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Effect of the quality of a post harvest handling on-line course on the motivation, learning acquisition and performance of two groups of students at the Distance State University of Costa Rica

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RESUMEN

El rendimiento, motivación y aprendizaje de los estudiantes son los tres ejes centrales en los que la Cátedra de Agroindustria se está enfocando a partir del año 2012 para mejorar la calidad de los cursos que imparte. La hipótesis que la cátedra plantea es que entre mejor sea la calidad de sus cursos, mayor será la motivación, rendimiento y aprendizaje de los estudiantes. Dos grupos del curso Manejo poscosecha impartidos en 2012 y 2013, se analizaron y compararon en los siguientes aspectos: motivación, el cual fue evaluado a través de una encuesta, rendimiento y adquisición de conocimiento basado en tres instrumentos de evaluación: un caso de estudio, un foro y un primer examen. La percepción de los estudiantes sobre el curso fue buena en general, pero sus habilidades de metacognición y autorregulación fueron pobres. No hubo diferencias significativas entre la adquisición de conocimiento y el rendimiento de los estudiantes en el 2013, mientras que en el 2012 sí se encontraron. Se concluye que hubo una mejora en la adquisición de aprendizaje en el 2013, pero los estudiantes necesitan aprender técnicas de metacognición y autorregulación. Se recomienda aplicar las mejoras de este estudio en el curso del 2014 para que la calidad del curso sea mejorada continuamente, además de mejorar el conocimiento y rendimiento de los estudiantes a través de la motivación.

PALABRAS CLAVE: evaluación, poscosecha, rendimiento, motivación, aprendizaje, cursos en línea.

ABSTRACT

Performance, motivation and knowledge of the students are the three central axis's in which the Agroindustry department has been working on since the year 2012 to improve the quality of its courses. The hypothesis the department proposes is: the better the quality of the courses is, the better the students' motivation, learning acquisition and performance. Two groups of a post harvest handling course, taught in 2012 and 2013, were analyzed and compared in the following aspects: motivation, which was evaluated through a survey, students' performance and learning acquisition based on 3 evaluation instruments: a case study, a phorum and a first exam. The perception of the students about the course was good in general, but their metacognitive self-regulation skills were poor. There were no significant differences between performance and knowledge acquired by the students in the 2013 group, but in 2012 group, significant differences were found. As a conclusion, there was an improvement in learning acquisition from 2012 to 2013, but students need to improve their metacognitive self-regulation skills and it is recommended to apply the improvements shown in this study for the 2014 course, so that its quality can continuously improve and the students' performance and learning raises through motivation.

KEYWORDS: evaluation, postharvest, performance, motivation, knowledge, on-line courses.

Research question

This study is based on a hypothesis formulated by the Agroindustry department (Andrés, 2012a) which suggests the following:

"The better the quality of the courses is, the better students' performance and knowledge acquisition will be, as well as their motivation".

Research justification

The goal of this study is to determine the effect the quality of a post harvest handling on-line course on performance, motivation and knowledge acquisition of two groups of students of taught by the Agroindustry course at UNED.

The comparison between the two groups was done with three evaluation instruments: the first exam (2012-2013), the case to solve (2013) and the phorum (2012).

Based on the hypothesis mentioned above, the Agroindustry department has published two studies (Andrés, 2012a; Andrés, 2012b) that justify the continuous research on this topic.

In the first study, a Quality Control on-line course was evaluated in order to measure the three elements of the hypothesis, which are the subject of the study: motivation, knowledge acquisition and performance.

This study showed many issues that needed to be changed in order to improve the quality of the course. The most important issues are the following (Andrés, 2012a):

a) The course has a high level of statistics. Some students think a statistics course should be taken before the Quality Control course.

b) The teacher told the students to study from the study guide instead of the book because it was supposed to be clearer and with less topics; but this study guide has a higher level of statistics than the book, thus this was something that really confused the students. Nevertheless, the teacher was very prompt in answering all the e-mails and questions from each student and things were clear as far as the methodology.

c) The text book is not designed to study at home (it's a presential class type). A study guide was written, but it has mistakes that need to be corrected for the next promotions till a new book can be written.

d) Students think it is necessary to have more than one class for the course (the rest of the classes are virtual). This will be taken in consideration, specially the video conference suggestion.

e) The exams had a higher level of difficulty than expected.

Based on the ladder, the department made changes in the course, so that the next group of students would achieve a higher level of the three elements mentioned above. Another article is being written along with two authors from Penn State University and it will be published shortly.

In the second study done by the Agroindustry department (Andrés, 2012b), a Post Harvest

Handling on-line course was evaluated for the first time and there were issues that needed to be solved, in order to improve its quality. The most important issues were set out in the following action plan, so that these changes could be implemented for the next group of students (20013), which is what this article is evaluating:

Chart 1. Action plan to improve a post harvest handling on-line course
quality taught during the first term of 2012

Issue	Corrective action	Responsible	Due date
Course orientation booklet wasn't clear for the students	Make this document clearer and simpler	Department	Third term 2012
Students didn't get feedback from their teacher because if wasn't requested of her	Ask the teacher to give students feedback on each Evaluation instrument to improve knowledge acquisition	Department and tutor	Third term 2012
Level of knowledge acquired was always lower than the final grade	Give level of knowledge a grade*	Department	Third term 2012
There were few students who answered the survey	Give the survey a percentage in the final grade of the course*	Department	Third term 2012

*This wasn't done, but the department asked the students what they thought about it.

Based on the issues mentioned for both courses evaluated, the Agroindustry department considers necessary to continue investigating the student's perception, performance and knowledge acquisition of the courses it teaches in order to improve their quality.

Theorical fundaments

On-line courses are being more and more an essential part of distance learning. With the growth of technology, they are being requested by the students of distance universities, due to the advantages they pose in a changing and more challenging world.

But, how can an on-line course teacher make sure their students are motivated to achieve the performance that is requested from them and at the same time, acquire the knowledge intended for each course?. The Agroindustry department has studied this questioning since 2010 (Andrés, 2010; Andrés, 2012a; Andrés, 2012b) through three axes and the results they have revealed are open windows to improve quality, but only the beginning of many more studies that need to be done in the department and at UNED.

The first axe the Agroindustry department studies is motivation. Without motivation, students won't reach neither a good performance nor acquire enough knowledge and will have a long way to go to get beyond what's being asked of them. According to Bautista, Borges & Forés (2009), the most

important role in teaching is to make students want to learn, to be willing to go further. And in on-line course it is necessary to be available to the student, so that the interest is not lost along the way.

Metacognition and self regulation are a part of motivation in which teachers need to insist their students take seriously, especially in on-line courses at UNED, which are student centered, not teacher centered. In many studies, this matter is key to achieve a better performance for students. For example, Kitchner (2009), found out epistemic assumptions influence how individuals understand the nature of problems and decide what kinds of strategies are appropriate for solving the problems they encounter. In another study about learning with or without a facilitator, Weerainghe; Ramberg & Hemawamage (2012), found it is not necessary to have a teacher as long as learning environments are designed to support students to be interactive and have motivation, regulatory skills and willingness to collaborate with peers.

The second axe studied by the Agroindustry department is knowledge acquisition, which is directly correlated to motivation. Without it, as mentioned above, students won't learn the same and it is more important than a good performance, even when this determines whether the student passes the course or not, it there is no learning acquisition, then the course wasn't worth it.

In order to actually achieve the goal of helping students learn, pedagogical adjustments can be done when students don't seem to have enough support material or an assignment that really helps them apply concepts (Bautista *et al*; 2009).

As well as for motivation, a good design of the on-line course determines how well the students will learn, but it must offer students technological tools that can make the learning experience more dynamic (Perez, 2012, personal communication).

Another factor that can help learning acquisition is feedback. Armbruster, Patel, Johnson, Weiss (2009), describe feedback as a part of active learning, if it's given on time and right after the students make a mistake or improve on a determined matter. This is very important, since it helps students feel certain about what they're learning and make them want to learn more. But feedback doesn't need to be limited to evaluation instruments, any moment is a good time for doing it, even if the student doesn't realize. This evaluation must not alter the learning process or become a goal itself, but is a tool the teacher has to help students improve their learning (Castillo & Cabrerizo, 2007).

The third axe is performance, which is related to a good evaluation process. In this matter, the alternative evaluation plays an important role in making the students improve their performance, since it is based on students' needs and specific situations (Andrés, 2012b).

It is also important to set out the evaluation to learning and one way to do this is make sure each assignment makes the student think, reflect, not only look for in a book and write it down.

With this study, the Agroindustry department is looking for tools that can improve the quality of the post harvest handling course and the way to find them is through the analysis of the perception the students have of the improvement of the course.

Methodology

This investigation is a quantitative co relational study (Hernández, Fernández & Baptista; 2012), in which the relationship between the quality of a course and the motivation, performance and knowledge acquisition of the students was studied through Pearson correlations and variance analysis.

To analyze all the data, the complete population of students was used. For the 2012 group, 47 students were used and for the 2013 group, 10 students. This was the complete population that took the course.

MOTIVATION AND COURSE EVALUATION SURVEY COMPARISON BETWEEN THE 2012 COURSE AND THE 2013 COURSE

A survey about students' motivation and perception of the course in general was applied at the end of the term.

The themes the survey evaluated were metacognitive self regulation, books used for the course, pedagogical methodology, learning acquisition, learning evaluation process and on-line activities.

The questions of the survey were taken from a series of studies that recommend quality indicators for on-line courses and specific questions to evaluate motivation (Capacho, 2011; Cardona y Sánchez, 2010; Gessa, 2011; Gargallo et al, 2009). This survey was also validated in two studies done by the Agroindustry department (Andrés, 2012a; Andrés, 2012b), one for a Quality Control course and the other for the course evaluated in this paper, but a year before.

In order to validate the survey, the results obtained in both studies were analyzed and turned into action plans which have proved to upgrade the quality of the courses, thus this means this survey is a good tool to determine the students' perception of the course and how it can be improved.

COMPARISON BETWEEN THE KNOWLEDGE ACQUISITION AND THE FINAL GRADE OBTAINED FOR THE EVALUATION INSTRUMENTS USED IN 2012 AND 2013 FOR THE POST HARVEST HANDLING COURSE

This comparison was done in the following way:

a) Knowledge acquisition

The knowledge acquired by the students in each evaluation instrument was evaluated using a scale designed by the author. The results from the 2012 group (Andrés, 2012b) were compared with the ones obtained for the 2013 group.

The scale consisted in evaluating four items: i. Basic concepts, ii. Application of concepts, iii. Criticism and level of analysis capacity and iv. Level of knowledge acquired

b) Final grade

The grades of the students obtained in each evaluation instrument were compared with the knowledge acquisition and the results from the 2012 and 2013 group were compared.

STATISTICAL ANALYSIS

The results were analyzed through a Pearson correlation to determine a relationship between learning acquisition and performance in each evaluation instrument.

Also an ANOVA (analysis of variance) was performed to compare learning acquisition and performance and determine significant differences among them.
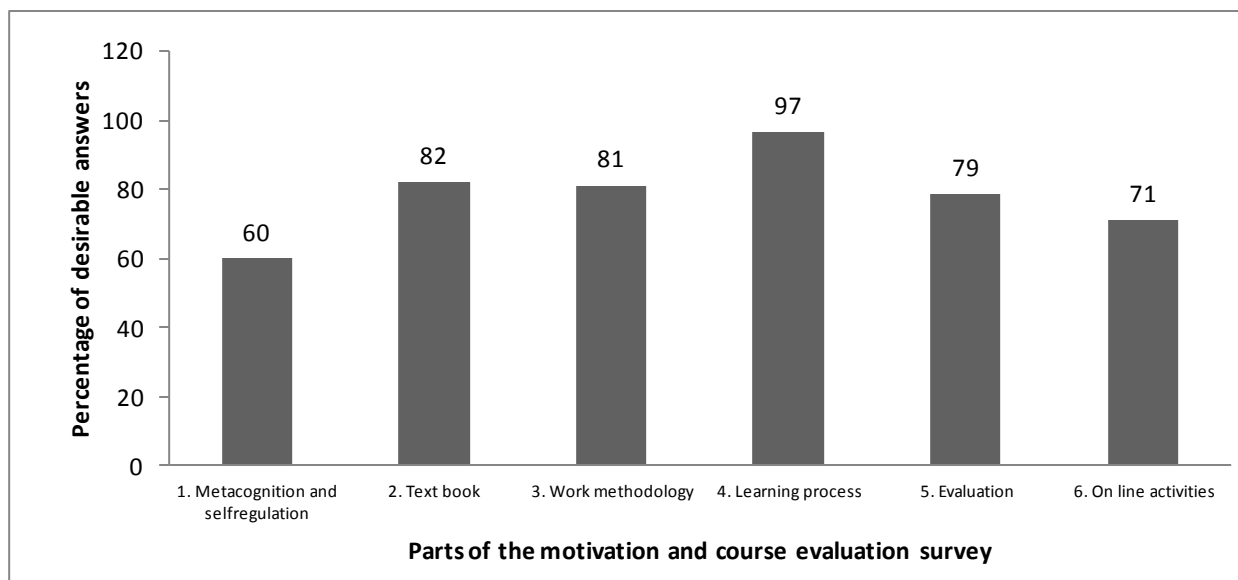
Results

MOTIVATION AND COURSE EVALUATION SURVEY COMPARISON BETWEEN THE 2012 COURSE AND THE 2013 COURSE

Opposed to the 2012 group, the majority of students responded the survey in 2013 (70%). Depending on the student's answer, a percentage of desirability was determined, shown in figure 1 (this was not done for the 2012 group, since it was not representative).

Figure 1. Percentage of desirability of the answers of the motivation and course evaluation survey applied to the 2013 group of the post harvest handling course

COMPARISON BETWEEN THE KNOWLEDGE ACQUISITION AND THE FINAL GRADE OBTAINED FOR THE EVALUATION INSTRUMENTS USED IN 2012 AND 2013 FOR THE POST HARVEST HANDLING COURSE

a) Comparison between general knowledge acquisition and performance in 2012 and 2013. In figure 2, the statistical comparison between knowledge acquisition and the final grade of the evaluation instruments evaluated in 2012 is shown.
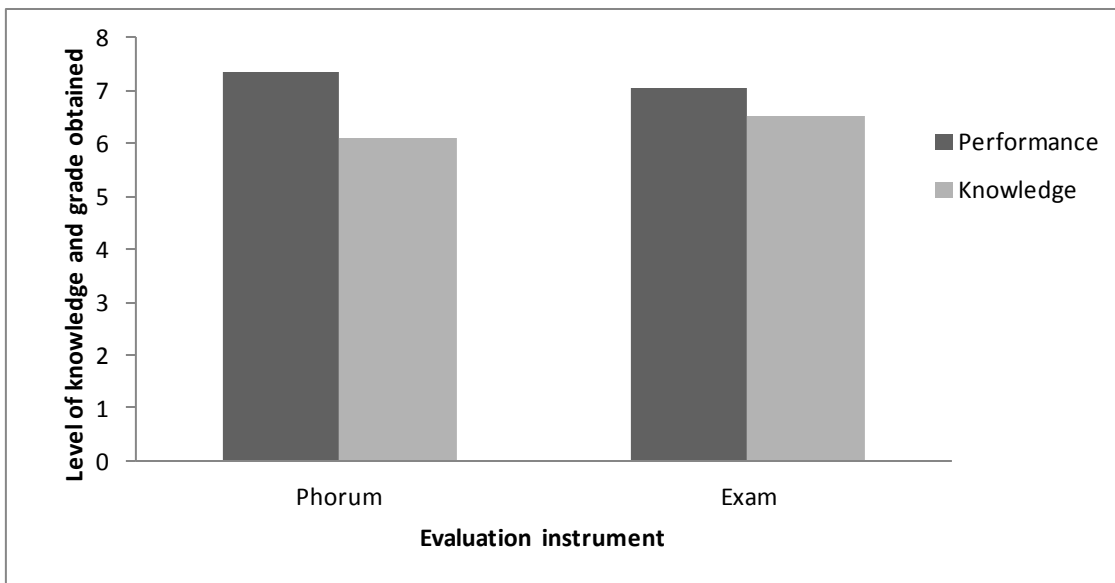
Figure 2. Statistical comparison between knowledge and final grade obtained for the evaluation instruments evaluated in 2012 (Andrés, 2012b)
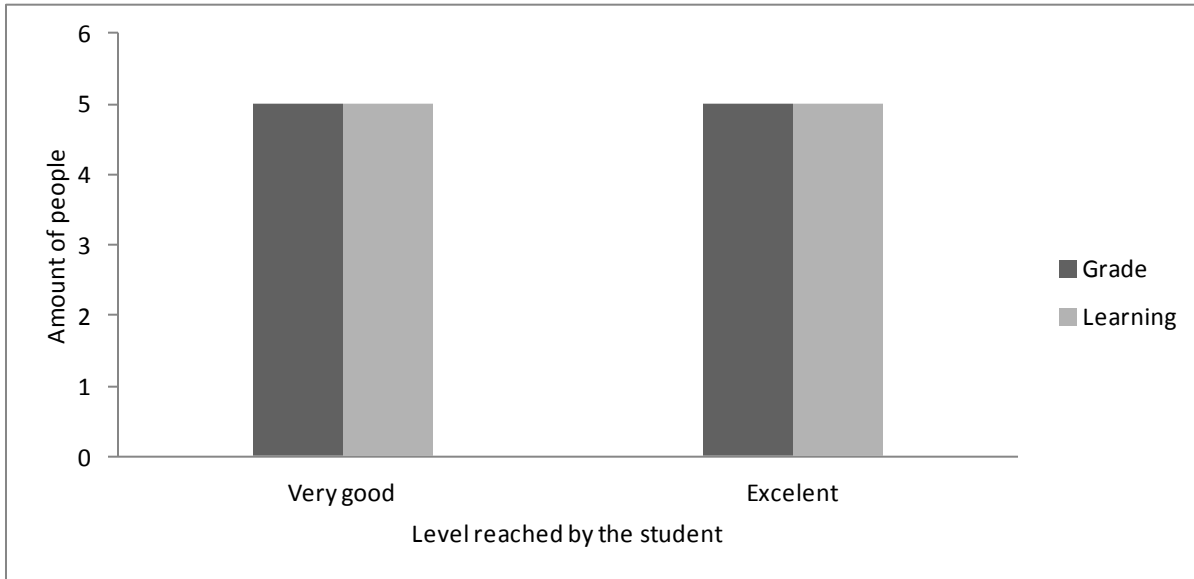
In figure 3, the statistical comparison between knowledge acquisition and the final grade of the evaluation instruments evaluated in 2013 is shown.
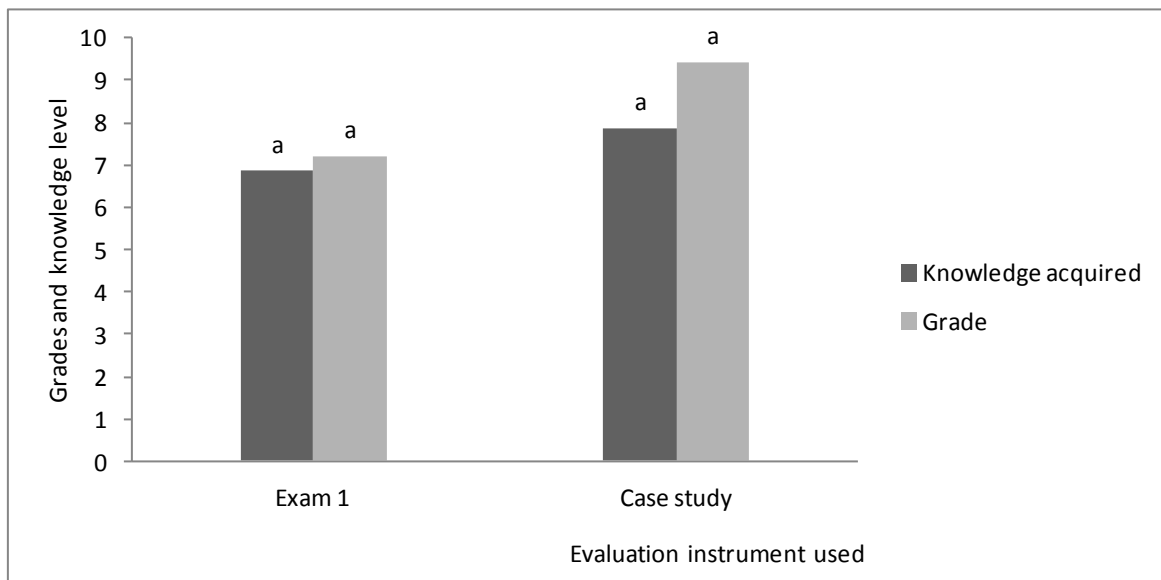
Figure 3. Statistical comparison between knowledge and final grade obtained for the evaluation instruments evaluated in 2013

b) Evaluation of the level of knowledge and performance for each evaluation instrument during 2012 and 2013

In figure 4, a statistical comparison between knowledge and final grade is shown for the case study evaluated in 2013.

Figure 4. Amount of students who got levels of learning and performance considered as very good (8-9) and excellent (10) between knowledge and final grade obtained for the case study evaluated in 2013
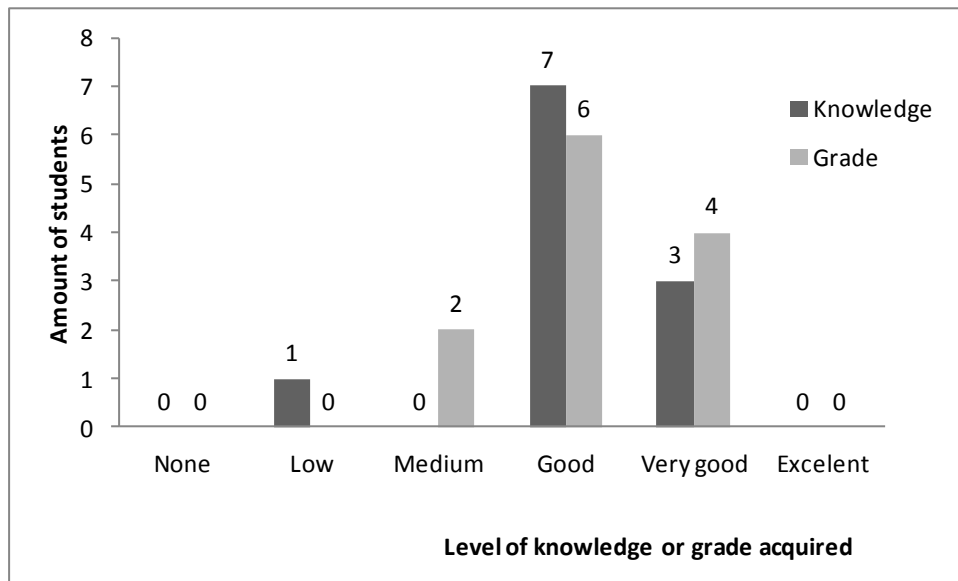
In figure 5, a statistical comparison between knowledge and final grade is shown for the first exam evaluated in 2012.
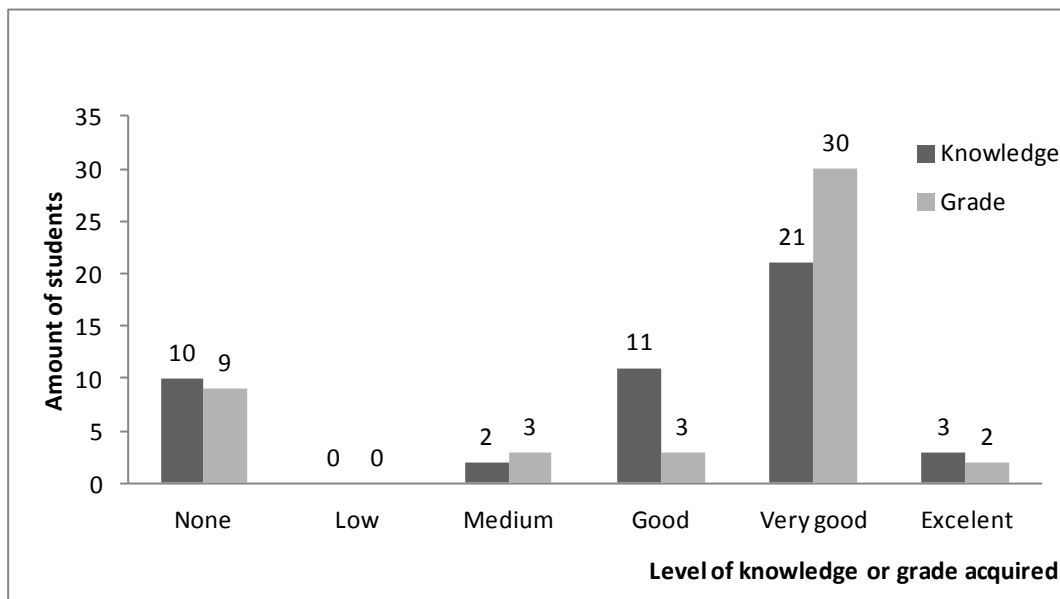
Figure 5. Amount of students who got levels of learning and performance considered as none (0), low (1), medium (2), good (3), very good (4) and excellent (5) in the first exam applied in 2012 (Andrés, 2012b)
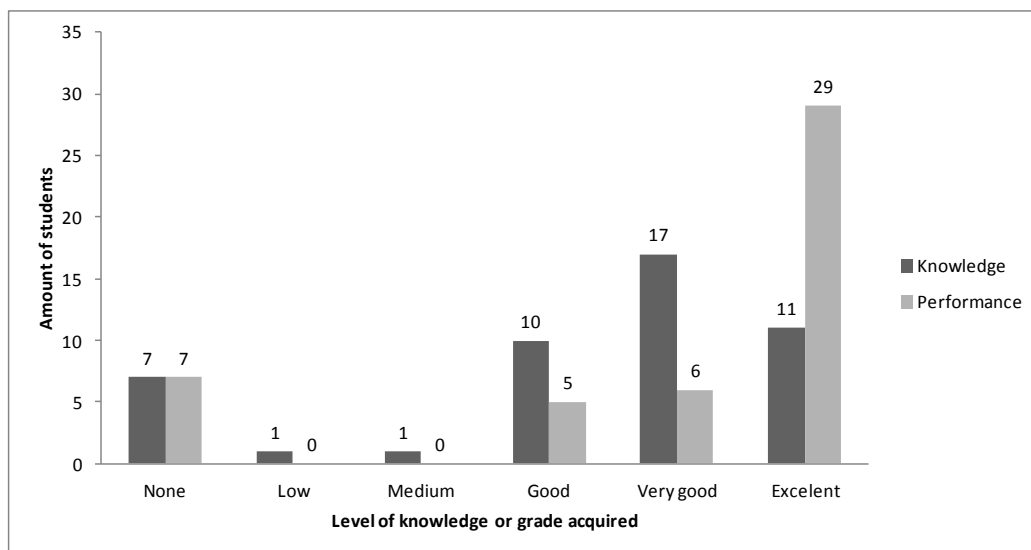
In figure 6, a statistical comparison between knowledge and final grade is shown for the first exam evaluated in 2013:

Figure 6. Amount of students who got levels of learning and performance considered as none (0), low (1), medium (2), good (3), very good (4) and excellent (5) in the first exam applied in 2013

In figure 7, a statistical comparison between knowledge and final grade is shown for the academic phorum evaluated in 2012:

Figure 7. Amount of students who got levels of learning and performance considered as between knowledge and final grade obtained for the academic phorum evaluated in 2012 (Andrés, 2012b)

STATISTICAL ANALYSIS

In table 1, Pearson correlation coefficients between knowledge and final grade are shown for 2012 and 2013.

Chart 1. Pearson correlation coefficients and variance analysis per learning factor obtained to determine correlation and significant differences among learning acquisition and final grade of two groups of students of a post harvest handling course during 2012 and 2013

	Basic concepts vs. grade	Application of concepts vs. grade	Level of analysis vs. grade	Global learning vs. grade
2012 group*				
Phorum				
Pearson coefficient	0.42	0.42	0.44	0.43
p value	0.0699	0.0706	0.0595	0.0721
First exam				
Pearson coefficient	0.96	0.97	0.97	0.97
p value	<0.0001	<0.0001	<0.0001	<0.0001
2013 group				
Case study				
Pearson coefficient	0.30	-0.34	-0.38	-0.38
p value	0.5310	0.5329	0.3486	0.5122
First exam				
Pearson coefficient	0.73	0.67	0.58	0.76
p value	0.0952	0.0434	0.4981	0.4635

*Taken from Andrés, 2012b

Discussion

In this study the metacognition and self-regulation were the parts of the survey students of the 2013 group didn't answer as the department expected, and this was also answered negatively by the students in 2012 (Andrés, 2012b). This means they are not clear about this skill or don't have the tools to accomplish it in a good way and this needs to be improve.

In a similar study, Puzziferro (2008), found out with a group of community college students, that the ones that applied metacognition and self-regulation, were significantly positively correlated with levels of motivation. Moreover, in an investigation about active learning done by Armbruster, *et al* (2009), it was recommended to adopt strategies to create a more self-centered learning environment in order to improve this area in students.

On the other hand, students don't think their knowledge acquisition should be graded, since it

is something inherent to the course. Further research needs to be done on this matter, but certainly students didn't feel they got enough feedback in 2012, whereas they felt they did 2013 and it is an improvement made to the course.

As for learning acquisition and performance, in 2012 significant differences between these factors were found whereas in 2013 weren't. This might indicate students of 2013 had a higher level of analysis and understanding of the subject, since their grade coincides with their knowledge acquisition. In a similar study on advanced placement exams done by Johnston & Barbour, 2013, students' performance was compared and there were significant differences among performance in different years.

The lack of significant difference among knowledge and performance for the phorum in 2012 and case to solve in 2013 indicates students acquired the knowledge and level of criticism expected from them.

There was an important improvement from the 2012 group to the 2013 group regarding the exams. Knowledge was significantly lower than performance in 2012. Moreover, performance was good and very good for most students in both years, but knowledge acquisition was higher than performance in 2013 compared to 2012. This might suggest students are learning to be more critic, to analyze more and learn the concepts and apply them in a better way.

Conclussions and Reccommendations

- Metacognitive self-regulation skills need to be taught to the students during the course in order for them to feel more motivated.
- The fact of grading learning acquisition needs to be investigated in further studies, to really determine the effect this might cause in students' performance and learning acquirement.
- Offering feedback to the students in each evaluation instrument is recognized as valuable.
- The 2013 group reached a higher level of learning acquisition than the 2012 group for every evaluation instrument applied in the course.
- Learning acquisition was improved from 2012 to 2013 in the first exam of the test.
- Further studies about knowledge need to be done so that different techniques can be included in the courses of the department to improve students' skills and performance.
- It is recommended to apply the improvements shown in this study for the 2014 course, to continuously improve the quality of the course.

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