

PLASIU: a system that facilitates creative decision-making in job-hunting

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Received: 21 August 2006 / Accepted: 10 April 2007 / Published online: 24 July 2007
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Abstract Through an analysis of university students' job-hunting logs, we have found that their introspection via rereading their log sometimes helps them discover themselves. Then we have built a system called PLASIU designed to support job-hunter's creative decision-making based on the observations from their actual job-hunting process. This paper provides an overview of PLASIU and describes the findings from a user study using PLASIU.

Keywords Creative decision making · Concept articulation · Conception · Interaction · Job-hunting

Introduction

There are announcements from the government that business activities are in good condition and the employment scene is seemingly getting better, however, university students often still have difficulty and/or perplexity in their job-hunting process especially in Japan. Recently, the employment rate of new graduates of universities and high schools has decreased, resulting in a growing number of young part-time jobbers. The scarcity of employment for the younger generation has

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become a social problem. Coupled with the decrease in younger population, many universities are actively trying to survive the inter-university competition, by focusing on the support and guidance for job-hunters to feature their high employment rate. As an academic, the author has many opportunities to have close contact with students in job-hunting. Taking a closer look at their process, you find that some students can get an official job offer relatively soon, and others cannot for a long time. In spite of the same affiliation and the similar capabilities, their job-hunting processes have ended with very different results. This can hardly be attributed only to the difference in personal capability. In addition, some students can hardly convince themselves of a job offer obtained as a result of compromise, and others can be more positive toward job hunting after they have found another goal different from an initial one. Where does this difference come from? If you can give them a good clue, you could support their job-hunting process. The authors originally have been working on a microscopic observation of human thinking process (Shoji and Hori 2003). We thought that the findings to be obtained from an investigation of how individual student's activity and thinking process is different by person may bring understanding of the approach and/or attitude to suitable job-hunting process for an individual person and thus provide an unprecedented new job-hunting support method/system.

With this as a trigger, the authors have decided to have an interview with them about their job-hunting and log their activities. Targeted at students in job-hunting, sets of investigations collected their job-hunting process log through interviewing them and made an analysis of their thinking process. The findings obtained are as follows: (1) The process characteristic of "conception" (i.e., awakening of a new viewpoint) is sometimes observed in the mental world of students during job-hunting, and (2) such conception can lead them to find their own identity and consequently allow for their success in job-hunting via creating decision-making (Shoji 2005).

Among the findings obtained from this job-hunting case analysis, Sect. 2 of this paper will describe especially a case where a job-hunter could discover a concept of her desired job via taking a note of her job-hunting log as a diary and rereading it. Based on the findings obtained from above-mentioned job-hunting case analysis, the authors have built PLASIU, a career designing support system designed to prompt the user's conception via a blog-based job-hunting diary to help them make a creative decision. Section 3 takes a brief survey of related studies previously conducted, and mentions their relevance to this study. Section 4 provides an overview of PLASIU, and Sect. 5 describes the findings obtained from a user study with PLASIU.

Findings from job-hunting process cases

The authors collected the cases to be used for observing the thinking process of individual students in job-hunting. In so doing the students were required to externalize their own thinking about job-hunting process. This study has had an individual interview with each student in job-hunting to log what they say and

analyze the content. The second batch of investigations were targeted at eight third-year students in a women's university as of January of 2003 and conducted in January, April, July, and October. The five out of them had already got a job lined up during the investigations (by the end of October of 2003). The limitations of the number and selection method of the subjects prevent us from clearly stating the statistical significance of these investigations, however, tracing their behavior and/or thinking can serve as a useful reference to know the average job-hunting process and/or thinking of the university's students (or the female students in general).

The method used for the first batch of investigations was simple in that only listening to and logging what the subjects say were conducted every time, however, this series of interviews led to finding that there certainly exists the job-hunting process that can be characterized as concept articulation (Shoji 2005). The second batch of investigations chose to have the subjects record (or log) their job-hunting process and think referring to their activity log during interviewing. The activity logging started 1 month before the first interview and had been recording their activities as appropriate. The second (conducted in April) and subsequent interviews in the second batch presented the subjects with what they said in the previous interviews and allowed them to express their view referring to the content as well as their activity log. This change in investigation method is based on the assumption that reviewing activity log and the content of previous interviews is effective in prompting concept articulation during job-hunting.

Among eight cases collected, one for a certain subject is described below. Due to limitations of space, only a part of it is included here.

1. Excerpts from the first survey interview (conducted in January of 2003):
 - I want to get a job that involves using computers. For example, software engineer who has contact with customers, or something. But now, no matter what type of job you are engaged in, you will use personal computers, won't you?
 - All I have done so far is requesting company brochures. I haven't had an interview with any company yet. So, initially I was confused as I had nothing to write in the log. Then, I chose to add to my log what I wrote in my "entry sheets" (i.e. a company-specific inquiry sheet about applicants themselves).
2. Excerpts from the second survey interview (conducted in April of 2003):
 - I have already submitted my entry sheets to many companies, participated in placement seminars, and had interviews with several companies. I'm working really hard, if I say so myself.
 - At school, I thought I excel at using computers, but comparing to other job-hunters in the science and engineering majors, I realized that's not true. In the meantime, I will get qualification as a system administrator.
 - On the day when I had an interview with a company, I often wrote my impression of the interviewer in the log. I'm ashamed that most of the content is what has got me and complaints.
 - Reviewing my entry sheets made for a variety of companies brought me to finding out that the content varies with the company. I feel that I wrote

- something I think desirable to the company. This may be necessary for passing a screening by the company, but I feel that I may be wrong.
- From now on, I want to stop saying a different thing depending on the company targeted and be vocal about what I really think.
3. Excerpts from the third survey interview (conducted in July of 2003):
- After the second survey interview, I found myself at a loss as to what to write in my entry sheets and job-hunting log. Rereading my log has made it clear that “computer” is a keyword. The other dominant content is my impression of persons I met. Especially, the words “fostering” and “teaching” frequently appear.
 - I inclined to be engaged in a job that involves not only computers but also education and training. When I talked about this during a job interview with a company in May, the interviewer suggested to me that I be an instructor as an example, and I got serious about it.
 - I got an official job offer as an instructor from two companies (between May and June).

At the second survey interview, this subject reviewed her own job-hunting log to find out that “the content written in her entry sheets varies with the company” and think why she cannot write in self-advertisement and/or the job she wants although she should do so (see Fig. 1). This provided her with a clue to get conscious of what she want to do and what her aptitude and strength are, however, the unclarity of the concept temporarily put her at a loss as to what to write in the document. After reviewing the log to check for the frequently used words and topics, she got conscious that “computer”, “fostering”, and “teaching” are important topics. In a interview she had after gaining an understanding of this concept, a job as an “instructor” came up in conversation and consequently she decided that she should aim at being an instructor (see Fig. 2). Later on, she was hunting a job with a focus

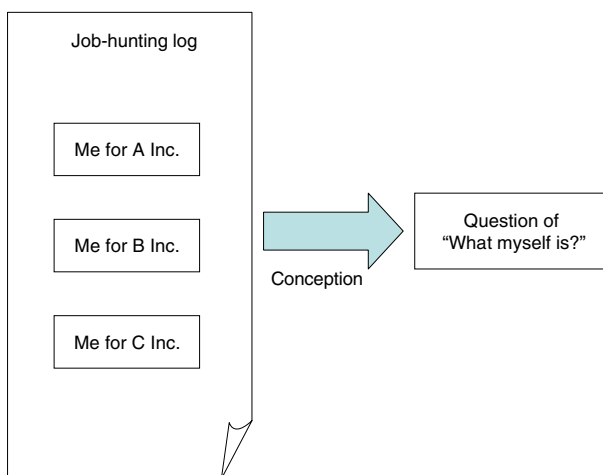


Fig. 1 The effect of introspection via activity log (1)

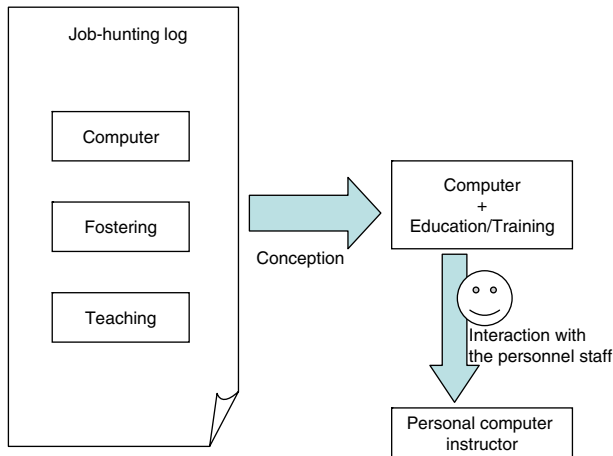


Fig. 2 The effect of introspection via activity log (2)

on an instructor to finally get an official offer as she wish without delay. This case shows that viewing job-hunting process log which is an externalization of your thought promotes the dialogue with yourself and leads you to concept articulation of yourself.

Related studies

Many previous studies in the field of cognitive science have already shown that mental leap caused by inspiration via interaction plays an important role to human beings featured by thinking process such as learning and problem solving. One of the most important challenge recognized in the field of creative support studies is making a detailed analysis of the effects that the difference in information representation method has on human cognitive process.

Schoen mentioned through an analysis of architect and psychotherapist cases that the dialogue with professionals themselves is important for their thinking process (Schoen 1983). He also showed that viewing externalizations of your thought, such as sketches and documents, can prompt the dialog with yourself, i.e. introspection. Miyake conducted a study to show the possibility of supporting non-professional person's learning and emergence via interaction (Miyake 1986). Via interaction between professional and non-professional persons about the mechanism of a sawing machine, this study illustrated that even when stuck in a dead end, a non-professional person can reach understanding with an appropriate viewpoint given by a professional as a trigger. Suwa made a detailed investigation of how an architect interacts with a sketch made by themselves (Suwa et al. 1998). Through this analysis, Suwa found that the interaction with a sketch has an effect to prompt architect's reinterpretation and/or unexpected discovery. And, he concluded that both reinterpretation and unexpected discovery can contribute to problem solving. Aihara showed that researcher's interaction with their own memo can bring them a

new idea for their research and proposed CASSIS, a system designed to prompt such interaction (Aihara and Hori 1998).

Interestingly, the observation in this study suggests that a similar phenomenon to the ones addressed by previous studies with a focus on professional tasks, including Schoen's and Suwa's, does occur also in a non-professional task of university students' job-hunting. This similarity implies that not a few findings from conventional creative activity support studies are also effective for the job-hunting process support.

Concept articulation observed in job-hunting is without doubt one of creative thinking, however, is largely different from a creation activity like design and art in that people in general are half-compelled to experience it. It has been previously pointed out that concept articulation plays an important role in creative activities, however, these activities are supposed to be done by persons with special skill and/or talent. Job-hunting, on the other hand, rather requires ordinary persons to do concept articulation. Capable persons can sell themselves at their discretion, and probably sometimes don't need concept articulation because they already have made clear what they want to do, but in general, concept articulation is often required under actual constraints. For this reason, if a framework and/or effective support system to facilitate concept articulation during job-hunting is put into practice making use of the findings from conventional creative activities support studies, it will provide great usefulness and significance.

Overview of PLASIU

PLASIU, a career designing support system that the authors have developed to prompt job shopper's conception and even their creative decision-making, is designed to enable each of job-hunting students and their professional coach (i.e., advisor) to exchange their comments with each other interactively based on the student's job-hunting diary-like blog. Figure 3 shows a component overview of the system.

In Fig. 3, each student writes in their respective diary via a Web browser. Their coach makes a comment on the content of their diary. The student can also make a further comment on their coach's comment. As shown above, the user of the system is of two types: student and coach. Each student is assigned a coach in charge, and only the student and their coach can view the student's diary. This is intended to prompt the user to write in private information about their ongoing job hunting to the diary by making the diary private. The system is a private blog system in the sense that only the user and their coach can view the diary (its name "PLASIU" is derived from a Japanese term for a private job-hunting diary). The system has been implemented in PHP, and MySQL is used for its database functionality.

What is a diary?

This section will define a diary in PLASIU. PLASIU allows each of the students and their coach to exchange their comments with each other interactively regarding the

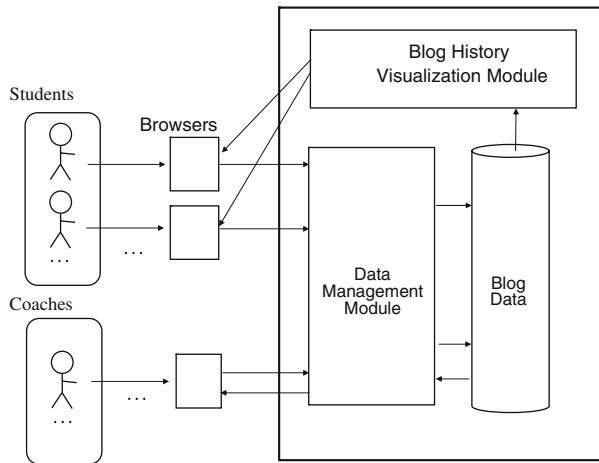


Fig. 3 High-level architecture of PLASIU

student’s job-hunting log. Each student is assigned a coach in charge, who is the only person to interact with the student. This interaction is something similar to the following sample shown in Fig. 4:

In Fig. 4, #1 is a student’s job-hunting log itself that is to be written in a fixed format consisting of six items: When, Where, With whom, What, Comment, and Degree of conception. For selecting the five items other than the degree of conception, a literature on diary (Omote 2004) and others have been consulted. The “degree of conception” mentioned here is a subjective indicator that shows whether or not the student has made some discovery through keeping a diary, and takes an integer value ranging from 1 to 5. Regarding this job-hunting log, the coach in charge and the student exchange their comments with each other (as shown in #2 and #3). Each comment consists of two items: free-format text and degree of

#1: Job-hunting log

When: December 5, 2005

Where: xx bldg.

With whom: Mr. X

What: I attended a job fair with Mr. X.

Comment: I don't know which one is the best for me because of great variety of companies.

Degree of conception: X

#2: Coach’s comment

What is your lesson learned there?

Degree of conception: Y

#3: Student’s comment

I felt that I have to start to study companies immediately.

Degree of conception: Z

Fig. 4 Structure of a diary

conception. Like a job-hunting log, both types of comments have a field for the degree of conception, which takes an integer value ranging from 1 to 5 specified by the coach or student. (Note that a degree of conception provided by the coach is an estimate of the one for the student.)

Thus, a diary for 1 day is prefixed by a job-hunting log followed by several comments. The whole diary in PLASIU is a series of 1-day diaries spanning more than 1 day.

Key features

PLASIU is intended to prompt a job hunter to conception about their own career via their job-hunting diary and help their creative decision-making leading to self-discovery. The authors expect the following three features to be effective in prompting a job-hunting student's conception: (1) writing a diary, (2) rereading a diary and (3) coach's comment. Therefore, PLASIU has two types of users: student and coach, and provides roughly two groups of features: ones for students and ones for coaches. Below is a summary of features provided by PLASIU. (Note: its administrative features are omitted.)

A. (Student-side features)

- Logging in
- Writing a diary
- Writing a job-hunting log
- Making a comment on the coach's comment
- Rereading a diary
- Rereading a job-hunting log and the interaction with the coach in charge
- Visualizing a history of degrees of conception
- Viewing a profile of the coach in charge
- Viewing/editing a profile of self
- Submitting a question to the administrator
- Logging out
- Making a new registration
- Making an entry of a profile
- Submitting a registration request

B. (Coach-side features)

- Making a comment on the content of a diary of a student in their charge
- Reading a diary of a student in their charge
- Viewing a profile of a student in their charge
- Editing a profile of self
- Submitting a question to the administrator

Figure 5 shows a PLASIU screen for entering job-hunting log. In Fig. 5, the two large rectangular buttons in the upper part of the screen are designed to be used for viewing a screen for writing a diary (red button on the left) and for viewing a screen for rereading a diary (blue button on the right). These buttons are also presented in the top page displayed after logging in. Pushing a red one on the left shows you a screen as shown in Fig. 5. Several input fields are displayed in the lower part of a



Fig. 5 A PLASIU screen for entering job-hunting log

screen for entering job-hunting log. The student will write in When, Where, With whom, What and Comment data to the upper five fields, and select an appropriate mark for a degree of your conception at the bottom field. Regarding this job-hunting log, the coach in charge and the student will exchange their comments with each other. Note that the student will also specify a degree of conception for each comment at the time of writing it. Similarly, the coach will specify a degree of conception for their comment. This provides an estimated value of the student's degree of conception at the time of writing a comment that the coach has made a comment on. A screen for writing a diary has a Comment field set to be smaller than a What field. This is in consideration of a notion that the demand for too much comment can put a burden on the student preventing them from continuing to keep their diary.

Operational experiment

Overview of an operational experiment

As mentioned above, PLASIU is intended to prompt a job hunter to conception about their own career via their job-hunting diary and help their creative decision-making leading to self-discovery. The authors expect the following three features to be effective in prompting a job-hunting student's conception: (1) writing a diary, (2)

rereading a diary and (3) coach's comment. Writing a diary is an act of representing your thoughts verbally, and is a concept articulation task itself. Considering that conception is an important factor of concept articulation, an act of writing a diary itself can be expected to have an effect of conception. The effect of conception via rereading a diary, on the other hand, not only can be inferred from a previous study (Schoen 1983), but also has been confirmed in the authors' studies as described in Sect. 2, and therefore can be expected to work also in PLASIU. In addition, coach's advice can be expected to have the same effect of conception as salesclerk's advice during shopping (Shoji and Hori 2003).

From these expectations, the authors assume that PLASIU has three types of conception effects mentioned above and have conducted an operational experiment with job-hunting students as subjects to look into the effects. The experiment was conducted over 137-day period from February 14 to June 30, 2006, during which 18 students registered used the system intermittently. Each one of two coaches registered (one male and one female) took care of nine students. Five of 18 students were heavy users with more than ten job-hunting logs (i.e., #1 shown in Fig. 4). Total numbers reached of students' job-hunting logs, students' comments, and coaches' comments were 136 (including 110 from heavy users), 357 (including 290 from heavy users), and 225, respectively. All the heavy users were arts students, two of which were males and three of which were females. Due to the difficulty of analysis without certain amount of diaries and comments, this experiment only used data from the above-mentioned five heavy users for analysis, and the follow-up questionnaire survey for them was also conducted (questionnaires for four of them had been collected as of July 8).

Result and discussion

In order to make an analysis, from among all job-hunting logs from the five heavy users, the authors first chose the portions where they seemed to compass their conception, and sorted out its locations of occurrence (dates, job-hunting logs, or comments), content, trigger, and target. Case 1 through 3 shown below are the examples:

A. (Case 1)

- User: ID3 (who got an official job offer in April 19.)
- Location of conception: In my job-hunting log dated February 21
- Content of conception: Also in the human resource industry, different companies have very different character and different compatibility with me. Recently I have finally noticed this fact.
- Trigger of conception: Via comparison of several companies after I attended their job fairs.
- Target of conception (among Self, Companies, and Tactics): Companies

B. (Case 2)

- User: ID8 (who got an official job offer in June 12.)
- Location of conception: In my comment dated March 12

- Content of conception: Thinking about what the companies appealing to me have in common or looking back at my past life has caused me to notice that there are three common points.
 - Trigger of conception: Via sorting out my thoughts anew with advice taken from my coach in his last comment.
 - Target of conception (among Self, Companies, and Tactics): Myself
- C. (Case 3)
- User: ID14 (who have not gotten any official job offer yet.)
 - Location of conception: In my comment dated April 1
 - Content of conception: I noticed that describing in the company inquiry sheet an answer to a question “Why our company, not others?” is effective.
 - Trigger of conception: Via coach’s advice in his comment.
 - Target of conception (among Self, Companies, and Tactics): Tactics

The authors have grouped cases of the five heavy users’ conception by the type of event that acted as its trigger into the following four types: (1) the ones via writing a diary, (2) the ones via rereading a diary, (3) the ones via coach’s comment, and (4) the ones via other factors (e.g., a remark of some other person you met during job-hunting, the content of a book you read, and other external factors outside of PLASIU). Note that if a case has a composite trigger, the case will belong to all types applicable. Table 1 summarizes the numbers of occurrence of four types of conception by the five heavy users.

Table 1 shows that among three features of PLASIU that the authors expected to be effective in user’s conception: (1) writing a diary, (2) rereading a diary and (3) coach’s comment, (1) and (3) have led to the relatively frequent occurrence of conception. The average numbers of occurrence of conception via (1) and (3) are 2.6 and 3.8 per user, respectively. All the heavy users experienced conception via either of them. The conception effect via (2) rereading a diary, on the other hand, has been confirmed for the only two heavy users and in the total number of occurrence of four, which is very few comparing to (1) and (3). Considering the finding from previous studies and/or the authors’ previous investigations, the low effect that rereading a diary has on conception is unexpected. For one thing, this unexpected

Table 1 The numbers of occurrence of conception (grouped by its trigger)

User	Got an official job offer?	Writing a diary	Rereading a diary	Coach’s comment	Others (external factors)
ID3	Yes (on 4/19)	1	0	1	3
ID8	Yes (on 6/12)	4	2	3	8
ID13	No	2	2	5	4
ID14	No	4	0	8	2
ID16	Yes (on 4/14)	2	0	2	3
	Total	13	4	19	20

result can be attributed to the lack of positive support for an act of rereading in PLASIU. The current version of PLASIU leaves whether to reread a diary to the user. The authors want to add a feature for prompting rereading to PLASIU and provide more effective support for conception in the future.

Next, the authors focused attention on the target of conception as well. According to a coach who is a job-hunting expert, the whole job-hunting process can be divided into three phases: (1) “self-analysis” for knowing yourself, (2) “corporate analysis” for knowing a company, and (3) “know-how acquisition” for knowing tactics. Among these, (1) self-analysis is supposed to be completed in a preparation phase prior to job-hunting, and (2) corporate analysis is supposed to be started in seminars conducted by the job placement industry, and (3) know-how acquisition is supposed to be moved forward to in preparation for the actual job interviews in companies. Consequently, the authors grouped the content of user’s conception by its target into three types: (1) conception about user him/herself, (2) conception about companies, and (3) conception about tactics. However, any composite conception will belong to all types that apply, instead of assigning it to either one of them. Table 2 summarizes the numbers of occurrence of three types of conception by the five heavy users.

Table 2 shows that (1) conception about self the most frequently occurred, while (2) conception about companies and (3) conception about tactics occurred with comparable frequencies, although this trend varies depending on the user. This result implies that PLASIU system, which is blog-based, has a great effect to lead the user to self-discovery via allowing them to face themselves by writing a diary. Its users are first-time job-hunting university students, who do not necessarily have rich knowledge of companies and job-hunting, and thus have difficulty in compassing their conception about companies and tactics simply via writing a diary. In fact, in most cases, conception about companies and tactics was derived from coach’s advice. By assigning knowledgeable experienced coaches under contract, PLASIU can prompt the user to conception about companies or tactics that is hard to occur simply via writing a diary, however, the authors want to add further support features effective in conception to it in the future.

Additionally, the relation between conception occurrence effect and the result of job-hunting is discussed here. As mentioned above, according to a coach who is a job-hunting expert, the whole job-hunting process can be divided into three

Table 2 The numbers of occurrence of conception (grouped by its target)

User	Got an official job offer?	Self	Companies	Tactics
ID3	Yes (on 4/19)	3	2	1
ID8	Yes (on 6/12)	10	2	5
ID13	No	7	4	0
ID14	No	10	2	5
ID16	Yes (on 4/14)	3	1	2
	Total	33	11	13

phases: (1) “self-analysis” for knowing yourself, (2) “corporate analysis” for knowing a company, and (3) “know-how acquisition” for knowing tactics. A job-hunting student is supposed to complete (1) self-analysis in a preparation phase prior to job-hunting, make a (2) corporate analysis via job placement seminars, and move forward to (3) know-how acquisition in preparation for the actual job interviews in companies. In fact, however, as is often the case with job-hunting students, they do not know what their desired job is until they obtain information about the companies as their targets, and they do not know their own advantages to be emphasized until they acquire know-how of job-hunting. Looking at the cases from the heavy users analyzed this time, a different case has a different order of conception phases (1) through (3). Thinking process for many students does not flow sequentially from (1) to (2) and then (3), but probably goes up the spiral to decision-making with gradual articulation of concept of themselves via these three phases repeated. Among the five students analyzed this time, ID3 and ID16 got an official job offer from companies satisfactory to them relatively earlier. In that sense, they are winners of job-hunting. Table 2 presents an interpretation that ID3 and ID16 had low occurrence of conception itself, but experienced a well-balanced combination of conception about self, companies, and tactics, which was effective in going up the spiral to decision-making. In contrast to them, ID13 and ID14, who could not get an official job offer during the experiment period, had high occurrence of conception itself, but most of them were (1) conception about self. Probably, writing a diary in the cases for ID13 and ID14 was directed only to their introspection, and consequently did not lead to going up the spiral to decision-making successfully. The limited number of cases obtained in this operational experiment prevents us from making a quantitative evaluation, however, it is of significance that job-hunting students actually used PLASIU in their activities and conception effects could be confirmed from their real descriptions.

PLASIU, which the authors have created, allows only the user of the system and their coach under contract to view the user’s diary. Such a system has an advantage that the user can write their personal events and idea frankly, however, at the same time, it has a disadvantage that it is not expected to provide a synergetic effect of others’ opinion as in social network services. On the other hand, a system that allows the user to exchange opinions with anyone in the community has an advantage that it can provide significant advice and/or sympathy, however, the user can not make a judgment on whether their peer is truly trustworthy and therefore is at risk for being slandered by them. An operational experiment on PLASIU carried out this time covered only the user’s communication with a coach, but still it has shown that the user interaction with reliable peers promotes the effect of their conception. How you can have healthy communication within an unspecified number of communities is an important problem involving trust of information and social intelligence, which cannot be solved immediately. However, the authors think that future improvement, via the evolution of research and technology, of the environment that can ensure healthy communication among people may allow us to operate PLASIU in an unspecified

number of communities and share a lot of knowledge and experiences to provide effective decision-making support.

Conclusion

The authors observed job-hunting student's thinking and found that the process characteristic of "conception" is sometimes observed in their mental world and their introspection for looking back at their own job-hunting log is effective in that case. This paper, firstly, has presented the findings from this case analysis. Next, based on the findings obtained from this analysis, the authors have built PLASIU, a career designing support system designed to prompt the user's conception during job-hunting to help them make a creative decision. This paper has provided an overview of PLASIU, described an operational experiment using the system, and discussed its result.

In the future, the authors plan to drive this study in a spiral manner where experiments are conducted that can acquire more data, and the system is further improved based on the findings from the experiments. Through this spiral, the authors intend to make clear a method of the effective support for self-discovery (i.e., conception) and creative decision-making during job-hunting. Additionally, the authors want to sort out roles of coach's advice and apply them to the functionality of the system. Based on this analysis, the following two features should be added to PLASIU: (1) Prompting the user to rereading a diary through presenting a previous one highly relevant to one being currently written or reread. (2) More actively providing advice and/or knowledge as needed in addition to the coach's comment on the diary. After adding these features, another operational experiment will be carried out to make an analysis of their effect. In the future, our framework for a method of supporting creative decision-making will be able to be directed not only to job-hunting, but also to various domains that require creative decision-making.

Everybody lives to be 80 these days. It may be said that the longer our life is, the longer way to go to discover ourselves. The lifetime employment system has virtually crumbled to bring us job changing, restructuring, reemployment after retirement, and others, resulting in increasing occasions to do job-hunting. That's probably why the term "career designing" is currently in the spotlight, that means that you should continuously (not only during job-hunting) consider and design your own career. In spite of this difficult situation, actual job-hunting assistance provided includes only uniform services intended for all the students (job-hunters), such as providing corporate information, recommendation of taking qualification exams, cultivation of academic capability for passing written exams, and conveyance of know-how. Any one of these conventional job-hunting support services may be useful for job-hunting as problem-solving with a problem to be solved made clear (i.e., job-hunting as rational decision-making), however, is not necessarily likely to help job-hunters in the process of self-searching. Now is the time to introduce a framework that supports job-hunting process as creative

decision-making. The authors' approach is just a beginning, however, is very likely to evolve in the future.

References

- Aihara K, Hori K (1998) Enhancing creativity through reorganizing mental space concealed in a research notes stack. *Knowl Based Syst* 11(7–8):469–478
- Miyake N (1986) Constructive interaction and the iterative process of understanding. *Cogn Sci* 10:151–177
- Omote S (2004) *Magic of diary: a habit to drastically change your life*. Sunmark Publishing, Tokyo (in Japanese)
- Schoen DA (1983) *The reflective practitioner: how professional think in action*. Basic Books, New York
- Shoji H (2005) How can you facilitate concept articulation during job-hunting? In: *Proceedings of the 2005 international conference on active media technology*. Kagawa, pp 107–111
- Shoji H, Hori K (2003) Creative communication for chance discovery in shopping. *New Generation Comput* 21(1):73–86
- Suwa M, Purcell T, Gero J (1998) Macroscopic analysis of design processes based on a scheme for coding designers' cognitive actions. *Des Stud* 19(4):455–483