# Utilization of attitude maps in evaluating teachers' attitudes towards assessment

**Feral OGAN-BEKIROGLU**

**Marmara University, Faculty of Education**
**Department of Secondary Science and Mathematics Education**
**Istanbul, TURKEY**

**E-mail: feralogan@yahoo.com**

Received 15 Apr., 2008
Revised 6 Jun., 2008

## Contents

- Abstract
- Introduction
- Teachers' Views and Attitudes Related to Assessment
- Purpose of the Study
- Methodology
- Results
- Conclusion and implications
- References

# Abstract

Various methods have been performed to identify teachers' attitudes towards assessment. Recognizing the idea that mapping is one of the most efficient tools, this study was aimed to investigate the effectiveness of attitude maps in the evaluation of teachers' attitudes towards assessment. The instrument, composed of open-ended questions, was utilized during the semi-structured interview protocol and used as the study's data collection tool. Attitude maps were constructed during the evaluation process to represent the pre-service teachers' attitudes' towards assessment. The participants' attitudes were determined and categorized as traditional, close to traditional, transitional, close to constructivist, and constructivist. Criterion validity of the results was achieved by comparing the categories drawn from the attitude maps with the categories derived by the survey. Results indicate that attitude mapping is a useful way to evaluate teachers' attitudes towards assessment.

**Keywords:** Attitude, assessment, attitude map, teacher development, constructivism

# Introduction

Teachers are expected to integrate assessment and instruction, and to employ alternative forms of assessment that provide opportunities for learning improvement by revealing what students know and to determine the skills students need to work on. According to Haney, Czerniak, and Lumpe (1996), attitude towards behavior is a primary factor that influences teachers' intentions to implement science reform recommendations. Therefore, investigation of teachers' attitudes towards assessment is essential.

In the literature review, teachers' attitudes are categorized mainly as traditional and constructivist. In order to define traditional and constructivist attitudes towards assessment, it might be useful to briefly mention how the assessment would look when based on traditional epistemology and constructivist epistemology.

Wilson (1994) describes assessment in both traditional and constructivist forms. She states that while in traditional model of assessment, the primary purpose is to rank students according to certain traits; the purpose of assessment in constructivism is to determine the nature of a student's constructions. The "traditional form of assessment tends to ask this question: Did the student master whatever objectives were set for him? Rather, a constructivist must ask this question: Where is the student in the process of constructing his/her knowledge about this concept?" (Wilson, 1994, p. 6). Thus, the goal of assessment in constructivist epistemology is to create more accurate models of student thinking. She adds "In order to produce the most valid inferences about what a student knows or understands; the teacher must necessarily gather evidence from multiple sources" (Wilson, 1994, p. 7). "The idea of administering an externally set instrument composed of multiple-choice questions and, based upon that single instrument rank ordering students, is anathema to a constructivist" (Wilson, 1994, p.9). Stiggins (1999) also emphasizes the importance of using varied assessment strategies by pointing out that "Various assessment users need different information in different forms at different times to make their decisions" (p. 26). Furthermore, researchers (Pilcher, 2001; Sluijsmans, Brand-Gruwel, van Merrienbore & Bastiaens, 2003; Wilson, 1994) agree that effective assessment approaches based on constructivist views promote integration of assessment and instruction.

# Teachers' Views and Attitudes Related to Assessment

Ample research has been conducted to determine teachers' views about and attitudes towards assessment (Barko, Mayfield, Marion, Flexer & Cumbo, 1997; Bushman & Schnitker, 1995; Cooney, Bell, Fisher-Cauble & Sanchez, 1996; Graham, 2005; Lawrence & Pallrand, 2000; Meyer & Tusin, 1999; Wolfe, Chiu & Reckase, 1999). The general results emerging from the research indicate that teachers are aware of the benefits of performance-based assessments to their students. Nevertheless, they are worried about the amount of time required to complete these assessments and concerned about their inadequate knowledge of how to assess students' learning. Crowded classrooms, lack of space, lack of facilities, and the structure of the curriculum are raised as obstacles in implementing recommended assessment strategies.

# Purpose of the Study

Various research methods, both qualitative and quantitative, have been used to identify teachers' attitudes towards assessment. Assuming that mapping is one of the most efficient tools, this study was aimed at investigating the effectiveness of attitude maps in evaluation

and classification of teachers' attitudes towards assessment by using the data gathered from interviews.

# Methodology

### *Participants*

The participants of the study were ten volunteer pre-service physics teachers enrolled in a teacher education program. Anonymity was preserved by using codes for the participants (e.g. P-1 represents Pre-Service Teacher One). The participants had completed the assessment and evaluation course successfully in the previous semester, and therefore had knowledge of various assessment methods including alternative forms of assessment.

### *Instrument and Data Collection*

The instrument developed by the researcher was composed of 14 open-ended questions. Twelve of these 14 questions were designed to determine the pre-service teachers' attitudes towards assessment and categorized under the following four dimensions: instruction, determination of assessment, assessment methods, and evaluation criteria.

The purpose of the first dimension was to determine if the participants perceived any relationship between assessment and instruction. The questions under the instruction dimension were: Which teaching methods do you use?; Which factors do you consider when you plan your instruction?; and Do you think there is a relationship between instruction and assessment? How?

The intention behind the determination of assessment dimension was to elicit how the participants define assessment, and to obtain their ideas about the purpose of assessment. Thus, the participants were asked the following questions during the interview: What is assessment?; Why do you need to do assessment?; How can you elicit students' different ideas and skills?; When do you assess your students?; and How often do you assess your students?

The aim of the assessment methods dimension was to detect the participants' thoughts about assessment methods by asking these questions: Which assessment methods do you use when you assess your students' learning?; What is (are) the most effective assessment method(s)? Why?; and Do you think alternative forms of assessment are necessary? Why?

Finally, the participants' views about evaluation criteria, in addition to academic performance, were determined with the help of the question in the evaluation dimension (i.e., Are there any criteria besides academic performance that you consider when you evaluate your students' performance?).

The remaining two questions in the instrument were related to knowledge of subject matter and external difficulties. The rationale behind these questions was to find any obstacles that the pre-service teachers might encounter during assessment. The participants' attitudes were mainly dichotomized as constructivist and traditional.

The instrument was used in the semi-structured interview protocol. The audio-taped interviews were conducted by the researcher in her university office. Each interview lasted 30 to 45 minutes. The participants were the researchers' former students, but were not current students when the data were collected.

*Data Analysis and Construction of Attitude Maps*

Qualitative data analysis involved verbatim transcripts of the tapes. The collected data were analyzed inductively to identify themes that described the participants' attitudes. One attitude map was constructed for each pre-service teacher based on the themes to evaluate and represent her/his attitude towards assessment.

Attitude maps can be considered analogous to cognitive maps. Liebman and Paulston (1993) used cognitive maps to enhance their research in social discourse by developing and including them in their research findings. Cognitive maps determine how people derive meaning from the world around them, specifically how individuals encode, process and decode meanings (Heun, 1975). Therefore, Heun designed cognitive maps to measure the gain or growth of an individual's knowledge, learning skills, or abilities. Dochy and Gorissen (1992) also constructed cognitive maps for students in order to study the development and use of domain-specific prior knowledge. Cognitive maps are also images of beliefs and values (Schwartz, 1978). Simmons (1986) utilized cognitive maps to examine the university supervisors' beliefs concerning the purposes of student teaching and supervision, and to identify their criteria of effective student teacher performance. Irez (2006), in addition, generated cognitive maps to display an overall picture of pre-service science teacher educators' beliefs about the nature of science.

According to Miles and Huberman (1994), cognitive maps have a way of looking more organized and systematic than they probably are in the person's mind. They can also be drawn from a particular text, such as an interview transcription (Miles & Huberman, 1994).

The following procedure was administered to construct the attitude maps: First, an ellipse was drawn for each dimension in the instrument. Second, the ellipses were named same as the dimensions (i.e., instruction, determination of assessment, assessment methods and evaluation criteria). Third, one more ellipse was drawn for the obstacles that the pre-service teachers came across due to the external factors and their subject matter knowledge. Fourth, the ellipses were filled in according to the sentences and themes derived from the transcripts. Fifth, each participant's definition for assessment was written in a box near the ellipse drawn for the determination of assessment dimension. Finally, arrows were drawn between the ellipses to illustrate how participants established relationships between the assessment dimensions and how obstacles affected their assessment.

Ten attitude maps were constructed for ten participants. The participants' attitudes towards assessment were determined and categorized as traditional, close to traditional, transitional, close to constructivist, and constructivist. Taking the structure and content of the attitude maps into account created these categorizations. For example, if a participant's map presented that her/his definition of assessment was consistent with constructivist epistemology, s/he aimed to continually assess students using varied assessment methods, s/he planned activities which enabled her/him to teach as well as assess; s/he evaluated students' effort and growth, and there were dialectical relationships between four dimensions (i.e., instruction,

determination of assessment, assessment methods, evaluation criteria) in her/his map; her/his attitude towards assessment was considered as constructivist. The following three descriptors emerged during the data analysis: transitional, close to constructivist, and close to traditional. The notion of transition implied a movement from "traditional" attitude to "constructivist" attitude (refer to definitions in the introduction section). For instance, if the map showed that the participant defined assessment as determination of the durability of knowledge that s/he gave to students, s/he drew upon a variety of assessment methods at different times to bring out students' diverse skills, s/he understood the idea that some assessment methods could enhance learning, but s/he neither combined the performance objectives with the appropriate assessment methods nor did s/he consider her teaching while deciding which assessment methods to apply, s/he graded effort but also respect, s/he might change her assessment style depending on obstacles, and there were three arrows between four dimensions, but there was not any dialectical relationship between these dimensions: her/his attitude towards assessment was classified as transitional. A map where constructivist themes and relationships were in the majority, but there were also some traditional themes was categorized as close to constructivist. For example, if the map demonstrated that the participant defined assessment as determination of whether students achieved the performance objectives, s/he set performance objectives by considering both expectations for students and content, s/he planned her/his teaching and assessment methods based on the performance objectives, s/he considered prior knowledge in designing her/his teaching, but not in setting of the performance objectives; s/he applied informal assessment as well as performance assessment and gave short-term research assignments; however, s/he neither believed that concept mapping was an effective method nor did s/he think that portfolio assessment might be fun for students, s/he evaluated both participation and curiosity, and there were four arrows or three arrows and one dialectical relationship between four dimensions in the map: the participant's attitude was determined as close to constructivist. On the other hand, a map where traditional themes were the majority, but there were some constructivist themes and relationships was categorized as close to traditional. If the assessment was defined as determination of student knowledge about a subject, prior knowledge was assessed before starting teaching but, it was not taken into account in assessment so that student growth was not an issue in evaluation, assessment methods relied more on exams and very little on alternative forms of assessment, there was no relationship between assessment and instruction, and there were only two arrows between four dimensions; such an attitude was evaluated as close to traditional. The dichotomy was done based on the separate factors and dimensions to avoid oversimplifying the complexity of the teacher's attitude. The categorization was repeated a few times to avoid miscategorization.

### *Criterion Validity*

In order to ensure the criterion validity of the results, the participants' attitudes towards assessment were also determined by the survey research. The categories determined from the attitude maps for the participants' attitudes were compared with the categories derived from the survey. The survey instrument was adapted from McMillan's (2001) questionnaire, with a few small changes, and it comprised 44 Likert-type items distributed across the following four subscales: instructional practices, such as class discussion and lecture; cognitive level of assessments, such as recalling of knowledge; types of assessment, such as informal assessment and multiple-choice exam; and evaluation criteria, such as participation and growth. These subscales were consistent with the dimensions in the interview instrument. The survey instrument was administered to 46 pre-service teachers, including the participants of

this study, and Cronbach's alpha reliability was found to be 0.74. This result illustrated that the survey instrument had internal consistency.

# Results

The pre-service teachers' attitudes towards assessment based on the attitude maps are given in Table I. Table I also shows their attitudes according to the survey results. Comparison of two results presents the criterion validity. There are slight differences in two participants' (P-1 and P-10) attitudes across the attitude maps and survey. There might be a chance that these two participants tended to be more constructivist during the interviews.

In order to provide examples from different attitude categories, three participants' attitude maps are given and discussed here in detail. The attitude maps of the second participant, the fourth participant and the sixth participant have been selected as examples to demonstrate how close categories can be distinguished with the help of the attitude maps. The attitude map of Pre-Service Teacher-2 (P-2) is presented in Figure 1. P-2 expressed that the purpose of assessment was to determine whether students mastered the objectives she set for them. Additionally, there was no sign of what she took into consideration while setting the performance objectives. According to her, lecture, lab experiments, and small research projects were enough and there was no need to use other teaching methods. The arrow from the instruction dimension to the assessment methods dimension represents her thought that assessment methods should be compatible with teaching methods. Therefore, her preferred assessment methods were exams (compatible with lecture) and performance assessments (compatible with lab experiments and projects). She said that:

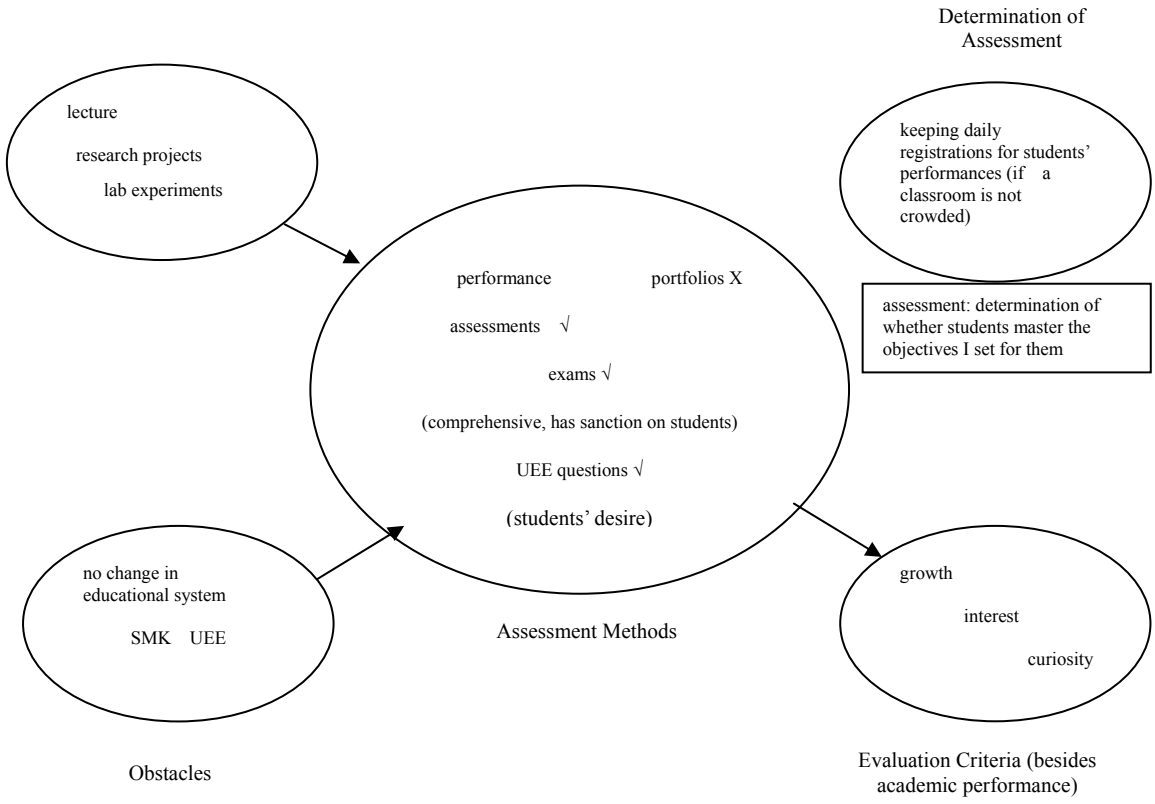
> *Exams have sanction on students and force them to study. Besides, I can ask many topics in one exam. Although I am against the university entrance examination (UEE), I ask multiple-choice questions because students are asked this kind of questions in the UEE …..I do not think that I will implement portfolio assessment in my classrooms because I do not see any benefits of portfolios. Moreover, portfolios are heavy burden for students (P-2).*

University entrance examination (UEE) is a national requirement for high school graduates in order to start university education in Turkey. It is a standardized examination administered at the same time in different parts of the country and includes multiple-choice questions. For this reason, she assumed that she had to ask multiple-choice questions on exams she prepared. Moreover, she believed that the pre-service teacher education was based on constructivist epistemology, but it was hard to reflect this epistemology in the real classrooms because there was no change, despite a few reforms, in the educational system. Consequently, as shown in her attitude map, she might not use performance assessments if she encounters any obstacles. In addition to current conditions in the educational system and UEE, P-2 thought that her subject matter knowledge (SMK) might also be an obstacle and affect her choice of assessment methods.

**Table I :** *The participants' attitudes towards assessment with regard to their attitude maps and survey results*

| Participants | Attitudes towards Assessment |
|---|---|

| | Attitude Maps | Survey |
|---|---|---|
| P-1 | Transitional | Close to traditional |
| P-2 | Close to traditional | Close to traditional |
| P-3 | Close to constructivist | Close to constructivist |
| P-4 | Transitional | Transitional |
| P-5 | Close to constructivist | Close to constructivist |
| P-6 | Close to constructivist | Close to constructivist |
| P-7 | Transitional | Transitional |
| P-8 | Constructivist | Constructivist |
| P-9 | Transitional | Transitional |
| P-10 | Close to constructivist | Transitional |




UEE: University Entrance Examination, SMK: Subject Matter Knowledge, √ : Yes, X : No, ~ : Maybe

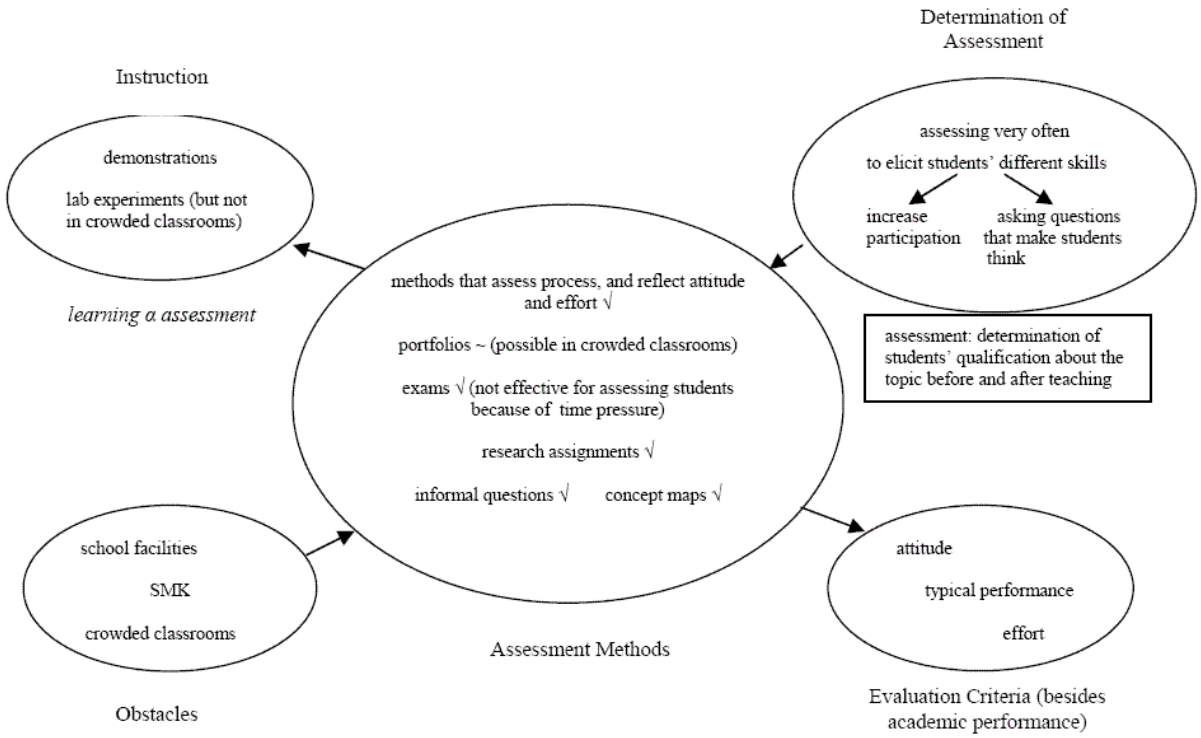
**Figure 1:** Attitude map of P-2

The arrow from the assessment methods dimension to the evaluation criteria dimension reveals that she made connections between her assessment methods and evaluation. She stated that:

> *To me, students' progression and growth between their beginning and final levels are important. In my evaluation, I also consider if students have interest and ask questions. .....It seems that performance assessments are appropriate for formative evaluation because I can assess process and student growth. Comprehensive exams, on the other hand, are good for summative evaluation (P-2).*

P-2's attitude map illustrates some themes that are in line with constructivist epistemology. That is, she made connections between the assessment methods dimension and the instruction dimension as well as between the assessment methods dimension and the evaluation criteria dimension. However, regarding only two arrows between four dimensions, her definition of assessment that was aligned with traditional epistemology, her preference for using a few assessment methods, her beliefs about reflection of constructivist beliefs to real school settings, and the non-existing relationships between the determination of assessment dimension and other dimensions; P-2's attitude towards assessment was considered as close to traditional.

Figure 2 displays P-4's attitude map. Her definition of assessment was measurement of student capacity about the subject. From her point of view, the purpose of assessment was to determine what students know before the instruction and what they have learned after the instruction. She believed that she would make valid decisions about students' capacity if she could increase students' participation in the class activities as well as ask questions that make them think. The arrow from the determination of assessment dimension to the assessment methods dimension shows that her assessment methods were consistent with her purpose of assessment. In other words, she aimed to assess students very often, she intended to use concept maps after teaching every subject, and she intended to give research assignments on weekly basis. P4 was aware of the limitations of exams; hence, as presented in her attitude map, she considered using other assessment methods, too.




UEE: University Entrance Examination, SMK: Subject Matter Knowledge, √ : Yes, X : No, ~ : Maybe

**Figure 2:** Attitude map of P-4

She expressed that:

> *In my opinion, exams are not very effective methods because there is time pressure. The methods that assess process are more effective. This kind of assessment methods can also reflect students' attitude and effort.....I give research assignments that either handle students' misconceptions or are related to daily life events. These assignments may become interesting for students and make them observe their environment (P-4).*

The arrow from the assessment methods dimension to the evaluation criteria dimension demonstrates how she connected her assessment methods with her evaluation criteria. In other words, she wanted to use assessment methods enabling to reveal students' attitudes and efforts because they were among her evaluation criteria. In addition, she gave credit to students' typical performance; therefore, informal questioning was among her assessment methods.

The arrow was drawn from the assessment methods dimension to the instruction dimension because she could make connection between assessment methods and student learning. This relationship was named as "learning α assessment" and illustrated by the arrow. She explained that:

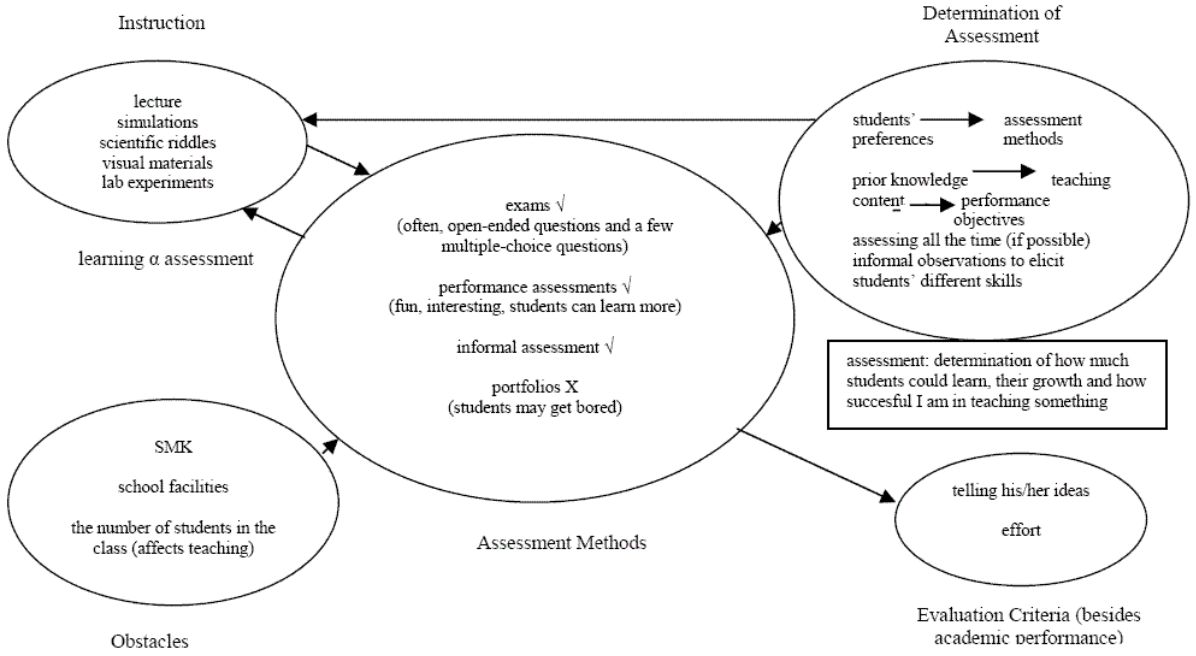
> *Students study according to my assessment methods. If I assess my students three times in one semester by designing exams, they will only study just before the exam date and forget immediately after that. Nevertheless, if they study in a continuous process, their learning will be durable. Students think that physics is difficult so that they don't like*

*physics. Thus, if examination is my only assessment method, students will tend to study half of the content, which will be enough to pass the class. On the other hand, if I assign students something that requires them to do research, their learning will be more durable since they endeavor to do the assignment and present the result proudly (P-4).*

Even though there were some constructivist themes in P4's attitude, she did not make any connection between her teaching and her assessment. There is no dialectical relationship between the instruction dimension and the assessment dimension. The direction of the arrow between these two dimensions is from the assessment methods dimension to the instruction dimension revealing that she did not consider her teaching when making her decision about which assessment methods to administer. Furthermore, there is no dialectical relationship between the instruction dimension and the determination of assessment dimension, meaning that she could not integrate assessment and instruction. She neither considered students' prior knowledge before setting performance objectives nor planned her teaching based on the assessment results. The arrow from the obstacles pointing to the assessment methods dimension reveals that she might change her assessment plans according to inadequate school facilities or crowded classrooms. For these reasons, P4's attitude towards assessment was coded as transitional.

Figure 3 presents P-6's attitude map. Her assessment definition included measurement of her success in teaching as well as determination of how much students could learn. The arrow from the determination of assessment dimension to the instruction dimension demonstrates that she planned her teaching according to students' prior knowledge. The arrow was drawn from the determination of assessment dimension to the assessment methods dimension because she thought that informal observations could elicit students' different skills and she was in favor of using informal assessments. This arrow also reveals that she took students' preferences about assessment methods into account. The two arrows between the instruction dimension and the assessment methods dimension show that there is a dialectical relationship between them. That is, she believed that students' way of study depended on how teachers assessed them, and so assessment methods affected their learning. Her belief is represented with the arrow named "learning α assessment" from the assessment method dimension to the instruction dimension. Additionally, her teaching methods were consistent with her assessment methods as shown with the arrow from the instruction dimension to the assessment methods dimension. She wanted to apply various assessment methods except for portfolio assessment. She expressed her opinion about assessment methods as follows:

*Only one method cannot assess students' performance. I utilize performance assessment since it is also a teaching tool. Moreover, performance assessments are fun and get students' attention. I prefer exams as well. I cannot assess higher-order thinking with multiple-choice questions; for this reason, I do not use them often. I do not prefer portfolio assessment as students may get bored. I rather prefer something that students can do in the class (P-6).*




UEE: University Entrance Examination, SMK: Subject Matter Knowledge, √ : Yes, X : No, ~ : Maybe

**Figure 3:** Attitude map of P-6

The arrow from the assessment methods dimension to the evaluation criteria dimension was drawn as she considered implementing both informal assessment and performance assessment to evaluate students' participation and effort. As mentioned above, there are many constructivist themes in the attitude map of P-6. Nonetheless, she set performance objectives based on the content of curriculum rather than her teaching and students' levels; hence, there is no arrow from the instruction dimension to the determination of assessment dimension. Moreover, there is no arrow from the determination of assessment dimension to the evaluation criteria dimension because she tended to assess student growth but she did not take it into account as an evaluation criterion. Therefore, there was not any relationship between determination of assessment dimension and the evaluation criteria dimension. Due to absence of two arrows, P-6's attitude map was categorized as close to constructivist.

# Conclusion and Implications

Results of the study indicate that attitude maps are an appropriate way to evaluate teachers' attitudes towards assessment. Attitude maps are visual images depicting teacher attitude in two dimensions. An attitude map consists of ellipses and arrows. Careful examination of the content of ellipses and the number and the direction of arrows among the ellipses gives researchers the opportunity to classify a teacher's attitude comprehensively. Based on the results, it can be concluded that an attitude map can provide an effective way for visually demonstrating the qualitative data and present a panoramic picture of a teacher's attitude towards assessment. Furthermore, it can demonstrate any variations among the dimensions as well as within the dimensions that constitute one's attitude towards assessment.

Although one of the purposes of teacher education programs is to shape pre-service teachers' attitudes towards assessment and prepare them for reform-based assessment and instruction, sometimes only subtle changes may occur in their attitudes. The same situation exists for in-service teacher education programs. Mapping is a diagnostic process and attitude maps can be used to detect slight changes in both pre-service and in-service teachers' attitudes.

# References

Barko, H., Mayfield, V. Marion, S., Flexer, R., & Cumbo, K. (1997). Teachers' developing ideas and practices about mathematics performance assessment: Successes, stumbling blocks, and implications for professional development. *Teaching and Teacher Education*, *13*(3), 259-278.

Bushman, L., & Schnitker, B. (1995). *Teacher attitudes on portfolio assessment, implementation, and practicability*. (ERIC Document Reproduction Service No. ED388661).

Cooney, T. J., Bell, K. Fisher-Cauble, D., & Sanchez, W. B. (1996). The demands of alternative assessment: What teachers say. *Mathematics Teacher*, *89*, 484-488.

Dochy, F. J. R. C. & Gorissen, V. M. (1992). *Methods for investigating the structure of the individual's knowledge base*. (ERIC Document Reproduction Service No. ED383748).

Graham, P. (2005). Classroom-based assessment: Changing knowledge and practice through preservice teacher education. *Teaching and Teacher Education*, *21*, 607-621.

Haney, J. J., Czerniak, C. M., & Lumpe, A. T. (1996). Teacher beliefs and intentions regarding the implementation of science education reform strands. *Journal of Research in Science Teaching*, *33* (9), 971–993.

Heun, L. (1975). *Maximizing individual student learning through cognitive style mapping.* (ERIC Document Reproduction Service No. ED119250).

Irez, S. (2006). Are we prepared? An assessment of preservice science teacher educators' beliefs about nature of science. *Science Education*, *90*, 1113-1143.

Lawrence, M., & Pallrand, G. J. (2000). A case study of the effectiveness of teacher experience in the use of explanation-based assessment in high school physics. *School Science and Mathematics*, *100*(1), 36-47.

Liebman, M. & Paulston, R. (1993). *Social cartography: A new methodology for comparative studies*. (ERIC Document Reproduction Service No. ED370832).

Meyer, D. K., & Tusin, L. F. (1999). Preservice teachers' perceptions of portfolios: Process versus product. *Journal of Teacher Education*, *50*(2), 131-139.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Pilcher, J. K. (2001, March). *The standards and integrating instructional and assessment practices.* Paper presented at the 53rd Annual Meeting of the American Association of Colleges for Teacher Education, Dallas, TX. (ERIC Document Reproduction Service No. ED451190).

Schwartz, S. H. (1978). *The development and application of a "cognitive map" to the daily newspaper newsroom*. (ERIC Document Reproduction Service No. ED165139).

Simmons, J. M. (1986). *An exploration of the role perspectives and evaluative judgment criteria of three university student teacher supervisors*. (ERIC Document Reproduction Service No. ED285855).

Sluijsmans, D. M. A., Brand-Gruwel, S., van Merrienbore, J. J. G., & Bastiaens, T. J. (2003). The training of peer assessment skills to promote the development of reflection skills in teacher education. *Studies in Educational Evaluation*, *29*, 23-42.

Stiggins, R. (1999). Evaluating classroom assessment training in teacher education programs. *Educational Measurement: Issues and Practice*, *18*(1), 23-27.

Wilson, L. (April, 1994). *A Theoretical framework linking beliefs with assessment practices in school mathematics: Assessment reforms in search of a theory*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, L.A. (ERIC Document Reproduction Service No. ED377215).

Wolfe, E. W., Chiu, C. W. T., & Reckase, M. D. (1999). Changes in secondary teachers' perceptions of barriers to portfolio assessment. *Assessing Writing*, *6*(1), 85-105.