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An Investigation of Students' Academic Development, Views, and Feelings through Journals

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The purpose of this study was to investigate upper primary school students' academic development in science courses and to evaluate their views and feelings about self-learning processes through journals. Students in 6th and 7th grade wrote journals twice a week for nine weeks. We evaluated the journals weekly according to the Science Journal Rubric (SCR), and individually observed students' academic developments. Subsequently, we also evaluated the journals by focusing on expressions in which students revealed their views and feelings about learning processes, excluding scientific concepts. We grouped the expressions containing views and/or feelings about the learning process into five categories. These categories were classmates, teacher, self-expressions, courses, and journals. The results supported the assertion that journals contain information not only about students' academic development but also about their personal and affective sides.

Keywords: student journal, science journal rubric, academic development, feelings

INTRODUCTION

Writing is an essential component of all science-related endeavors (Yore et al., 2004). Some researchers confirmed that writing allows students to reflect not only on existing knowledge and experiences, but it also enables them to actively construct new understandings (Anders & Guzzetti, 1996; Yore, Hand, & Prain, 1999). Although writing can help students transit from passive to active learning and shifts the learning process from teacher-centered to student-centered (Fok, 2008), it is often neglected in the classroom practice (Dempsey, PytlikZillig, & Bruning, 2009). The ability to share one's own understanding with others is a necessary component of coming to understand concepts. Consequently, teachers are expected to "provide adequate opportunities for students to communicate with one another orally, in writing, through symbols, models, charts and diagrams about appropriate, challenging and interesting science content" (Council of Chief State School Officers, 2002, p. 32).

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Journals are therefore very important in enabling students to share scientific concepts and experiments through writing and to reflect on their emotional feelings. According to Caine ve Caine (1995), feelings and cognition cannot be separated, which means that items such as concepts, feelings, and attitudes that are used in education are interconnected. They reflect and inform each other. Feelings give real meaning to our thoughts and actions. Boud (2001) emphasizes that we need to focus on the present feelings and emotions which can inhibit or enhance possibilities for further reflection and learning. Boud also states that expressive writing has a particular role to play in working with feelings.

Journal writing is one of the most important writing tools in helping students to reflect on their experiences and emotions in the classroom. Students need to learn how to communicate effectively in a science curriculum. There is a plethora of learning opportunities in science that involve written work (Ediger, 2001). Writing and drawing are ways for students to convey their scientific understanding, and journals thus provide a window for accessing these understandings (Doris, 1991: as cited in Shepardson & Britsch, 2000). In addition, student journals provide an outlet for emotional expression (Sprengr, 1999, p.28).

State of the literature

- Journaling is one of the important tools that help students to reflect on their experiences by writing in the classroom.
- It also provides an outlet for emotional expression.
- There have been many studies about student journals with a variety of purposes and in different areas. However, few studies have performed a deep qualitative analysis of student writings and made content coding using different variables with upper primary school students'.

Contribution of this paper to the literature

- SCR was proved to be a reliable and valid instrument for student journal assessment.
- The evaluation of journals through a reliable and valid assessment tool helped the observation of student development in science courses.
- The study shows that journals contain information not only about students' academic development but also about their personal and emotional sides.

Student journals

For more than a quarter-century, student journals have been used in different levels of education, such as pre-school (Shepardson & Britsch, 2001), elementary school (Erduran Avci, 2008; Lambirth & Gouch, 2006; Shepardson & Britsch, 2000), higher education (Cremer, 2005; Kaur, 2003; Roe & Stallman, 1994; Roth, 1985; Wagner, 1999), distance learning (Parer, 1988: as cited in Wagner, 1999), teacher education (Bain, Mills, Ballantyne, & Packer, 2002; Cornish & Cantor, 2008; Gallagher, Vail & Monda-Amaya, 2008; Hume, 2009) and special education (Regan, 2003). In addition to various educational levels of use, journals have been used by researchers in numerous subject areas, such as medicine (Goldenhar & Kues, 2006), nursing (Barton & Brown, 1992; Chirema, 2007), geography (Cook, 2000), marketing (Fisher, 1990), engineering (Palmer, Holt & Bray, 2008) and education (Conner & Gunstone, 2004; Grande, 2008; Kaur, 2003).

According to the literature as well, student journals have been utilized for different purposes. The remarkable studies from the literature involving journals and the purposes of the studies can be categorized as follows: to facilitate student learning (Garmon, 1998; Hume, 2009; Roth, 1985), to improve writing skills (Bain et al., 2002; Fisher, 1990; Regan, 2003), to evaluate course experience (Kaur, 2003; Richardson & Boutwell, 1993; Wagner, 1999), to reflect professional practice (Bain et al., 2002), to motivate students to express themselves (Lambirth & Gouch, 2006), to enhance

reflective practice (Bain et al., 2002; Blake, 2005; Chirema, 2007) as a source for determining students' use of learning strategies (Conner & Gunstone, 2004), and to assess students' learning (Erduran Avci, 2008; Ruiz-Primo, Li, Ayala, & Shavelson, 1999).

In particular, during the past decade, the use of student journals in science education has become a hot topic (Ajello, 2000; Erduran Avci, 2008; Erduran Avci & Uslu, 2009; Hanrahan, 1999; Hume, 2009; Ruiz-Primo et al., 1999; Ruiz-Primo, Li, Ayala, & Shavelson, 2004; Shepardson & Britsch, 2000; Shepardson & Britsch, 2001). According to Shepardson & Britsch (1997), the value of children's drawing and writing in science lies in its potential to assist children in making observations, remembering events, and communicating their learnings. By using student journals, children are able to express their ways of seeing and understanding scientific phenomena, and constructing or reconstructing these phenomena.

What do the results of studies on student journals reveal?

In the literature, there are many studies about student journals that serve a variety of purposes. By contrast, there are very few studies that perform a deep qualitative analysis of student writings as well as content coding using different variables. Journal content is analysed by means of different coding variables. These variables are as follows: course content, course activities, other students, lecturer activities, skills acquired, course structure, assessment (Wagner, 1999), graphic contexts (Shepardson & Britsch, 2000), mental contexts (Shepardson & Britsch, 2001), type and level of feedback conditions (Bain et al., 2002), students' feelings and perceptions toward their lecturers' behavior, clarity of course content, assessment procedures, volume of work, assessment practices, generic skills (Kaur, 2003), feelings, association, integration, validation, appropriation, outcome of reflection (Chirema, 2007), and pedagogical content knowledge (Hume, 2009). Gallagher, Vail & Monda-Amaya (2008) inspected the journals of graduate students using content analysis. Graduate students reflected the most on their own skills and the skills of others from interpersonal communication and team effort perspectives. As the result of the content analysis, eleven categories were found to be reflected in the journals. These categories are; (1) self-evaluation, (2) communication skills, (3) personal evaluation of the team, (4) components of teaming, (5) conflicts, (6) paraeducators, (7) relationships with other professionals, (8) mentoring, (9) logistic issues, (10) problem solving and (11) evaluation of team process. In another study performed with graduate students, students were asked to write journals

following each in-class group discussion. Thematic analysis of the journals revealed three coding categories, which are intentional process, identity process and emotional experience (Richardson et al., 2009). Dymont and O'Connell (2011) conducted a review of the literature to identify research articles that systematically analysed the level of reflection presented in higher education students' journals. A series of key contextual factors that can limit and enable deeply journal writing, were distilled from the articles. Blumenfeld (2010) presented her undergraduate teaching experiences about student journals as a brief explorative reflection rather than a research study. She stated that "the journals acknowledged the students' feelings and allowed a safe container for the range of emotional responses-positive, frustrated, and negative-to their readings."

As described above, most of the studies using student journals were performed with higher education or graduate students, while studies conducted with upper primary school students remained limited. There are few studies on various aspects of students' academic development when using student journals. In addition, there are no studies to be found in which student journals are used in observing both the academic development of primary school students as well as their feelings about the learning process. According to Wanket (2005), when students practice journal writing, they prepare themselves for their future academic, political, and emotional lives. Fulwiler (2000) stated that a student's journal can be a documentary of personal and academic growth, a record of evolving insight and a tool to gain that insight. He believed that journals are at the heart of any writing-across-the-curriculum program. In this context, this research finds it important to study the use of student journals at upper primary school levels as an instrument with which to observe student development and examine feelings about the learning process.

Purpose and research questions

This study began with the aim of using student journals in science courses and assessing them using a rubric. During the assessment process, researchers noticed that the journal contents included ideas and feelings about different areas that were not satisfied by the criteria in the rubric. This fact raised the question, "What additional possible different clues exist in the journals?" Therefore, the purpose of the study was extended and answers to the below questions were sought:

- How student journals can be used for observation and assessment of the academic development of the students in science and technology course?
- What possible clues do student journals include about the students' views and feelings about the

learning process besides the scientific and academic expressions?

METHODS

This is a qualitative study performed to evaluate student journals according to a rubric and to observe students' academic development and feelings using the information obtained from the student journals. Research was performed for science courses in a primary school located in Tokat, Turkey during the fall semester of 2007-2008. First, the student journals were evaluated using the SCR. In the second phase, students' expressions about the learning process, including the feelings and views expressed in the journals, were examined. The data obtained from these journals are presented in tables.

Participants

Research was conducted with the contribution of 30 students. Half of the students were 6th grade students and the other half were 7th grade students. Because the re-organized primary school course curriculums of the Ministry of National Education were first applied to the 6th and 7th grades at the time of the research, these grades were chosen as the target groups for the research. Of the 6th grades, all of whom are 12 – 13 years old, 6 were female and 9 were male. 7th grades were 13-14 years old and 11 were female where 4 were male. Children from socio-economically average level families attended the school in which the research was conducted.

Procedure

At the beginning of the study, students were informed about journal writing, the important points that needed to be considered, and the proper time to write. They also gained their first experience by writing their first journals during class. The same teacher was responsible for the science course in both 6th and 7th grades. The course was scheduled 4 hours a week for both grades, and the courses for the two classes were held consecutively on two days. The participating students wrote in journals about the course topics and course contents twice a week for nine weeks. The journal subjects specified according to the curriculum are as follows:

6th grade subjects: Reproduction in living, growth and development, force and motion, structure of matter.

7th grade subjects: Systems of body, force and motion, electricity in our lives.

An example subject is given below:

What did you learn about force and motion in this lesson? Which issues interested you most and which issues did you

understand well? Which activities did you like most? Were there any parts you could hardly understand or could not understand? Please share your comments, feelings and ideas by writing in your journal.

The students were given a journal writing task as homework. The journals were collected from the students on a regular basis and evaluated using the SCR. Some notes and comments were written on them, and the comments were shared with the students. Each of the participants was expected to make 18 journal entries during the study, but some of the participants could not complete this number of entries due to certain special situations, such as health problems or lateness to the course. Some journals were excluded from evaluation because of illegible handwriting. In total, 28 of the student journals could not be assessed, and 512 student journals were evaluated during the research. Of the evaluated journals, 258 belonged to 6th grade students and the remaining 254 journals belonged to 7th grade students.

Science journal rubric

SCR is an analytical rubric designed by the researchers in order to assess the science journals of primary school students. SCR is made up of seven criteria, namely, 'use of scientific language', 'relationship to daily life', 'creative thinking', 'layout/composition', 'use of scientific process abilities', 'use of diagrams, figures, formulas, equations, drawings etc.' and 'understanding of scientific concepts'. These criteria were assessed according to a 4-point scoring system (4: perfect, 3: good, 2: moderate and 1: poor).

Reliability and validity of SCR

SCR was prepared in four phases. In the first phase, the criteria of the rubric were specified using the objectives of the Turkish science course curriculum (Ministry of Education, 2005), and the criteria were defined. In the second phase, the content of the rubric was validated by the two science education experts. In the third phase, the linguistic validity of the rubric was checked by two Turkish language experts. In the fourth phase, the rubric was finalized by the researcher.

Table 1. Variance analysis results for the total score

Source	SS	df	MS	F
Persons	1038	24	43.25	37.19
Raters	0.08	1	0.08	0.069
Error	27.92	24	1.163	
Total	1066			

SS: Sum of Squares; df: Degrees of freedom; MS: Mean square; F: Variance ratio.

Twenty-five random student journals were evaluated by two raters according to SCR criteria. In order to determine the reliability of the raters, a generalization analysis was performed (Atılgan, 2006: 115). In this study, a generalization analysis was made for each criteria scores and the total scores in the rubric. Interraters' generalization coefficient for the total score was computed as 0.90. The results of analysis of variance are presented in Table 1.

Interraters' generalization coefficients for each criterion were made for the SCR. According to this analysis, the g-coefficient varies between 0.71 and 0.93. In addition, the Pearson moment multiplication correlation coefficient of interraters was calculated using the SPSS program and was found to be 0.994 ($p < 0.01$). These coefficients and analyses indicate that there is a statistically meaningful, high, positive relationship between raters. According to the results of the analysis, it can be said that this evaluation is reliable and valid.

Data Analysis

The student journals were inspected according to the seven criteria of the SCR. The criteria were scored on a 4-point-scale, and scores of the student journals were determined. In this way, the academic developments of the students were followed. During the analysis, it was noticed that the student journals contained some expressions that were emotional rather than academic in focus. Using the information from SCR, such expressions were highlighted and grouped into another category. Appropriate codes and themes for this group of expressions were then developed. These themes and codes were tabulated containing related expressions from the student journals. The tables, which contained both themes/codes and expressions, were inspected by three experts from different areas (Turkish language and literature, children's language and mental development, and educational programs). Experts inspected the themes and codes individually and stated their personal opinion on the appropriateness of the themes and codes to the students' expressions. As a result of this inspection process, if the experts shared the same idea, then an "opinion agreement" existed, and if they had opposite reactions, then an "opinion disagreement" occurred. The expressions were grouped into five categories and consisted of students' views and feelings about the learning process, as expressed in the journals. The reliability coefficient was computed for all the codes and themes in each of these categories. Miles and Huberman (1994: 64) state that an intercoder reliability of 70 percent is a acceptable reliability level for studies. In this study, experts reached an opinion agreement level of 85 percent.

RESULTS

Assessment of student journals by SCR

The student journals were numerated from 1 to 18 ordered weekly. The student journals were evaluated according to the seven criteria of the SCR ('use of scientific language', 'relationship to daily life', 'creative thinking', 'layout/composition', 'use of scientific process abilities', 'use of diagrams, figures, formulas, equations, drawings etc.' and 'understanding of scientific concepts'). The daily scores of the students were summed up in the table. Such representation of the scores simplified the process of observing the individual student's progress for the teacher. On a weekly basis, the teacher filled out the tables, which included the evaluation of student journals. The teacher also informed the students about his/her assessments (via in-class/private conversations and post-it notes on the journals). As a result, both the teacher and the students were able to observe individual development and be aware of individual progress.

For each daily assessment, the mean score was computed. The distribution of the mean scores from the student journals are presented in appendix 1. The mean scores from appendix do not display any regular change according to weeks or criteria. Researchers believed that because the journal topics were different, the mean scores of the journals were close to each other. An inspection of mean scores reveals that the highest mean score belonged to 'layout/composition' criterion. The lowest mean score for 6th grade students' journals was for the "relationship to daily life" criterion, while the lowest mean score for 7th grade students was for "use of diagrams, figures, formulas, equations, drawings etc." criterion. The mean scores of "use of scientific process abilities" and "use of diagrams, figures, formulas, equations, drawings etc." criteria of 6th grade students' journals were higher than those of 7th grade students' journals. For the remaining criteria, the mean scores for 7th grade students' journals were higher than those of 6th grade students'.

In this study there are many different kinds of statements in journals, such as definitions about scientific concepts, scientific explanations, samples related to daily life, experiments and observations made in the classroom, problem solving, graphics, drawings, suggestions, results and references concluded from activities, various warnings and questions asked to the teacher. Students usually present scientific explanations in their journals along with drawings and shapes. Examples of student drawings and writings are as follows:

I learned important things about energy. Let me give you an example: Ayse's father says that if a moving vehicle's brake is pressed, energy loss will occur.' But Ayse opposes him, saying, 'no father, it won't. Who do you think is right? I think Ayse is right because energy is never lost. It is conserved.

"I learnt about an electroscope at school. An electroscope is a tool measuring whether an object is loaded with electricity or not, and if it is, what kind of a load it has. I learnt about a lightning rod as well. A lightning rod is placed on the sharp-tipped buildings. The lightning rod is a precaution against electrical shock. As I draw, the lightning rod leads the lightning into the earth. Our teacher taught them all. Then he gave an assignment. Our subject is protection against lightning. (Figure 1)"

"We dealt with questions about time-road graphics at school. I will draw the graphics of those questions below"(Figure 2).

Examining expressions reflecting student's views and feelings about the learning process in journals.

Student journals were examined in terms of expressions containing their views and feelings about the learning process, except for students' statements relating to scientific and academic concepts. Student expressions reflecting their views and feelings were coded as stated in the data analysis section and were grouped into five categories. These categories are "expressions about classmates", "expressions about the teacher", "self-expressions", "expressions about the courses" and "expressions about the journals". This section of the paper presents a deeper analysis of the codes, which were determined after an analysis of the journals.

Expressions about the classmates

The students wrote expressions about the achievement, emotional reactions, participation, and negative behavior of their classmates in the journals. Sample expressions and distributions of the codes for the "expressions about classmates" category are presented in Table 2. Students recorded their grades from the exams and made comparisons with those of their friends. In addition, they made some rankings, mostly in the expressions of achievement sub-category. Their expressions of emotional reaction included behavior like laughing, crying or states like being anxious or angry. The students commented on the participation of their friends by writing about the in-class activities they performed. Some of the students stated clearly that they became angry with some of their classmates because they talked continually. The journals of 6th grade students included more expressions of this category than those of 7th grade students.

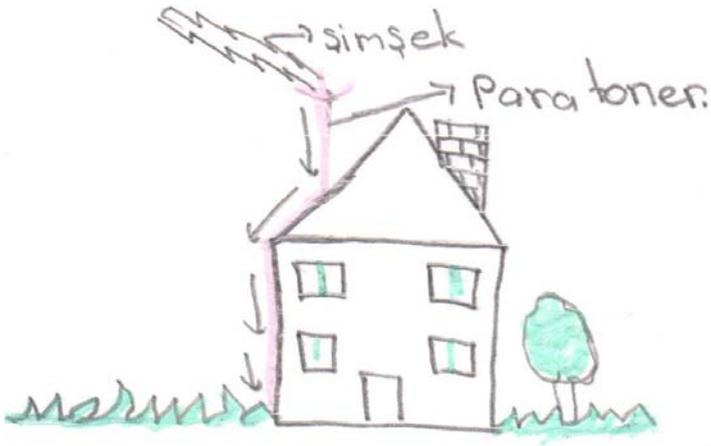


Figure 1. A student's lightning rod drawing

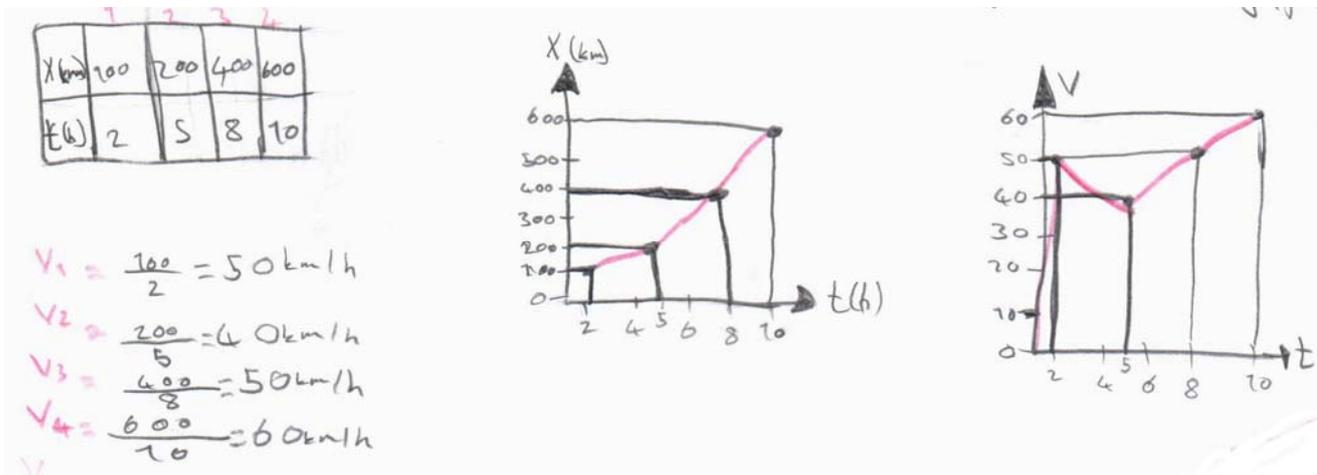


Figure 2. Student drawing showing the analysis of a question with graphics

Expressions about the teacher

Another significant group of expressions from the student journals is the statements about the teacher, examples of which are provided in Table 3. The students wrote about the teacher's different states (being angry, funny or his health status) in class, behaviors (about teaching/punishing) and their comments (their love towards him, comments about the teacher's expressions addressing himself or another person). It was an interesting fact that the majority of expressions in this category were related to punishment. The journals also included sentences reflecting the positive effect regarding the teacher's use of constructive words, like "congratulations" or "well done," whereas no negative statements existed in this sub-category. The 6th grade students seemed particularly keen on the health of the teacher. In addition, there were more statements about the teacher in 6th grade students' journals than in those of the 7th grade students.

Self-expressions

The students reflected on their self-evaluation, self-criticism and emotional reactions in their journals, which are summarized in Table 4. For the most part, students criticized themselves about their answers to tests or their success level in answering questions asked by the teacher. Table 4 reveals that 7th grade students produced more self-evaluating comments than 6th grade students. By contrast, when the journals are evaluated with a focus on emotional reactions, 6th grade students were more productive in comparison with 7th grade students. For both grades, very few self-critical expressions were found in the journals. The few self-critical expressions were mostly about exams and course attendance.

Table 2. Distribution of codes for the expressions about classmates and samples

Codes	6 th grade		7 th grade		Sample student expressions
	<i>n</i>	%	<i>n</i>	%	
Achievement	25	9.72	6	2.36	'Aslı Gül was the first, Hasan Yılmaz was the second, Zeki was the third.' 'Ahmet, Tunç, Arda could not solve the test, then they did not study for the exam either.'
Emotional reactions	17	6.61	2	0.78	'My friend Fatma cried.' 'Arda was still laughing, I was angry with him.'
Participation	37	14.39	29	11.41	'My friends Fatma, Gonca, Seren and Aygül did an experiment.' 'Our friends Osman and İsmail gave examples.'
Negative behavior	24	9.33	4	1.57	'Ahmet was speaking continually.' 'The thing Arda did made both of us angry and the teacher feels uncomfortable.'

n: number of students

Table 3. Distribution of codes for the expressions about the teacher and samples

Codes	6 th grade		7 th grade		Sample student expressions
	<i>n</i>	%	<i>n</i>	%	
Punishment	29	11.28	12	4.72	'Our teacher got angry with the ones who did not do their homework.' 'Our teacher punished those who made noise in the class.'
Fun	11	4.28	1	0.39	'He tells us funny things.' 'He speaks of funny things; we laugh a lot.'
Love	15	5.83	3	1.18	'I love my teacher too much.' 'I and my friends love our teacher.'
Teaching	15	5.83	11	4.33	'Our teacher teaches well.' 'Our teacher lectures the lesson very well.'
Health	15	5.83	1	0.39	'Our teacher had a headache.' 'Our teacher was ill.'
Reinforcement	9	3.50	4	1.57	'He congratulated the ones who. 'He told me well done.'

Table 4. Distribution of codes for the students' self-expressions and samples

Codes	6 th grade		7 th grade		Sample student expressions
	<i>n</i>	%	<i>n</i>	%	
Self-evaluation	53	20.54	109	42.91	'I answered some true and some wrong' 'Only I answered this question.' 'I did not have many right answers in the test. Mostly my answers were wrong.'
Self-criticism	6	2.33	6	2.36	'The exam was easy but I was often mistaken in a question.' 'Even our teacher warned me time to time, my participation in the class was poor.'
Emotional reactions	27	10.50	15	5.90	'I was surprised.' 'I was disappointed.'

Expressions about the courses

The student journals also included some statements about the students' courses. The distribution of the expressions about the courses is presented in Table 5. The students reflected on both positive and negative ideas about the courses. For the most part, these expressions were about the difficulty of the courses, impressions on the courses and their sympathy toward the courses. Few students who wrote about the difficulty of the courses commented on learning the topics. The students' expressions were mostly about the atmosphere in the class, such as being happy, funny, or nice. By contrast, few 7th grade students described the lessons as very boring and tiring.

Expressions about the journals

Another group of statements from the student journals were those related to the journals themselves, which are provided in Table 6. The students frequently considered the journals as a person and specified their love or their longing with different sentences like, "I missed you" or "I love you". In some journals, there were some questions like, "How are you my journal?" or "How was your day?" It can be said that some students personalized the journals as close friends. For example, the statement, "We are just like friends of destiny" from one of the journals clearly indicates this. In addition, opening expressions like "Dear journal/dear science journal," which existed in 74 percent of 7th grade students' journals and 64 percent of 6th grade students' journals, support this finding.

Table 5. Distribution of codes for the expressions about the course and samples

Codes		6 th grade		7 th grade		Sample student expressions
		n	%	n	%	
Positive ideas	Difficulty	7	2.72	10	3.93	'This subject is easy.' 'The questions were so easy that anyone could answer them.'
	Impressions	77	6.61	109	15.35	'Our lesson is very funny and exciting.' 'The science and technology course is very nice.'
Negative ideas	Sympathy	26	10.11	11	4.33	'I like the science course very much' 'The course I like the most is the science course.'
	Being tiring	-	-	1	0.39	'...courses are very tiring.'
	Being boring	-	-	3	1.18	'Science course bore me.' '...courses are boring.'

Table 6. Distribution of codes for the expressions about the journals and samples

Codes		6 th grade		7 th grade		Sample student expressions
		n	%	n	%	
Emotional reactions		39	15.12	3	1.18	'My dear science journal, I love you much.' 'Dear journal, I missed you a lot'
	Addressing	59	22.95	94	37.00	'Hello my dear journal, how are you?' 'Hello dear journal, I came again'
Personification		55	21.40	73	28.74	'We are like friends of destiny with you.' 'My dear science journal, we are together again.'

DISCUSSION

This study focuses on using student journals in science and technology courses. Use of journals in science and technology courses for two main targets was inspected in the research. These targets are (1) observation of students' academic development and assessment, and (2) examining students' views and feelings about the learning process. 6th and 7th grade students were asked to write journals which included the concepts they learned in the subjects covered in science and technology course. Written expressions of the students were assessed using the rubric for the first target where content analysis were performed for the second target. Discussion will be held around these two targets of the study.

Students kept journals in order to follow their academic developments in science courses. They reflected on definitions about scientific concepts that they have learned, scientific explanations, samples related to daily life, experiments, observations made in the classroom, problem solving, graphics, drawings, suggestions, results and references concluded from activities in their journals. According to Roth (1985), having students keep journals involves some difficulties. He stated that the most significant problem was in evaluating student journals. Korkmaz (2004) highlights the importance of developing and using a rubric that is most suitable for the target of the study. In order to address this problem, the SCR, which is an analytical rubric, was developed and used in the evaluation phase.

With this rubric, the teacher can observe students' academic developments in terms of different criteria in the SCR. Students who are given their journal scores as feedback also become aware of their own academic developments. Cornish and Cantor (2008) also concluded similar results in their study with pre-school teacher candidates. They noticed that students are more aware of their learning and growth over time. When the literature is examined, it is seen that few researchers used scoring systems, which they called 'journal writing rubric' or 'scoring criteria', to evaluate the journals of primary school students (Shepardson & Britsch 1997; Erduran-Avci, 2008). With this study, the SCR is proven to be a reliable and valid instrument for student journal assessment. Creme (2005) considers assessing student learning journals in two perspectives. First, they formally would demonstrate values of constructing and writing knowledge. Second, assessment may undermine the very qualities that we value in the journal. He proposes a range of formative kinds of assessment use initially, and then to assess summatively a new, final product. In our study, students were assured that the assessment of the journals would have no effect on their semester grades and the journals would only be used as an instrument to supervise their academic development by their teacher. At this very point, students' trust in the teacher plays a vital role. Dymont and O'Connell (2011) emphasize this fact as: "If educators have a trusting relationship with their students, then students might be more open to writing their deep and critical thoughts."

In addition to providing evidence about academic developments of students, journals were proven to reveal some clues about their views and feelings that may be related to the learning process. Student expressions reflecting their views and feelings were coded into five categories. These categories were “expressions about the teacher”, “expressions about classmates”, “self-expressions”, “expressions about the courses” and “expressions about the journals”. It was interesting that the highest expression count for the teacher were about two distinct issues in both grade levels. These issues were “the observations about teacher’s punishment behavior” and “the positive comments about teacher’s instruction in the classroom”. It was observed that some students, especially from 6th grades, mentioned about the teacher’s health (like his/her being ill or having a headache) in their journals. In addition, it was found that 6th grade students reflected their feelings to the journals while 7th grade students preferred criticizing themselves about their performances in the exams. Students not only wrote about the success, in-class participation or feelings about themselves. They also transferred their feelings and observations about their classmates. In this context, the journal of a student also might contain valuable clues about another student’s learning process. Writings about the expressions of students in the science and technology course also are significant parts of the journals. These students’ expressions were mostly about the atmosphere in the class, such as being happy, funny, or nice. The students frequently considered the journals as a person and specified their love or their longing. Even in some journals there were some expressions as the students had a dialogue with the journals. This fact can be commented as some students consider the journals as a close friend and share their feelings with the journals.

Students’ expressions can also be considered to be representative of various factors – learner, learning, subject, environment, and instructor (Seven & Engin, 2008) – related to a state of learning. Considering the fact that each of these elements has an impact on learning, one can say that the interrelations between them are very important for instructors. Because learning has an emotional component (Erlauer, 2003: 13), states in which the elements of learning and their relations could be defined with an emotional vector are very valuable for researchers of education. Many researchers agree that feelings have an important effect on learning (Wolfe, 2006; Maidment & Crisp, 2011). According to Caine ve Caine (1991: 82), teachers need to understand that students’ feelings and attitudes will be involved and will determine future learning. Student journals provide opportunities to observe such states.

The results of this research reveal that the students wrote clearly about many elements of learning. It was

observed that journals also included expressions that identify the emotional state of the students during learning. Educators can use the power of emotion to enhance learning and retention (Wolfe, 2006). Consequently, the teacher had the opportunity to audit the students more closely and gain deeper information about them. The relation between the students and the teacher is very important in the educational process (Güneş & Demir, 2007; Lickona, 1991). Dunlap (2006) states that “journaling gives students a voice by allowing them to describe — in their own words — the cognitive and perceptual changes they experience and the accomplishments they achieve during their learning experiences”. As such, journals can be regarded as instruments that transfer students’ feelings and views (about the learning process, themselves, classmates, teacher etc.) to the teacher.

CONCLUSIONS

As revealed by the results of this research, journals provide detailed clues about learning status, students, teachers, courses and the learning process. The evaluation of journals using a reliable and valid assessment tool helped the observation of student development in science courses. The students were given the opportunity to reflect on their feelings and views about the learning process and to communicate to their teacher through their journals. The teacher was able to gain information on each student’s point-of-view and to have a better knowledge of them. As a result, journals are seen as a tool that students use to reflect on their scientific understandings and express their views and feelings about the learning process. As stated by Fulwiler (2000: 30), “all knowledge is related; the journal helps clarify the relationship.”

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APPENDIX

Table A1. The distribution of mean scores of science course journals of 6th and 7th grade students according to the SCR criteria

Criteria number	Grade	Journal entry number																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Mean
1	6 th	2.4	2.1	2.3	2.2	2.5	2.1	2.3	2.1	1.9	2.5	2.4	2.5	2.5	2.7	2.3	2.9	2.2	2.4	2.35
	7 th	2.5	2.6	2.4	3.0	2.7	2.3	2.5	2.8	2.6	3.0	2.7	2.8	2.3	2.9	2.8	2.8	3.0	3.3	2.72
2	6 th	2.0	2.1	1.8	2.1	2.0	2.0	1.8	1.5	2.2	2.0	1.9	2.0	1.8	1.9	2.2	2.0	1.9	2.1	1.96
	7 th	2.2	2.4	2.0	2.3	2.4	2.0	1.9	2.4	2.2	2.4	2.2	2.1	1.8	2.1	2.5	2.1	2.3	2.3	2.20
3	6 th	2.7	2.6	2.7	2.7	2.4	2.4	2.8	2.5	2.7	2.6	2.4	2.7	2.8	2.8	2.7	2.9	2.4	2.9	2.65
	7 th	2.9	2.9	2.6	2.9	3.0	2.7	2.6	3.1	3.0	2.9	3.0	3.0	2.7	2.9	3.1	3.1	3.1	3.5	2.94
4	6 th	2.1	1.8	2.4	2.2	2.0	2.1	2.6	2.1	2.0	2.2	2.1	2.3	2.6	2.6	2.4	2.6	2.4	2.1	2.56
	7 th	2.2	2.4	2.2	2.2	2.4	2.1	2.2	2.5	2.3	2.3	2.5	2.3	1.8	2.4	2.4	2.5	2.4	3.1	2.34
5	6 th	2.1	1.5	2.2	2.4	2.1	1.9	2.0	1.8	1.6	1.9	2.0	2.1	2.1	2.5	1.9	1.8	2.2	2.6	2.04
	7 th	1.9	1.7	1.4	1.7	1.5	1.3	1.5	1.6	2.0	1.8	2.2	2.0	1.6	2.0	1.6	2.2	2.2	2.9	1.84
6	6 th	2.4	2.3	2.3	2.4	2.2	2.1	2.7	2.3	2.2	2.5	2.4	2.4	2.7	2.8	2.5	2.6	2.6	2.6	2.44
	7 th	2.5	2.6	2.4	2.7	2.6	2.2	2.5	2.8	2.5	2.9	2.7	2.6	2.2	2.9	2.8	2.8	3.0	3.3	2.67
7	6 th	2.2	2.2	2.3	2.2	2.0	2.0	2.1	1.9	2.0	2.2	1.9	2.1	2.4	2.4	2.0	2.5	1.9	2.3	2.14
	7 th	2.2	2.3	2.1	2.2	2.4	2.0	2.2	2.3	2.2	2.2	2.4	2.3	1.9	2.3	2.2	2.4	2.8	2.8	2.29
Mean	6 th	2.27	2.09	2.29	2.31	2.17	2.09	2.33	2.03	2.09	2.28	2.16	2.30	2.41	2.53	2.29	2.47	2.23	2.43	2.26
	7 th	2.34	2.41	2.16	2.43	2.43	2.09	2.20	2.50	2.40	2.50	2.53	2.44	2.04	2.50	2.49	2.56	2.67	3.03	2.43

Note:

Criteria numbering:

1: use of scientific language,

2: relationship to daily life,

3: layout/ composition,

4: use of scientific process abilities,

5: use of diagrams, figures, formulas, equations, drawings etc.,

6: understanding of scientific concepts,

7: creative thinking