Kember, D., Leung D. Y. P., & McNaught, C. (2008). A workshop activity to demonstrate that approaches to learning are influenced by the teaching and learning environment. *Active Learning in Higher Education, 9*(1), 43–56.

Abstract

It is important to demonstrate to those taking courses for new teachers that approaches to learning have a relational nature ─ that they are influenced by the teaching and learning context. This paper describes a workshop activity, based on the Revised Study Process Questionnaire. Workshop participants recorded their approaches to learning in two contexts ─ how they currently studied as postgraduate students, and how they studied in their most disliked undergraduate course. Analysis of the results from this activity indicates that approaches to learning are markedly influenced by the teaching and learning environment. This provides a graphic demonstration to workshop participants of the importance of their teaching, as it will have a strong influence on the quality of learning of their students. The data from the activity gives quantitative evidence of the relational nature of approaches to learning. Further, there appears to be a discipline effect operating with the nature of the typical teaching and learning environment in the arts, humanities and social sciences being more conducive to students cultivating a deep approach to learning.

Keywords: *Approaches to learning; Revised Study Process Questionnaire; Higher education; Teaching and learning environment; Workshop activity for teaching assistants*

Relationship between teaching and approaches to learning

Many universities now require new teachers and tutors to take courses in teaching in higher education. One of the most popular theoretical underpinnings for these courses is that of students' approaches to learning. Most commonly these approaches have been characterised as deep and surface approaches (Marton and Säljö, 1976). The main characteristics of deep and surface approaches can be described as follows (Kember with McNaught, 2007, p. 25).

Deep approach

- A deep approach is adopted when the student is interested in the topic or the academic task.
- As a result there is an attempt to understand key concepts or the underlying meaning of an article.
- An attempt is made to relate together the concepts to make a coherent whole. A piece of writing will be logically related with an introduction and conclusion.
- New knowledge will be related to previous knowledge and to personal experiences.

Surface approach

- An activity or assignment is undertaken because it is a set task and the course cannot be passed unless the assignment is completed. The task does not arouse interest.
- As a result the minimum possible time and effort is devoted to the task.
- There is no attempt to reach understanding of key concepts; instead reliance is placed upon memorisation of model answers or key facts perceived as likely to appear in tests or examinations.
- Coherence of the topic is not sought; so material is seen as a set of unrelated facts.
- Concepts are not related to personal experience; so remain as abstract theory. As a result what has been memorised is normally quickly forgotten.

Two of the most commonly used texts for courses in teaching in higher education (Biggs, 1999; Ramsden, 1992) draw heavily upon approaches to learning, see Marton et al. (1984) or Prosser and Trigwell (1999) for general treatments of learning approaches.

Relational nature of approaches to learning
Approaches to learning have at times been confused with cognitive styles, of which there are many variants (Biggs, 1993). One of the commonest examples is extrovert or introvert personality. The most significant difference between approaches and styles is that the cognitive styles are relatively stable and tend to be envisaged as characteristic of the person.

Approaches to learning have a degree of stability in that students may have a preferred or predominant approach. In contrast to learning styles, however, students also adapt their approach to suit their perception of what is required for a particular learning task or in response to the prevailing learning environment (Biggs, 1993; Ramsden, 1987). The relational nature of approaches to learning has most commonly been established through qualitative research. For example, Laurillard (1984, pp. 134-5) provides quotations of an engineering student using a deep approach for an applied project and a surface approach to solve an algorithmic problem. Gibbs (1992, p. 8) provides quotations of a student who uses a deep approach in a geography course but uses a surface approach for computing.

Establishing the relational nature of approaches to learning is vital in courses for new teachers. If they realize that the way they teach will make a big difference to the way their students learn, the course is likely to be taken more seriously. Evidence, such as that cited above, does not seem to be particularly convincing to the students in our courses as it comes from a quite different context. Students with quantitative backgrounds seem particularly suspicious.

The importance of approaches to teaching
The relational nature of approaches to learning imply that the curriculum design and the nature of the teaching and learning environment have some bearing on the learning approach students adopt. The influence of teaching on approaches to learning can be visualized as a chain by which teachers' paradigms about, or conceptions of, teaching are translated into a teaching and learning environment that influences students' approaches to learning and, ultimately, their learning outcomes. This is depicted in Figure 1 which is a simplified version of one of the summative outcomes of Kember's (1997) review of research into academics' conceptions of teaching.

<< insert figure 1 here >>

The model can be illustrated in practical terms by the identification of factors conducive to either deep or surface approaches. Biggs (1999: 73) associated the following four factors with a deep approach.

- A well structured knowledge base
- An appropriate motivational context
- Learner activity
- Interaction with others

Gibbs (1992: 9) listed the following characteristics of teaching and learning environments which tend to encourage a surface approach.

- A heavy workload
- Relatively high class contact hours
- An excessive amount of course material
- A lack of opportunity to pursue subjects in depth
- A lack of choice over subjects and a lack of choice over the method of study
- A threatening and anxiety provoking assessment system

There is good evidence for the links in the model. Two studies have characterized approaches to teaching in higher education (Kember and Kwan, 2000; Trigwell et al., 1994) and both showed evidence that the approach adopted by teachers in the respective studies followed logically from those teachers' beliefs about teaching.

Gow and Kember (1993) and Kember and Gow (1994) showed, at the departmental level within universities, that teachers' beliefs about teaching influenced the approaches to learning students adopted in their courses. Trigwell et al. (1999) found comparable results with individual teachers. Sheppard and Gilbert (1991) produced case studies of teaching and learning in four departments. They found that the lecturer's theories of teaching impacted upon the development of students' epistemological development. Courses which considered alternative conceptions of knowledge were more likely to be associated with meaningful learning outcomes.

The implication of the model of factors influencing learning approaches is that beliefs about teaching are important. In a course for new teachers it is imperative that participants reflect seriously on the impact and importance of their approach to teaching.

Influence of discipline on approaches to learning

Both of the most widely used instruments for measuring approaches to learning have indicated disciplinary effects. Entwistle and Ramsden (1983) reported scores for the Approaches to Studying Inventory: English and history were higher on deep approach and lower on surface approach than physics and engineering. Biggs (1987) gathered data from a wide sample of Australian universities with the original version of the Study Process Questionnaire. Arts and science students had equal mean scores for deep approaches in the first year, but in each subsequent year the arts students had higher mean scores.

Similar differences have been reported for teaching evaluation questionnaires. Feldman (1978) reviewed 11 studies which compared ratings across disciplines and found that the humanities and arts tended to be rated higher than sciences, engineering and business administration. Cashin (1990) analysed large data sets from two widely used course evaluation instruments in the United States to find that ratings tended to be higher in the arts and humanities than in science, engineering and business. Barnes and Patterson (1988) also produced closely related findings.

Feldman (1997: 48) suggested a number of possible explanations for the discipline effects of teaching evaluation questionnaires. Among possible causes of these differences are the following: some courses are harder to teach than others; some fields have better teachers than others; and students in different major fields rate differently because of possible differences in their attitude, academic skills, goals, motivations, learning styles, and perceptions of good teaching. Feldman's explanations for disciplinary differences in ratings are clearly speculative. As this disciplinary effect is so widespread, any further evidence into its underlying cause would be valuable.

Workshop activity

It has become common to require or encourage Professors and Teaching Assistants (TAs) to take courses in teaching in higher education. Those attending these courses are often not fully motivated or convinced of the need for them to take such a course. It is, therefore, desirable to include, near the beginning of the course, a demonstration of the importance of good teaching. This article describes a very graphic demonstration of how teaching can have a marked influence on the approaches to learning adopted by students.

Quantitative data from the activity is then used to demonstrate the relational nature of approaches to learning from a research standpoint. The data proved to be quite revealing of the relationship between deep and surface approaches. The same body of data also contributes to knowledge on the influence of discipline on approaches to learning.

At The Chinese University of Hong Kong (CUHK), each year there are approximately 600 new masters of philosophy (MPhil) and doctors of philosophy (PhD) students who enter the University on postgraduate studentships. A condition of this financial aid is that the students have duties as TAs. They either act as tutors in tutorials or as demonstrators in laboratories. The University's policy on teaching and learning quality requires that all TAs receive some professional development. Since 2003, the majority of this professional development has been carried out by staff from the Centre for Learning Enhancement And Research. The activity we are about to describe is one that has been conducted many times in the last two years with our

TAs and has always resulted in lively interest and, we believe, a good understanding of approaches to learning. The whole activity normally takes between 40 and 50 minutes.

The workshop begins with an introductory icebreaker which teases out the characteristics of disliked courses - compulsory, poorly taught, uninteresting, etc.. The activity itself begins with a brief 10 minute power point explanation of the concepts of deep and surface approaches to learning. Each participant is then given a sheet of paper with a version of the R-SPQ on each side. One side is labelled 'How you study now' and the other 'How you studied in the course you disliked most'.

This activity is based on TAs completing the Revised Study Process Questionnaire (R-SPQ-2F; Biggs et al., 2001). This was designed to be used primarily as a simple two-factor instrument with deep and surface approach main scales. Each of the scales is measured by ten items. Responses are gathered to each item with a five-point Likert scale ranging from 1='*never or only rarely* true of me' to 5='*always* or *almost always* true of me'. These responses are shown on the questionnaire as having scores from one to five respectively giving a maximum score of 50 and a minimum score of 10.

The participants therefore complete the R-SPQ twice. In our context where English is a second language, this needs to be managed carefully as there is considerable variation in reading speed among our postgraduate students. While the participants are completing the questionnaire and calculating their four scores – DA and SA for how they study now and DA and SA in the most disliked course – a large table with four columns is drawn on a whiteboard with sufficient space for all participants to record their scores. As participants finish they come to the board and record their scores. The time taken to fill in the R-SPQ twice, and calculate and record the four scores, is usually less than 30 minutes.

At this point, the visual record is clear and in all courses it has been easy to extract, illustrate and have discussion about two central tenets about approaches to learning:

1. An individual may adopt different approaches to learning in contrasting learning environments. A deep approach is predominant when students are engaged in challenging tasks in topics which interest them. A surface approach predominates when the teaching and learning situation is disliked.
2. Within a similar learning environment, there will be marked variation between the approaches to learning adopted by individuals.

The activity is rounded off using graphical displays of two sets of data from another university in Hong Kong. Firstly, the DA scores in a sample of about 4,000 undergraduate students are shown; these decline progressively throughout the three years of the degree studies. By this stage in the activity, participants appreciate the significance of this negative slope and see how it is an indictment of higher education. The final illustration is a positive one. It is also from the same 'other Hong Kong university'. However, it is a programme-level study. Before the programme renewal took place the same downward trend in DA scores was observed. After the teaching and learning environment was changed – fewer lectures, more project work, more progressive assessment – the DA scores rose over time. Two cohorts of students in the renewed programme were tracked. The activity thus ends with a demonstration that the course design and approach of the teachers can have a marked effect on student learning.

The subsequent related activity is to ask small groups of students to compare the nature of teaching in the most and least favoured course they had taken. Each group is expected to produce a chart showing the nature of good and poor teaching. The groups normally find this task quite straightforward, indicating that they had clearly perceived the influence of teaching on the way they learnt, even if the observation had been largely tacit. The charts usually bear a reasonably close resemblance to literature lists of factors likely to induce deep and surface approaches, such as those quoted above.

Results and Discussion

The participants were 643 new teaching assistants enrolled in 31 short courses before the start of their teaching at CUHK in the years 2003 and 2004. Data were only included in the analysis if complete responses were obtained to the questionnaire for both study modes. This reduced the useable data to 617 sets, 96.0% of the total sample.

In the R-SPQ each of the deep and surface approach main scales is measured by ten items. Both of the main scales have readily identifiable surface and motive sub-scales, each measured by five items. In the quotation near the start of the article, which defines deep and surface approaches, the first part of each listing deals with the motive component and the latter parts the strategy. In the activity participants are just asked to calculate deep and surface approach main scale scores. These can range from a minimum of 10 to a maximum of 50. In this paper we also give scores for the constituent motive and strategy sub-scales for each approach.

Relational nature of approaches to learning
The relational nature of approaches to learning would be demonstrated if it could be shown that the students' approaches to learning differed between the two contextual situations. The workshop activity demonstrates that readily to participants in a non-statistical manner. The aim in this section is to use the data to show the relational nature of approaches to learning in a more rigorous manner by showing that the scores for approaches to learning differ by magnitudes which are statistically significant.

Mean and standard deviations of the four subscales and the two main scales were computed for the two teaching contexts. The scores are summarized in Table 1. The mean scores for deep motive and deep strategy (and hence deep approach) are higher than those for surface motive and surface strategy (and hence surface approach) for current study and the reverse pattern is observed for the most disliked course.

A series of paired t-tests, also shown in Table 1, revealed that the differences in the mean scores of the four sub-scales and the two main scales between the two contexts were statistically significant. These differences can be interpreted as an indication that the students in the sample were more inclined to employ a deep approach for current study, but might switch to greater use of a surface approach when studying their most disliked course.

Essentially this constitutes a demonstration of the relational nature of approaches to learning. These approaches can be markedly influenced by the nature of the teaching and learning environment.

<< insert table 1 here >>

There were also systematic differences in the standard deviations. For each sub-scale and main scale there was more variability in scores for the most disliked course than for current study. This may be interpreted as showing that in their current study the students stuck closely to their preferred approach as it was consistent with expectations. In their most disliked course they were more inclined to vary their approach to suit perceived demands.

Correlation between deep and surface approaches
The standard deviations had indicated that there was greater variation in the approach used in the most disliked course. This suggested that comparing the correlation between deep and surface approaches in the two contexts might be revealing. Accordingly, for the two contextual situations, the Pearson product correlation between the deep and the surface approaches was calculated. In both cases, the correlations were statistically significant in a negative direction. The magnitude of the correlation for the current study situation was only small ($r = -0.17$) while that for the most disliked course was moderately high ($r = -0.56$).

To help in interpreting the magnitude of the correlations, scatter plots of DA score against SA score in the two contexts are displayed in Figures 2 and 3. For current study, the DA scores were clustered towards the higher end of the scale and SA scores were widely distributed; so the correlation was low. In the most disliked course, DA scores were on the low side and SA scores high. This resulted in a substantial negative correlation.

The quite high correlation between deep and surface approaches in the most disliked course could be explained by students finding it expeditious to use an approach other than their preferred one. The results for current study indicate that most of the students preferred a deep approach, which is hardly surprising for those who have been awarded a higher degree scholarship. In their most disliked course they may have set out to employ a deep approach,

but found the expectations of the course or assessment favoured a surface one. It is also possible that some of the students employed both approaches, possibly by trying to understand material but then committing it to memory for tests or examinations. Chinese students have been found to employ a variety of approaches which combine memorising and understanding (Kember, 1996, 2000).

<< insert figure 2 here >>

<< insert figure 3 here >>

R-SPQ scores by faculty

The sample was divided into three faculty groups: engineering (n=219), science (n=200) and social science (n=198). The social science group included 55 students from the arts faculty. Economics students (n = 64) were included with the science students.

Table 2 presents the mean scores and standard deviations of DA and SA across the three faculty groups in the two contexts. All three faculty groups displayed the pattern of higher DA scores and lower SA scores observed for the overall sample.

<< insert table 2 here >>

Two sets of multivariate analysis of variance (MANOVA) were performed to assess the mean score differences for DA and SA across the three faculty groups for the two contexts. The social science faculty scores were highest for DA and lowest for SA in both study contexts. However, MANOVA indicated that only the *current study* context score differences were statistically significant (*current study*: $F(4,1228)=9.989$; p-value=0.00; *most disliked course*: $F(4,1228)=1.537$; p-value=0.189). Using the Scheffe procedure, the mean DA scores in the science group were found to be significantly lower than in the other two groups. The mean SA score for the social science group is statistically higher than the other two groups.

Since small differences can be statistically significant given the large sample sizes considered in the study, effect sizes are also included in Table 2. Using the social science faculty as the reference group, the effect sizes of the two contrasts in mean differences for the remaining two groups were computed with the pooled standard deviation across the three groups as the standardizer (Olejnik & Algina, 2000). The effect sizes of differences in the two learning approaches for engineering and science were considered as at the upper end of the small to medium range by Cohen's (1988) convention. The exception was for DA for studying in the most disliked course where the effect size was considered to be minimal.

Change in approach between contexts.

We then computed the differences in scores of DA and SA between the two study contexts (ΔDA and ΔSA) for each student. The means and standard deviations of ΔDA and ΔSA are displayed in Table 2. Again MANOVA was used to test for any differences among the three faculty groups with the result being $F(2,1228)=2.416$ with p-value=0.047, which is marginally significant. The Scheffe procedure revealed that only the difference in ΔDA between the social science and the science groups was statistically significant. With social science as the reference group, the science group showed a medium effect size in ΔDA which was negative.

Given the consistency between studies and between teaching evaluation questionnaire ratings and approaches to learning, this must be seen as a real effect. As this study and others have demonstrated the relational nature of approaches to learning, it seems reasonable to conclude that the findings indicate that the nature of the typical teaching and learning environment in the arts, humanities and social sciences is more conducive to cultivating a deep approach.

Conclusion

We have found this well-tested workshop activity to be of value to the many participants who have engaged in it. It is offered to others who might wish to try it in other contexts.

Further, this paper is a demonstration of the synergy between teaching and research. We set out to design and teach an effective short course for teaching assistants. The conclusions drawn from the activity are credible to participants because the data were gathered from them using a reputable instrument. It soon became clear to us that the data we were gathering in a teaching activity was valuable research data. Reflecting on and learning from teaching experiences is central to the scholarship of teaching (Boyer, 1990).

This set of 'teaching' data from the workshop clearly demonstrates the 'research' findings that approaches to learning are markedly influenced by the teaching and learning environment. Furthermore the demonstration is quantitative and very direct. The finding, therefore, is of value as Ramsden (1987) has pointed out that approaches to learning have been widely misinterpreted. They are commonly equated to relatively stable cognitive styles, which are a function of the student rather than being influenced by the task and the learning environment.

This study has in addition added evidence that a discipline effect operates on approaches to learning. Teaching in the arts and social sciences seems more inclined to promote a deep approach than that in science and engineering. The effect is not large, but is significant, and has been found consistently in a number of studies and contexts.

While there is no clear evidence of the reasons for these disciplinary differences, it seems reasonable to assume that the arts and social sciences, on average, tend to adopt learning and teaching environments closer to those found to favour a deep approach. Examining the two lists of factors (Biggs, 1999; Gibbs, 1992) noted earlier, it seems possible that the arts and social sciences favour greater levels of learner activity and more interaction and discussion. Science and engineering courses possibly have higher class contact hours, greater amounts of course content and a higher perceived workload. Further systematic examination of the teaching and learning environment and learning designs adopted in different discipline contexts seems warranted.

With the evidence of beliefs influencing teaching approach, which in turn impacts upon learning approaches, it is possible that teachers' beliefs about the nature of knowledge and the way it should be taught influences disciplinary teaching approaches. Becher (1989) characterised members of a discipline as an academic tribe. Investigating the nature of these disciplinary beliefs might provide more insights into differences in approaches to learning by discipline.

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Figure 1. A model of teachers' impact on student learning outcomes

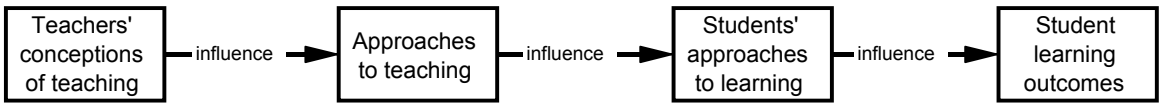

Table 1. Mean response to SPQ subscales and scales for current study and most disliked course

	Current study		Most disliked course			
SPQ scales	Mean	SD	Mean	SD	Paired t	p-value
Deep motive (DM)	17.03	3.15	11.83	4.17	32.22	<0.00
Deep strategy (DS)	16.48	3.04	12.23	3.79	27.83	<0.00
Surface motive (SM)	10.82	3.14	16.98	4.30	-34.85	<0.00
Surface strategy (SS)	12.43	3.20	17.05	3.92	-28.90	<0.00
Deep Approach (DA)	33.52	5.63	24.06	7.54	32.68	<0.00
Surface Approach (SA)	23.26	5.69	34.04	7.75	-34.90	<0.00

Figure 2. Scatter plots of DA scores against SA scores for current study

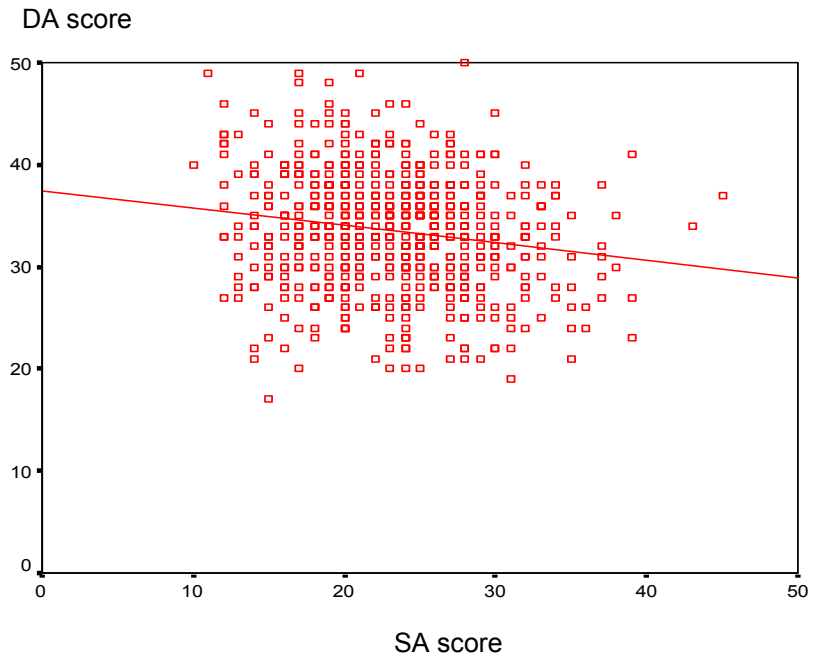

Figure 3. Scatter plots of DA scores against SA scores for most disliked course

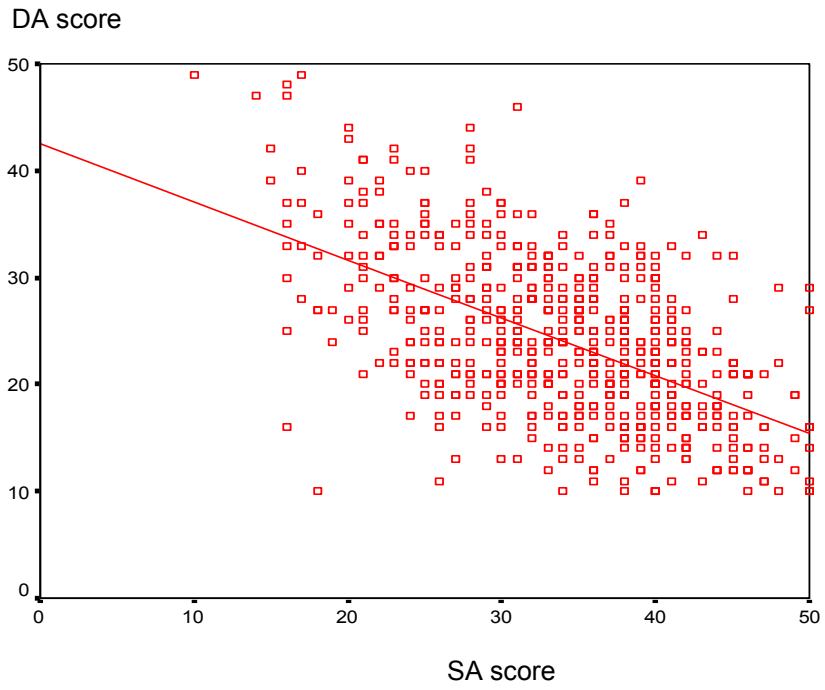

Table 2. Mean response to SPQ subscales and scales for current study and most disliked course for social science, engineering and science faculties.

	Social Science (N=198)		Engineering (N=219)		Science (N=200)		Effect size	
Current study	M	SD	M	SD	M	SD	Engineering	Science
DA	34.56	6.03	33.59	5.82	32.33	4.78	-0.17	-0.40
SA	21.68	5.36	24.17	5.63	23.71	5.75	0.45	0.36
Most disliked course								
DA	24.24	8.12	23.94	7.68	24.03	6.82	-0.04	-0.03
SA	33.11	8.28	34.81	7.58	34.19	7.36	0.22	0.14
Difference								
ΔDA	10.32	8.10	9.66	6.87	8.30	6.39	-0.09	-0.28
ΔSA	-11.43	8.06	-10.64	7.60	-10.48	7.49	0.10	0.12