzi, 1978; Streubert & Carpenter, 1999).

As an EFL researcher interviewing with the teachers with integrated design, it was necessary for the interviewer to recognize and attempt to bracket those experiences. Colaizzi (1978) maintained that the success of phenomenological research questions depends on the extent to which the questions address lived experiences independent of theoretical explanations.

Data Collection Procedure

First, 15 male and female experienced teachers within the age range of 35 to 28 were emailed by the researcher. In order to collect the data, semi-structured interviews were held with the participants of the study over 3 months. After obtaining informed agreement, each participant was asked to take part in a WhatsApp individual interview with the researcher. Each interview

session attended individually by the interviewees lasted approximately 15 minutes.

This method is based on conversation, with the emphasis on the researcher's asking questions and listening, and respondents answering (Jamshed, 2014).

In this method of interview, interviewees are considered as meaning-makers, not passive conduits for retrieving information from an existing vessel of answers. In semi-structured interviews, the whole process of interviewing changes throughout the continuum of highly structured to highly unstructured in that the pre-determined questions were not necessarily asked in a fixed order but rather in a more flexible manner (DeJonckheere, & Vaughn, 2019). Moreover, the answers were not predetermined in the form of any response category, either (Jamshed, 2014).

During interviews, the interviewees were allowed to answer the questions and proceed in their own way in an informal situation. To interview the participants, they were asked a set of three interview questions. The interview procedure was pilot tested with five participants, purposefully selected from the main sample of the study.

Accordingly, the order of the protocol questions was revised slightly. The final interview questions were 1) What do you think about teachers' engagement and assessment based on the integration of KARDS and TPACK to improve teachers' pedagogical content knowledge? 1.1) How do you analyze learners' needs and motivations, and autonomy? 1.2) What is your vision toward doing coteaching with technology integration? 2) What do you notice about the gaps to maximize teachers' pedagogical content knowledge? 2.1) Subcategory question: What are effective ways to observe your own classes and colleagues' classes?) What kinds of technology-integrated micro strategies do you consider for observing your classes and your colleagues classes? Interview question 3) What is your vision toward the integration of teachers' knowledge? positive/ negative Give some solutions for maximizing the integration of teachers' knowledge.

The interviews were recorded and transcribed. Then to analyze the collected data, con-

tent analysis was drawn upon. In content analysis which is a data coding technique, the recurring themes or patterns are extracted out of the transcripts.

Data Analysis Procedure

To analyze the collected data in the present study, the interview contents were thematically analyzed drawing on the tenets of content analysis proposed by Auerbach and Silverstein (2003). According to them, content analysis is the most common form of analysis when dealing with qualitative data. They enumerate five stages for content analyses including a) getting familiar with data, b) coming up with initial codes, c) looking for themes among codes, d) reviewing the themes, and e) producing the final report. The five stages were taken into consideration to analyze the collected data in this study and answer the research question.

The written transcripts were read many times to achieve an overall sense for them. The researcher coded all segments of the text and gathered themes by the codes. In the process of data analysis, the opinions of separate candidates were renovated into a significant category by the procedures of data diminishing, combining the same or similar codes, induction, and identifying new meaningful ideas emerging from the gathered data. From each transcript of each interviewee, significant phrases or sentences that pertained directly to the integrated design were recognized. Meanings were then assembled from the significant declarations. The constructed meanings were clustered into themes approving for the advent of themes mutual to all of the transcripts.

RESULTS

As pointed out in advance, to respond the research question of the current study, the participants were interrogated through three interview questions with subcategory questions. In fact, the investigators read transcripts judiciously, considered the codes, and constructed larger notions and themes in order to attain comprehensive meanings and infrastructures addressing the research questions of the study. For the purpose of integration and noticing, the

results of analyses is explained per se and grounded on each interview question in the resulting segments.

Interview question 1. What do you think about teachers' engagement and assessment based on the integration of KARDS and TPACK to improve teachers' pedagogical content knowledge?

Analyzing the data shows that that integration is considered a solution for teachers' engagement for participants of the present study. In fact, teachers need to refresh their pedagogical and pedagogical content knowledge based on integrative knowledge principles. Generally, the consequences designated that EFL teachers have engagement through diagnostic reasoning and dialogic tasks. For instance, one of the teachers noted:

I don't have enough familiarity with technology for teaching, but I prefer to engage myself with different types of feedbacks and rubrics for improving my knowledge. Generally, teachers' decisions and judgments are crucial for the future of their knowledge.

Another respondent maintained:

In my opinion, separate teaching and learning do not engage learners and teachers. Pedagogically, teachers need more collaborative activities for their assessment. Even, they need to assess based on different types of knowledge. It is not one-dimensional activity.

Out of the 15 participants in the study, 7 teachers declared that they find the integration of instructional designs as a prefabricate for teachers' knowledge engagement. four of them mentioned that they found some standards and principles are needed for making integration. Four of them asserted that knowing how to motivate and self-regulate ourselves is the key for engaging in teachers' activities. Generally, they mentioned that the epoch of separate learning without teachers' theorizing different notions of pedagogy is outdated.

Interview question 1.1) How do you analyze learners' needs and motivations, and autonomy? One of the respondents mentioned:

In my opinion, asking learners to report their

needs is one way for giving autonomy to them and I try to give them projects based on their interests.

Other respondents claimed:

I think that teachers gathering and observing the recorded classes scaffolds need assessment steps. I use positive feedback for giving motivation to learners. They write their needs for the institute.

From 15 verbatim transcripts, 60 significant statements were extracted. Table 2 represents examples of significant statements with their formulated meanings. In fact, each statement

was read carefully in order to draw the underlined meaningful notion behind it. For instance, as seen in Table 2, in the statement uttered by one of the interviewees as "I ask them to report their needs verbally and I try to give them motivation with project based on their interest." the meaning "learners discussion and feeling is influential." was emanated. Another example, as shown in Table 2, is "Teachers gathering and using different views." which revealed the meaning "Collaboration and reflection in groups is effective."

Table 2

Selected examples of significant statements of EFL teachers about maximizing pedagogical content knowledge through components of KARDS with TPACK-XL with a focus on analyzing

Significant Statement	Formulated Meaning
I ask them to report their needs verbally and ...	learners discussion is influential
I try to give them motivation with projects based on their interest.	Learners' feeling and engagement is pivotal.
Teachers gather and using different views.	Collaboration and reflection in groups is effective
I use positive feedback for giving motivation to learners.	Teachers` positive feedback is scaffolding motivation.
The learners write their needs for the institute. I want learners to explain about their needs. I consider learners' comprehended input for creating motivation and give them tasks based on their aptitude to maintain their motivation.	Noticing the procedure of input, feedback, and output is essential.
Learners' involvement in tasks creates motivation	Learners` accountability is required
I teach them creative learning and ask them about styles of teaching Online and electronic polls and think-aloud discussions are helpful.	Using technology scaffolds needs assessment
Knowing learners' needs is the first step. I ask for volunteers and then find ways for the participation of other learners. It depends on the learners' age. Mostly managers decide about it. But as a teacher I give them good feeling of I can learn.	The psychology of the classroom is pivotal for the participation of other learners.

For the purpose of the final themes to have emerged, the researchers examined the formulated meanings pondering over them. They wanted to arrive at larger categories signifying the main ways of analyzing learners' needs. For example, as set forth in Table 2,

from the formulated meaning of Learners' accountability is required the theme learner-based analyzing emerged, and from the meaning Collaboration and reflection in groups is effective, the category teacher-based analyzing" was drawn.

Table 3**Example of five theme clusters with their related formulated meanings**

Formulated Meaning	Theme cluster
Learners' accountability is required.	learner- based analyzing
learners' discussion is influential.	
Collabotation and reflection in groups is effective	reflection-based analyzing
Noticing the procedure of input, feedback, output is essential.	Process-based analyzing
Using technology scaffolds need assessment.	Affordance-based analyzing
Learners feeling is pivotal.	Psychological-based analyzing
Psychology of the classroom life is pivotal.	
Mixture of above components is mentioned.	Integrated Analyzing

Interview Subcategory question 1.2) What is your vision toward doing coteaching with technology integration?

Considering the data revealed that technology integration is a scaffolding for teachers' co-teaching for participants of the present study. In fact, teachers need to refresh their pedagogical and pedagogical content knowledge based on technology integration principles for cooperation. For instance, one of the teachers noted:

Quality of collaboration is essential for working in one context. I teach then give recorded feedback online. Other teachers share

their feedback too. One way is gathering with teachers and deciding about essential challenges in the context. Another participant mentioned that we use scaffolding strategies. Online movies can be a kind of teaching for learners. I use vocabularies and grammar in the movies and animations. Mostly, we do not have a face-to-face situation to teach with other teachers in one class because of management and financial issues in the institutes and schools. So we substitute it with our recorded movies in the Instagram or other apps.

Table 4**Selected examples of significant statements of EFL teachers about doing co teaching**

Significant Statement	Formulated Meaning
online Task preparation, online curriculum planning are pre planning tasks that can be done in group.	Technology helps teachers planning.
We have online cooperation in making syllabus. one teacher teach the others assess the learners.	Technology scaffolds Collaborative assessing.
Sharing videos recorded in the class then reflection on parts of teaching. We use scaffolding strategies. online movies can be a kind of teaching for learners.	Technology integration scaffolds co-teaching.

Table 5**Example of five theme clusters with their related formulated meanings**

Formulated Meaning	Theme cluster
Technology helps teachers planning.	Integrated co-planning
Technology integration scaffolds co-teaching.	Integrated co-teaching
Technology scaffolds Collaborative assessing.	Integrated co-assessing

As a result, three theme cluster have emerged that consisted of Integrated co-planning, Integrated co-teaching, and Integrated co-assessing.

Interview Subcategory Question 2. What do you notice about the gaps to maximize teachers' pedagogical content knowledge?

One of the participants noted that gaps exist in the quality of teacher reflection and their reasoning of assessment. Therefore, I consider my reflection as a kind of tool for assessment. Even more concentration on the reflection in pairs is a gap that need to be fulfill in teachers professional development. Although technology can fill the teachers' gaps nowadays, more discussion on technological assessment is needed in ttc classes.

Other participants mentioned that teacher's identity is a core for teacher development. As I enter the class, I have a positive or negative impact on personalities. I try to notice gaps in my professional identity. Cooperation and dialogue with other teachers and learners make learning easy. One-way assessment is not complete without other teachers' diagnosis, So teachers need more cooperation in their judgments about learners. We focus on analyzing learners' skills, but I cannot use technology appropriately for assessment. I scaffold myself by using self-study and giving motivation for using modern approaches. There is a need for change in using approaches.

Table 6

Selected examples of significant statements of EFL teachers about noticing the gaps

Significant Statement	Formulated Meaning
The speed of internet and connection problems make use of technology hard for assessment.	Gaps in internet use exist.
I try to notice gaps in my professional identity.	Knowledge without professional identity is not complete.
I consider my reflection as a kind of tool for assessment.	The quality of teachers' reflection and their judgement for assessment is essential.
I scaffold myself by using self-study and giving motivation for using modern approaches.	Heutagogy principles are effective

As a result, Four formulated have emerged that consisted of speeds of internet, quality of

professional identity, quality of reflection, and quality of heutagogy.

Table 7

Examples of five theme clusters with their related formulated meaning

Formulated Meaning	Theme cluster
Gaps in internet use exist.	Cybergogy gaps
Knowledge without professional identity is not complete..	Identity mapping Gaps
The quality of teachers' reflection and their judgement for assessment is essential.	Integrated reflection gaps
Heutagogy principles are effective.	Heutagogy gaps

As a result, four theme clusters have emerged that consisted of Cybergogy gaps and quality of internet, identity mapping gaps, quality of integrated reflection, and quality of heutagogy that is related to self-determined learning concept.

Interview Subcategory question 2.1) What kind of reasoning and seeing reflect in observation of yours classes and colleagues' classes?

Table 8**Examples of significant statement**

Significant Statement	Formulated Meaning
I have reflection on my types of feedbacks in the class.	Teachers` diagnosis and reflection is essential for observation.
I notice fairness of assessment for different learners.	
In Most of the workshops, we have collaboration about planning syllabuses and assisting observations.	Teachers` collective reflection and discussion is pivotal for observation.
We have conversation about key materials and weak parts That is observed in the 15 minutes recorded class or even have mini teaching in the workshop.	Practice in the context and feedback is helpful for seeing and observation
I consider everything based on knowledge of skills and psychology in the class. I rely on my personal knowledge and if there is special issue I ask other more knowledgeable Instructor.	Knowledge focused seeing and reasoning scaffolds teachers` noticing in observation

Table 9**Example of five theme clusters with their related formulated meanings**

Formulated Meaning	Theme cluster
Teachers`diagnosis and reflection is essential for observation.	Diagnostic reasoning
Knowledge focused seeing and reasoning scaffolds teachers` noticing in observation.	Knowledge-based reasoning
Teachers` collective reflection and discussion is pivotal for observation.	Dialogic reasoning

As a result of the formulated meanings, three theme clusters of diagnostic reasoning, knowledge-based reasoning, and dialogic reasoning were delved.

Interview question 3) What is your vision toward the integration of KARDS with TPACK-XL? positive/negative Give some solutions

Table 10**Selected examples of significant statements of EFL teachers about reasoning in observation**

Significant Statement	Formulated Meaning
I think that integration is better than separation in learning or teaching. I consider it as a kind of shift in teachers` epistemology.	Integration lead to paradigm shift.
Focus of teachers can be different on components of integrated model.	Partial standards and principle should be defined.
Different kinds of technology designs exist that can be used with KARDS model for improving teachers.	Integration of technology frameworks with KARDS are useful.

Teachers believed that unintentionally they use some part of KARDS in their teaching without knowing about it. They mentioned

that some partial standards should be defined for its implementation with technology integration.

Table 11**Example of theme clusters with their related formulated meanings**

Formulated Meaning	Theme cluster
Integration lead to paradigm shift.	Positive view
Partial standards and principle should be defined.	Partial principles and standards
Integration of technology frameworks with KARDS are useful.	Instructional designs

The result showed that among 15 participants of the study, 11 participants had positive views toward integration and 4 participants believed in integrated teaching without any idea about the integration of instructional designs.

DISCUSSION

The present study aimed at investigating Iranian EFL teachers' noticing the quality of pedagogical content knowledge based on integrated design. The results of data analyses revealed that teachers have a positive view toward integration. They mentioned that partially defined standards and principles are needed for a clear understanding of teachers. It showed that teachers use different types of diagnostic, dialogic, and knowledge based reasoning for reflection of their observations. In the quality of teachers' pedagogical content knowledge, some gaps are noticed by teachers such as technological gaps, identity mapping gaps, and integrated reflection gaps. Their perspective toward doing co-teaching was based on three phases of integrated co-planning, integrated co-teaching, and integrated co-assessing. 9 participants mentioned that co-planning and co-assessing is used more than co-teaching because of special conditions and co-teaching is done through sharing recorded videos. For analyzing learners' needs mixture of different types such as learners-based analysis, teacher-based analysis, process-based analysis, affordance-based analysis, psychological-based analysis was mentioned that results in integrated analysis.

CONCLUSION

Based on the findings of the present study, EFL head teachers are encouraged to provide EFL teachers with more instruction concerning integrated instructional design. More focus on the gaps are needed. Like most empirical studies, the present study had some limitations which can be addressed in the future. The participants of the current study were 4 male and 11 female teachers with above 10 years of experience and within the age range of 35 to 48. Similar studies with equal size participants from novice and experienced and other age ranges can provide different results. The current study made use of interviews as its only method of data collection.

In the future, researchers are encouraged to use other means of data collection such as think-aloud protocols to come up with more comprehensive results. In the present study, the researcher focused on teachers perspectives. A similar study can be carried out focusing on learners' perspectives towards EFL learners and the possible solutions.

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