

# **Students' cognitive and non-cognitive beliefs about learning as a factor in learning skills acquisition: Suggestions from cognitive counselling**

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## **Abstract**

Cognitive counselling, which is a practical research activity in which counsellors provide personal consultations for clients who have cognitive problems, has identified some problems that many students possess. One of these problems concerns inappropriate beliefs about learning (e.g., trying to memorize without understanding, emphasizing the outcomes of problem solving and neglecting the processes). Psychological research findings about these beliefs have shown that they are linked to use of ineffective learning strategies and low achievement. This paper discusses the importance of considering students' beliefs about learning when assessing the reason of their study difficulties and supporting them in solving their problems. Three case examples are provided to illustrate how this approach can effectively be used.

## **Instruction**

Cognitive counselling is a research activity that originated in Japan (see Ichikawa, 2005, who described the motivation behind, and the history of, this activity). Cognitive counselling is distinct from psychological counselling in that it targets cognitive problems such as those associated with memorizing, problem solving, and motivation, instead of problems involving psychological or emotional difficulties. Examples of manifestations of problems in cognitive counselling are: 'I cannot memorize well', 'I do not know how to solve complex math word problems', and

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‘Although I have been studying so hard, I cannot achieve good results. I don’t want to study anymore’. One important feature of cognitive counselling is the use of findings from cognitive psychological research when counsellors assess the source of students’ difficulties and support them in overcoming these difficulties. The findings from psychological research (e.g., from topics such as learning strategies, self-regulated learning, and memory) are useful for assessment and support purposes. The goal of this activity is to develop autonomous learners.

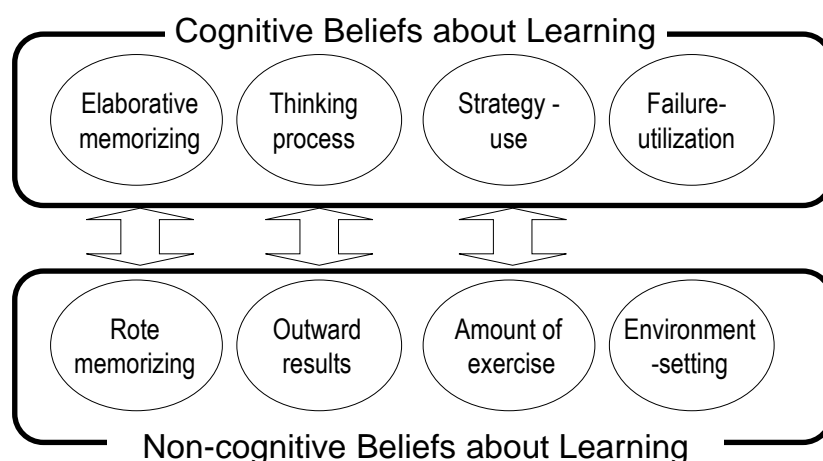
Each client in cognitive counselling receives about 10 counselling sessions, with each session lasting 90 to 120 minutes. Three steps are taken. The first step is assessing what might be the fundamental reason behind the student’s difficulties. The second step is supporting the student in working out ways to solve the problems. The final step is compiling a report about the process of counselling the student. This report is for sharing with other counsellors and discussing how the experience of working with the student could contribute to enhancing their skills in supporting students. The case sharing aspect is referred to as the ‘case conference’.

Discussions in case conferences of cognitive counselling have drawn attention to a number of problems that students commonly share. Among the problems found in cognitive counselling sessions, one of the most serious concerns the inclinations of students’ beliefs about learning. Findings from case studies in cognitive counselling suggest that weaknesses in student’s approaches to learning are often accompanied by particular beliefs about learning. For example, a client’s problem of relying only on rote memorization and neglecting meaning often appears with the belief that ‘rote memorizing is important and sufficient’. Likewise, a problem that involves solving many problems without any reflection and repeatedly making the same mistakes is often caused by the belief that ‘Practicing a lot is most important, and we do not have to consider the effectiveness of the method’.

Although various aspects of students beliefs about and motivations for learning have previously been investigated (e.g. Pint rich, 2003; White, 1959), aspects relating to what they believe as effective learning methods have not been adequately examined until recently. The kinds of beliefs about learning and their influences on study behaviour, which have been identified and examined in case studies of cognitive counselling had not been sufficiently examined in the previous research. Thus, the purpose of this paper is to highlight the importance of paying attention to students’ beliefs about learning when assessing the reason behind their study-related difficulties. Three examples are provided to show how gaining this kind of understanding can be used to facilitate transformations in students’ learning behaviour.

## Psychological research findings about students' beliefs about learning

Although various aspects of students' beliefs about and motivations for learning have previously been investigated (e.g., Pintrich, 2003; White, 1959), aspects relating to what they believe as effective learning methods have not been adequately examined. In particular, the inter-relationships of their beliefs about effective ways of memorizing, problem solving, managing failure, and so on have not been examined in previous psychological research. Recent studies concerning students' beliefs about learning have used correlational analyses to better understand the structure of these beliefs. Uesaka, Seo, and Ichikawa (2006), for example, developed a new questionnaire by integrating useful aspects of previous exploratory questionnaires that assessed students' beliefs about learning (Ichikawa, Horino & Kubo, 1998; Ueki, 2002). Uesaka et al. (2006) identified eight subscales and two subordinate categories. The structure of this questionnaire is shown in Figure 1. (The items of this questionnaire were asked in the context of mathematics because it was developed as part of an assessment of basic competencies in mathematics called COMPASS (Componential Assessment Test; Ichikawa, Seo, Murayama, & Uesaka, 2005), but it is conceptually applicable to learning in other subjects.)



*Figure 1.* Structure of students' beliefs about learning (Uesaka, Seo, & Ichikawa, 2006)

Some of the subcategories of the questionnaire are paired: 'elaborative memorizing orientation' and 'rote memorizing orientation' comprise a pair involving beliefs about ways of memorizing, 'outward process orientation' and 'thinking process orientation' comprise another pair involving beliefs about ways of problem solving, and 'amount of exercise orientation' and 'strategy-use orientation' is a final pair concerning general approaches to learning. Examples of items in this questionnaire are shown in Table 1.

Table 1. *Examples of Items Assessing Students' Beliefs about Learning (From Uesaka, Seo, & Ichikawa, 2006)*

Cognitive Beliefs about Learning:	
Elaborate Memorizing:	I try to figure out relationships among different areas of knowledge
Thinking Process:	I try to find another way to solve the problem even after finding the answer
Strategy-use:	The process does not matter to me as long as my answer is correct
Failure utilization:	It is good opportunity to perceive my weakness when I fail in learning
Non-cognitive Beliefs about Learning	
Rote Memorizing:	If I remember perfectly, I can say that I understand
Outward:	The process does not matter to me as long as my answer is correct
Amount of Exercise:	The process does not matter to me as long as my answer is correct
Environmental:	If I learn in an upper level class, I can improve my grade

A student's belief is categorized under 'rote memorizing orientation' when it attaches importance only to rote memorizing, but categorized under 'elaborative memorizing orientation' when it not only attaches importance to rote memorizing but also to understanding the meaning of learning materials. A belief is categorized as belonging to 'outward process orientation' when it values only getting the correct answer and neglects the process, but classified under 'thinking process orientation' when it considers the thinking process as being just as important as getting the right answer. A belief is categorized under 'amount of exercise orientation' when it emphasizes only the amount of practice and neglects the method of learning, but classified into 'strategy-use orientation' when it attaches importance not only to the amount of studying but also to the efficiency of methods that are used. The last two categories in the questionnaire are not paired. 'Failure utilization orientation' pertains to beliefs that consider failure as providing a good chance to learn about and address one's own weakness and 'the environmental-setting orientation' pertains to beliefs that consider exam scores as depending mainly on the quality of one's teachers and text books – rather than one's effort.

As shown in Figure 1, elaborative memorizing orientation, thinking process orientation, strategy-use orientation, and failure utilization orientation are classified under the same category, while the other four subscales – rote memorizing orientation, outward orientation, amount of exercise orientation, and environmental orientation – are classified together under another category. The former group was labelled as 'cognitive beliefs about learning' and latter group was labelled as 'non-cognitive beliefs about learning' because the former beliefs are congruent with positive concepts

from cognitive psychology while the other beliefs are congruent with negative concepts.

Uesaka et al. (2006) not only proposed a structural model of students' belief about learning but also showed the relationship between students' achievements and their beliefs about learning: they demonstrated that math achievement positively correlated with 'cognitive beliefs about learning', which was calculated as the total of scores in elaborate memorizing, thinking process, strategy-use, and failure utilization orientation; but negatively correlated with 'non-cognitive beliefs about learning', which was calculated as the total of scores in rote memorizing, outward orientation, and environmental orientation.

This finding about the relationship between students' beliefs about learning and school achievement suggests that students' beliefs influence their achievement. Moreover, Ueki (2002) had earlier shown that such beliefs affect students' learning behaviours. Thus, the inclinations of students' beliefs about learning could result in a negative cycle of learning as shown in Figure 2: if students have inappropriate beliefs about learning, they tend to employ ineffective learning methods or strategies in many study areas. These ineffective methods can result in low achievement, and if students remain in a 'low achievement condition' for a long period of time, they would find it hard to keep up their motivation.

The findings of recent research studies about student learning beliefs suggest that these beliefs also influence the effects of interventions for the development of desired learning skills and strategies. For example, Shinogaya (2008) demonstrated that teacher's encouragement of reading a textbook before class as a form of preparation had positive effects only for students who valued understanding the meaning of what they read as well as rote memorizing, but not for students who considered rote memorizing as the only thing that is important.

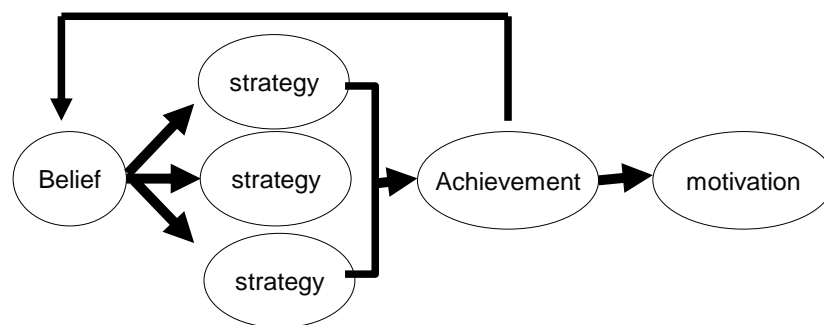


Figure 2. Influencing process model of students' beliefs about learning

These psychological research findings suggest that students' beliefs about learning impact on the learning outcomes for the students, including their use of learning strategies, the benefits they get from teachers' instruction, and their achievement in class. Thus, it can be said, when supporting students to promote more effective

learning, that it is important not only to focus on students' domain knowledge and their learning skills but also on the students' actual beliefs about learning.

## **Educational practices involving students' beliefs about learning**

Some recent research studies have also put forward examples of how students can be supported in their learning with the use of research findings about these learning beliefs. In this section, three such methods are described.

### *Providing feedback to students about the results of questionnaires they complete*

The first method is to provide feedback to students based on their responses to the questionnaire developed by Uesaka et al. (2006). The important point here is to encourage students to consciously understand their beliefs orientation. In many cases, students do not consciously recognize their tendencies, and they tend to think that 'other students also think the same as me'. So, it is necessary for students to develop some form of 'meta-cognition' about their orientation. Recognizing their own orientations would be the first step in an intervention from this perspective.

When this approach was used at a public junior high school in Japan, each student was provided with a visual representation of their orientation. Figure 3 shows examples of spider charts that visually convey students' beliefs about learning. After researchers have briefly explained each subscale, students were encouraged to share the results with other students. Many students then realized that the patterns of the spider chart are highly individual. It helped them to more consciously recognize and consider their own orientation, and to get a more objective perspective on this orientation. After that, students were asked to answer questions on a worksheet: 1) firstly, they were asked to answer which orientation was highest (or lowest) among the eight subcategories; 2) secondly, they were asked to consider any orientations that they wanted to promote; and 3) thirdly, they were asked to think about how to enhance those orientations.

This type of support started in 2004 with 9<sup>th</sup> grade students, but it has since been used with students from a broader age range. Now it is used from 5<sup>th</sup> grade to university levels. Recently, for the provision of feedback, spider charts have been made by using percentile scores instead of students' raw scores from their responses to the questionnaire. This is because the average scores in the 'cognitive beliefs about learning' tend to be higher and the 'non-cognitive beliefs about learning' tend to be lower, so comparative information instead of an absolute score is considered as providing a more meaningful representation of the students' learning orientations in the spider charts.

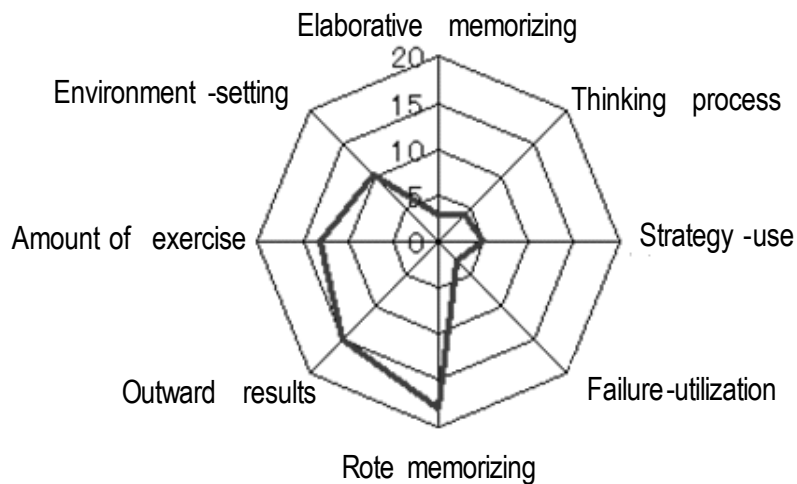


Figure 3. Example of spider chart of students' beliefs about learning

### *Combining feedback about learning beliefs and strategy skills training*

The second method is best explained using an example of an educational intervention which was conducted with high school students (10<sup>th</sup> grade students; see Uesaka & Manalo, 2008). In this intervention, not only feedback but also effective learning skills were provided. This intervention was developed because there were obvious limitations in the previous support of providing only feedback to students. Although it is important for students to reflect on their belief tendencies facilitated through the provision of feedback, in most cases it is hard for students to change their ways of learning by themselves. Thus, if teachers or advisors hope to facilitate transformations in students' learning behaviours, it is necessary to teach effective learning strategies to students as well as making them conscious about their orientations.

In the educational intervention referred to, researchers involved in cognitive counselling and teachers in a high school collaborated and provided students with a course to improve their learning skills. The course was delivered over 6 days, and each day's session lasted about 2.5 hours (70 minutes x 2). The following topics and activities were dealt with in the course.

- |                 |                                                                                                        |
|-----------------|--------------------------------------------------------------------------------------------------------|
| 1st day:        | Reflecting on overall learning (including asking students to reflect on their beliefs about learning). |
| 2nd day:        | How to memorize effectively.                                                                           |
| 3rd day:        | How to solve problems effectively.                                                                     |
| 4th day:        | How to utilize external resources effectively.                                                         |
| 5th & 6th days: | How to write and present effectively.                                                                  |

On the first day, students were given a chance to consciously reflect on their beliefs about learning by using the questionnaire. Opportunities to experience effective learning methods were provided from the second to the sixth days. In here, participants experienced demonstrations relating to psychological research findings to facilitate their understanding of some effective ways of leaning. For example, during

the fourth day's session, which encouraged the use of external resources when solving problems, the students were given the opportunity to compare the relative ease/difficulty of problem solving with and without the use of diagrams. In addition, activities were prepared that provided participants with opportunities to use the strategies in their real school subjects. For example, using external resources such as diagrams for solving authentic math word problems was included as part of the course.

To validate the effectiveness of the course, personal interviews with participants were conducted about three months afterwards. The results demonstrated transformations in both the students' learning behaviours and their beliefs about learning. For example, although one general weakness among Japanese students is their lack of spontaneity in using external strategies like drawing of diagrams when problem solving (Uesaka, Manalo, & Ichikawa, 2007), spontaneity in the participants' use of diagrams was confirmed to have been enhanced based on data gathered from the notebooks they used in their course. Prior to the intervention provided, all of the participants copied the teachers' diagrams from the board onto their notebooks; they rarely constructed diagrams by themselves. In contrast, after the intervention, the participants not only copied the teachers' diagrams but also constructed their own diagrams in their notebooks. This result provides support for the effectiveness of combining the approaches of making students conscious of their learning beliefs orientations and providing opportunities for the students to develop effective learning strategies.

### *Facilitating change in students' beliefs and learning behaviours through personal tutoring*

In the previous two examples given, the support provided to students was delivered in group settings. However, providing general instruction and support in group settings is not always effective for promoting the desired transformations in all students. Students with serious problems (e.g. lack of motivation) need personal tutoring, in which an appropriate prescription can be provided to each learner based on assessment. Personal tutoring like cognitive counselling is an effective method for this.

One example of a case study in cognitive counselling was conducted by the current author (Uesaka, in press). The client in this case was an 8th-grade girl (14 years of age) living in Japan. The reason why she visited the cognitive counselling service was as follows. Her achievement was comparatively high in primary school, but it dramatically decreased after she entered junior high school. She spent a lot of time attempting to solve problems given in class, but her achievement did not improve; rather it deteriorated further. As a result, she developed a serious lack of motivation. Her low achievement was especially serious in math, so she hoped to improve in this school subject.

The initial assessment indicated several problems in her learning behaviour and in her beliefs about learning. One of the problems was that she was practising a lot, but did not reflect at all about what she was doing, so she made the same mistakes repeatedly.



Moreover, the assessment results suggested possible reasons why she used such an ineffective learning approach. Firstly, she strongly valued the amount of time she spent on exercises but did not care much about the quality of methods she used. This orientation is congruent with the ‘amount of exercise orientation’, which is one of the subcategories in the questionnaire developed by Uesaka et al. (2006). Secondly, she considered experiences of failure in studying as embarrassing, so that she preferred not to reflect on her failure in solving problems. This suggested that she was weak in the ‘failure utilization orientation’.

To address this client’s difficulties, in addition to making her conscious of her own beliefs about learning, the counsellor taught her how to use a learning strategy called ‘lesson induction’. This strategy involves considering the reasons for failure or success that follows attempts at solving problems. The counsellor also pointed out to her the problems associated with her beliefs about learning, and additionally encouraged her to write down the ‘lessons learnt’ (from the lesson induction strategy) in her notebook to make her think more about those lessons. By asking her to reflect on the reasons why she failed in problem solving through the use of lesson induction, the counsellor aimed at helping her develop understanding of the procedures and other aspects of problem solving she had not yet learnt.

As the counsellor guided the student in inducing lessons from many problem-solving exercises, the student gradually understood that she often repeated the same mistakes. After she realized this, she started to use lesson induction spontaneously in math, which means she induced lessons even in tasks where the counsellor did not provide encouragement for using lesson induction. After she had acquired lesson induction as part of her own repertoire of strategies in mathematics, her achievement started to improve. Her motivation also increased following the improvements in her achievement.

After the student realized the effectiveness of this strategy and the inappropriateness of previous methods of learning she had used, her beliefs were also transformed. One comment she made during counselling was, ‘This [lesson induction] is really good! I thought solving as many problems as possible was most important. But if I correct my weaknesses, it is far more effective!’ This comment shows clearly that her beliefs about learning were transformed from the ‘amount of exercise orientation’ towards the ‘strategy-use orientation’.

Moreover, after she changed her beliefs about learning, her learning behaviours in other school subjects also changed. In particular, she started to use lesson induction even in science, in which she did not receive explicit encouragement for its use. The learning process that this student went through can be understood easier using the diagram shown in Figure 2. In mathematics, she was advised to use lesson induction as an effective strategy, and her achievement was enhanced. Enhancement of her achievement in mathematics led her to be better motivated. Moreover, the improvement of her achievements caused a change of her beliefs about learning, and it affected the learning methods she used in other subjects like science. Although this is

a description of a case study with only one client and thus generalizability would be limited, it clearly shows that improvement in class achievement through the use of effective learning strategies leads to positive changes in beliefs about learning (this is the feedback process shown in Figure 2).

## **Conclusion**

The most important purpose of this paper was to explain the importance of focusing on students' beliefs about learning if improvements in their learning outcomes are desired. It has been observed in recent research that students' beliefs about learning affect their use of learning strategies, how much they benefit from the instructions provided by their teachers, and their achievement in class. Thus, paying attention to students' beliefs about learning is one crucial aspect in efforts to facilitate transformations in students learning behaviours.

Another important purpose of this paper was to introduce specific examples which describe provisions of support for students from the perspective of their beliefs about learning. Three examples, which include both class-based (group) and one-to-one approaches, were described. Strategies for supporting students from the perspective of their beliefs about learning are by no means limited to the approaches described in these three examples. It is expected that different types of interventions would be developed in response to findings about the beliefs that students hold about their learning.

The final point that needs to be considered in this paper is whether these perspectives and teaching approaches are really applicable when working with students at other levels of study, such as at the university level. Although the questionnaire that Uesaka et al. (2006) developed was based on knowledge gathered from case studies in which most of the clients were school students, the questionnaire itself should be applicable to students at other levels of study. One of the reasons it can be considered applicable comes from findings from an exploratory attempt to use this questionnaire in a university setting. During a class of educational psychology in one Japanese university where the first author is teaching, students were given feedback about their beliefs about learning based on their responses to the questionnaire. The students were provided with brief instructions and a feedback sheet; they were asked to share their profiles with other students and to fill in the worksheet that was basically similar to the one used with school students. The comments they wrote on the review sheet (e.g., 'I was surprised to find that friends around me had quite difference orientations', and "It is a good experience to know my own orientation ... I had not consciously thought about these until today.') showed that this activity can provide insightful information even to university students. This observation suggests that this questionnaire can be useful in raising university students' awareness about their usually unconscious orientations towards learning. However, at the present time, insufficient investigations in this area have been undertaken with university students; thus it is the present authors' intention to pursue such investigations as part of their future research plan.

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