Congruence Of Assessment And Instructional System:
The Case Of Problem-Based Learning

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1. INTRODUCTION

In this paper two different student assessment systems will be described. Both systems are developed for use within a problem-based curriculum. In order to appreciate the requirement for a non-traditional assessment system within a problem-based curriculum, the paper opens with a description of our faculty's curriculum, and the principle of problem-based learning.

The first assessment system discussed, the so-called 'Progress Test' or 'classical' problem-based learning assessment system, is the system that our faculty of economics and business administration started with when the first students entered our school in 1984. This system is called classical because of the fact that it was taken over from the medical school, being inextricably entwined with all the other ideas, experiences and solutions on problem-based learning. However, as with many ideas that are taken over, the system inevitably began to develop, from year to year, with small shifts in some years, and discontinuous large jumps in others. One of these paradigm shifts occurred in the academic year 1991/1992, the year of a general reprogramming of the faculty's curriculum. In that year the backbone of the classical assessment system, the Progress Test, was removed from the first year program and replaced by a new type of test, the so-called OverAll Test. To stress the importance of this paradigm shift, I will call the assessment system with the new OverAll Test as backbone the 'alternative' problem-based learning assessment system. This is largely the same system.
prevailing at the moment. In this paper I will not only describe both systems, but also give the main arguments that led to the abolishment of the Progress Test, and sketch which factors contribute to the necessary congruence of assessment and instructional systems, and which don't.

2. FACULTY'S HISTORY

In 1974, the University of Limburg in Maastricht started with a Faculty of Medicine. The founders of the faculty engaged themselves in an experimental educational approach: problem-based learning. The medical school originally adopted a curriculum similar to the program developed by McMaster University, Canada, but within a short time, Maastricht was developing its own variant to this program, for which it has obtained a reputation. In the beginning of the 1980s, the further faculties of Health Sciences, Law, and Economics & Business were founded. All of them adopted problem-based learning as their leading educational principle. Very soon however, it was found that every school became confronted with its own problems in implementing problem-based learning in non-medical disciplines.

3. PROBLEM-BASED LEARNING IN THE STUDY OF ECONOMICS & BUSINESS ADMINISTRATION

To appreciate the rationale of both assessment systems described in this paper, some background on problem-based learning is required. A short sketch will be given in this section; for a more elaborate description, see Gijselaers et al., (1995), which contains several contributions on the educational system of our faculty.

The principal idea behind the concept of problem-based learning is that learning should be organised around problems related to the profession, rather than around subjects which are centred around academic disciplines. The starting point for problem-based learning is the student’s confrontation with a description of phenomena or events. For instance, take the following proposition:

"The difference between 'committed' and 'discretionary' fixed costs, and between 'engineered' and 'discretionary' variable costs, is not due to technical factors, but is a result of management's policy."

The discussion amongst the first year students following on the reading of this problem-task, might contain the following elements:
"It seems to me that the proposition is false. There is no doubt that variable costs, as direct material or direct labour must have an explicit, specified physical relationship to the level of activity, thus independently of any physical quantity. The adjectives 'committed', 'discretionary' and so on aren't familiar to me, but they probably don't dispose of the basic distinction between fixed and variable costs."

"But probably this proposition isn't so easy as you suggest. The core element of the proposition isn't the distinction between fixed and variable costs, but between 'committed' and 'discretionary' costs, and between 'engineered' and 'discretionary' costs."

"But even in that case the proposition apparently still is false. Although, I like to repeat, the meaning of 'engineered' is not quite clear to me, that term seems to suggest a relationship to technical factors, and the existence of such a relationship rejects the proposition."

"Isn't the impact of management decisions much more important in explaining the different costs categories? As I see it, technical factors explain a lot of the difference between fixed and variable costs, but are less important in distinguishing 'engineered' and 'discretionary' costs."

... In this (constructed) discussion between students in a tutorial group, we encounter several elements of problem-based learning. To start with: the description of a phenomenon, this time in the form of a proposition. Students formulate a problem on the basis of this description. Such as: "can all costs be influenced by management and if so, in what manner"? Subsequently, a brainstorm process takes place with the intention to solve the problem. The first step of the brainstorm is to activate prior knowledge. From the discussion it is evident that the concepts fixed and variable costs were the object of study in an earlier part of the same course: they belong to the body of prior knowledge. Other elements of prior knowledge could originate from an elementary accounting course some of the students followed at secondary school, or from reading journals, from practical experience doing a holiday job, and so on. After reactivating the combined prior knowledge of the group members, the 'thinking aloud' phase comes: explanations are brought forward, students define the elements of the problem they are able to satisfactorily explain, and those they cannot master. Those unsolved questions will be noted down and will subsequently serve as learning issues for individually consulting the literature. When the group meets again, the students will tackle the problem again to see whether the new information enables them to give a better explanation of the problem.
This approach of problem-tasks, sketched in the example above, is formalised in a structured problem-solving framework that consists of a seven step sequence: the 'seven-jump'.

| step 1: | clarify terms and concepts not readily comprehensible |
| step 2: | define the problem |
| step 3: | analyse the problem |
| step 4: | draw up an inventory of the explanations inferred from step 3 |
| step 5: | formulate learning objectives |
| step 6: | collect additional information outside the group |
| step 7: | synthesise and test the newly acquired information |

*Figure 1: Seven-jump*

In the discussion during the first session the students follow the steps one to five in order to formulate learning goals. In the follow-up session they complete the seven-jump by performing the last step: informing each other about their individual findings, and synthesising the information acquired. After completion of the seven-jump of one problem-task, they will restart the cycle with the next problem.

The problem-tasks are derived from professional practice, schools of thought or paradigms, and are adapted for educational purposes. The problem-tasks are collected in a course-book, which is the guide to the student's learning activities during each eight weeks block. There is a thematic relationship between the several problem-tasks in one course-book: the task described above as an example is taken from a course on finance and accounting, with its theme the enterprise Sphinx, a famous ceramics producer with it's headquarters in Maastricht.

Students work in small tutorial groups consisting of 12 persons. They meet in two-hour sessions twice or three times a week to discuss and analyse problems that fall in the domain of the block. The tutorial group is guided by a staff member, a tutor, whose task is to facilitate the learning process and to stimulate the functioning of the group. Problem-based learning distinguishes itself from case-oriented learning methods in several ways. The starting point of the learning process in problem-based learning is the problem itself; one of its prime roles is to motivate students to learn new concepts or theories by challenging them with a provoking problem they cannot solve with their existing knowledge. Another aim is the systematic analysis of this prior knowledge. In case-oriented learning methods, in contrast, the problem constitutes only the tail end of the learning process. A
further difference is in the extent to which the learning process is teacher centred. Within the problem-based learning system there is no predefined problem. There is only a short context, referring to a specific problem-domain, and the tutorial group defines the problem itself, as the second step of the seven-jump. Since the interests of students diverge, different tutorial groups will come up with different problem definitions. Hence since prior knowledge also diverges, different tutorial groups will define different learning goals. Ultimately, this has consequences for the sequence and scope of learning and for the assessment procedures applied.

![Figure 2: Learning process](image)

The tutor still plays a crucial role in the learning process. However, the prime task is to facilitate and to stimulate. As in a Socratic dialogue, the tutor confronts the students with the consequences of their reasoning, perhaps by using parallel examples. It is not the task of the tutor to dispense extended information, or give any lectures: the learning process is rather of a self-discovery type.

4. REQUIREMENTS FOR AN ASSESSMENT SYSTEM

A key prerequisite of any assessment system, of whatever sort, is that its procedures are congruent with the educational and instructional principles. Students, especially those in economic faculties, who are daily trained in optimising behaviour, adapt their study approach to the assessment procedures in order to maximise their chance of success. When designing an assessment system this fact cannot be ignored. A badly designed system gives students incentives that counteract the educational principle (e.g. tests tempt them to just memorise facts, whereas we want them to apply their knowledge). On the other hand, in a well-designed assessment system we have an additional instrument to achieve the desired behaviour: the test system itself serves as an educational tool. Thus we cannot expect a traditional assessment system to work well within a problem-based
curriculum. To mention just one important aspect: how would we design such an traditional exam, when we realise that students have followed different learning paths, with the implication that not all students go through the same material at the same time?

5. PROGRESS TEST

A central element in the ‘classical’ problem-based learning assessment system is the so-called Progress Test. This is a test exclusively designed for problem-based learning: you won’t easily find a comparable test in any other educational system. The reason that the architects of problem-based learning in the medical school spent so much energy in designing a new type of test exclusively for problem-based learning is that they considered all other assessment systems to be incompatible with the main principles of problem-based learning. These principles are (see Van der Vleuten & Wijnands, 1990):

- the principle of self-directed learning, the student is fully responsible for her or his study actions, and
- the learning through practice principle, together with an emphasis on abilities as well as knowledge.
- Knowledge that students can apply and use, e.g. to solve problems. Thus, there is an
- integration of theory and practice and, along with that, an
- integration of the disciplines or subject matters.

To assess the knowledge of the students, the medical school designed a dual system. One component of that system was the 'Block Test'. This is a very classical component: at the end of each course (block in our terminology), students get a test consisting of 150 or more objectively scorable items representing the cognitive objectives of the last eight weeks block. Except for the fact that the item format is true/false, and not multiple choice, the format of the test appears rather standard. However, the function of the test is not at all standard. Block Test scores do not play any role in the grading of the students. In our terminology: the test doesn’t serve a summative (evaluative) purpose, only a formative (educational) one. The main argument behind this one-sided use of this test is easy to imagine. Problem-based learning stimulates self-directed learning. This would be a hollow objective if all blocks are constrained by tests that force students to master the complete spectrum of subjects. Such tests would result in a concentration on the subjects deemed important by the lecturers who wrote the block book, which may be far from the learning path the students prefer. They also stimulate learning by rote strategies and a focus on detail, which is
the opposite of problem-based learning. The only way to completely circumvent these unwanted side effects of assessment is to exclude such a test from the grading system.

To enhance the formative value of the Block Test, students get much more feedback than solely their general test score. Using the table of specifications of the block, which explicitly states the objectives for different disciplines, all test items are clustered and the students' feedback consists not only of the over-all score, but also of a more detailed insight in her or his knowledge on all the different subjects of the block. This insight is both in absolute terms (what do I know in comparison to what I ought to know?) and in relative terms (do I know more or less than my fellow students on this subject?).

A second measure to overcome the negative side effects of the Block Test is the inclusion of the question mark option within the true/false format of the items. This option allows the students to 'pass', thereby indicating that they did not master the subject of the item, probably because they spent their time on other subjects. It relieves students of having to give forced answers. Students are not punished for avoiding an item: choosing the ?-option renders a score of 0 points, while choosing the good answer scores 1 point, and choosing the false answer scores -1. Thus, the introduction of this new option is an attractive one for students: in the long run, such a system gives the same score as pure guessing, but in addition, it gives better feedback. In the short run, the system is much saver than guessing, especially when the test constructors play their favourite game of formulating the items in such a way, that pure guessing gives a more than 50% chance on the wrong answer.

The block test is primarily of formative nature; it is the 'Progress Test' that is to be considered the utmost important instrument in the assessment system. An outsider would have a difficult job distinguishing a block test from a Progress Test. Both consist of items in a true/false format, the number of items being somewhat higher in the Progress Test: at least 250. The great difference is not a matter of format, but a matter of content: the items of the Progress Test are sampled from the whole cognitive domain, and represent the ultimate objectives of the curriculum. Since the Progress Test is administered four times a year to all students of faculty, irrespective of the year they are in, the test can best be conceived of as a kind of 'repeated final examination' (Van der Vleuten, 1989, p. 14). Each student will participate in at least 24 Progress Tests, these tests are repeated every 3 months and every time being made up of new items, parallel in content to the previous ones. This last aspect is achieved by sampling the items with fixed weights for the several disciplines, classified by a fixed blueprint.
Confronted with a final examination, one would not expect much from a freshman. A second year student would probably do a better job and, as we hope, the student just before graduation is at her or his best. Clearly, this is a vintage model, in which the expected productivity grows with the age of the vintage. The model also makes it evident why there is a need for a question mark option in the item format: if you expect the youngest vintage to reach a very low score, especially at their first test (ideally a zero score if the test is constructed in such a way that it truly measures the contents of the blocks), it would be beyond all reason to expect them to go all the way, patiently guessing every item. Therefore, in the Progress Test even more than in the block test, forced guessing should be circumvented.

Since we have a vintage model with growing expected productivity, the obvious norm would be one that grows with the vintage. This is indeed the case, however in an indirect way. Grading is based on a norm-referenced perspective of the test scores. This means that the relative score counts: the score of any student is compared with scores obtained by other students from the same vintage. (This contrasts with the domain-referenced perspective, in which only the absolute score matters, and in which the performance of the fellow students is not relevant in the grading decision.) A good student scores above the average of her or his vintage; a bad student scores below that mark. Yet this is only one part of the story. The other part is not surprisingly, the growth in the average score of students over time. The relative norm, combined with a growth in average knowledge in her or his vintage, confronts the individual student with the need to perform better all the time from an absolute perspective, in order to pass the Progress Tests.

6. THE PARADIGM SHIFT AND BEFORE

From the first year of its existence, there were differences between our assessment system and the ‘classical one’, especially with regard to the Progress Test. The main issue was related to the level of the test. Whilst the classical Progress Test aims at the final level, we started to test at an intermediate level. At the time we did not have a real choice: only the first year curriculum had been developed, all the other parts were at a drafting stage. Thus choosing the complete first-year program as the level of testing was more a necessity than the outcome of an unrestricted choice.

From the medical school experience we learned that testing at the final level has the disadvantage of a very low discriminative power in the first years of study. This is not surprising: the freshmen can be expected to master only a very small portion of the items, and, as a consequence of different individual learning paths, those portions differ from student to
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student. In such a situation the sample error caused by sampling only a limited number of items from a very large cognitive domain is inevitably large. This implies a low discriminative power of the test within this group of students. In the medical school, this situation is not problematic. All medical students are bound to our university, due to legal restrictions on switching from one university to another (there is a so-called 'numerus fixus', combined with a selection committee). For economic studies however, these restrictions do not exist, meaning that any student who passes her or his 'propedeutic' (first-year) examination in Maastricht, can continue their studies at another Dutch economic faculty, or vice versa. In these circumstances, a highly reliable examination is required at the end of the first year; passing the 'propedeutic examination' enables the student to continue her or his study elsewhere, and must, for that reason, be a guarantee that the student is capable of finishing this study. Such a guarantee can only be provided by an examination that is highly discriminative. This implies an examination at a lower level than the final one. Being confronted with such a different legal context, one of the first deviations with regard to the classical Progress Test was the inclusion of a large portion of items at the first-year level.

A further step to reform the Progress Test into a solid guarantee for being capable of finishing the study of economics, either at our own university or one of the other Dutch faculties, concerned the grading system using the scores of the Progress Test. The medical school chose a group-referenced interpretation of the test score: the student's score is compared with the score of other students of the same year group. The relevant score in this grading process is not the score on one Progress Test, but to restrict the impact of outliers, a moving average of the latest three scores on the Progress Test. We took over that grading system but supplemented it with an additional requirement: a criterion referenced score. In at least one of the four Progress Tests taking place in the first year, students had to achieve an absolute minimum level. In practice, this was to be the last Progress Test of the year, the test itself being composed of items sampled from all first year blocks. It quickly appeared that for a large majority of our students this new requirement was the binding one. Hence we in fact changed the assessment system having a Progress Test with a relative norm, formulated in terms of a moving average of test scores, into a system with an absolute norm for a single specific test: the last Progress Test of the year.

Further changes were also made. In the medical school, the domain of 'common knowledge' is quite important when compared to the specific knowledge for one specialisation within the medical school. When we consult our doctor, or we find ourselves in a sickbed, we expect the doctor to be an all-round professional, being able to discriminate between the
symptoms of pneumonia and bronchitis, and also being competent to recognize a concussion. In contrast, we don’t expect a political economist to be a good advisor in labour conflicts, nor do we expect an econometrician to be a good negotiator on export contracts. Implicit in this difference of expectations is the view, that the cognitive domain of an economic faculty is much more diverse than that of a medical school. Examining the role of a general economist, econometrician or business student, the common knowledge they share is a much smaller domain than the specific knowledge we expect them to master. To account for so many diverging specialisations as one typically finds in the study of economics, we had to introduce several different Progress Tests, one for each specialisation.

The several reforms necessary to adapt the Progress Test to the context relevant for the economic faculty resulted in a drastic change of the assessment system. Even so, we were not satisfied with the new system, and especially not with the scoring model in relation with the item format. Repeatedly we found as one of the conclusions of evaluations of the tests, that the tests (or at least a large portion of the items composing the test), were not fair for students with partial knowledge. This circumstance, discussed in more detail in Tempelaar (1997), was the last drop that made the cup run over.

The rather complex assessment system, the technical scoring problems mentioned above, and the feelings that the format of fixed-response items were not suited for measuring problem-solving skills, all together led to the decision to abolish the Progress Test, and choose as a substitute the OverAll Test.

7. THE OVERALL TEST

In the current assessment system of Maastricht’s economic faculty, two separate tests are used to measure different cognitive performances within the same domain. Using Bloom’s taxonomy, the Knowledge Test has as its primary aim to test the level of knowledge and comprehension, whereas the objectives of the OverAll Test are the levels of application, analysis, synthesis, and evaluation. Further objectives of the OverAll Test are to measure student’s problem solving skills, and her or his competencies in scientific reasoning. In short, the OverAll Test measures the creative competencies of the students, whereas the Knowledge Test mainly tests the reproductive competencies of the student. Alternatively, using the taxonomy of Osterlind & Merz (1994), the Knowledge Test is designed to measure the levels of factual recall and interpretative reasoning within the dimension of reasoning competency and the continuum of cognition of convergent
thinking; the OverAll Test aims instead at both convergent and divergent thinking, and the reasoning levels of analytical and predictive reasoning. For that reason, many of the objectives of the OverAll Test can be recognised in terms of 'performance assessment' and 'authentic assessment'.

It is clearly difficult to provoke creativity, especially under the conditions that are typical for an examination: many students are gathered into a large sports hall, competing not only for high scores, but also for nervousness. In the circumstances even the execution of a routine action is rather awkward. To avoid the negative impact of these unattractive conditions, and to allow for an extension in time of the creative moment, the items of the OverAll Test are all based on scientific articles that are distributed among the students two weeks before the examination takes place. Together with study guidelines, they form an important guide for the questions the students can expect in the exam. The combination of articles, study guidelines, a two-weeks preparation period without any other duty, and the open-book character of the test, create strong resemblance to a take-home exam. The important difference is the better guarantee we get on the intellectual ownership of the answers the students give. Although the study guidelines are an important guide to the questions, the questions themselves are not revealed in advance, which greatly reduces the risk of unwanted forms of co-operation.

The OverAll Test consists of both fixed-response format items (true/false items) and items with constructed-response or essay format. The latter format is most important both with regard to the contribution to the total score the students can achieve, and with regard to the time available. Since the discussion on the pro's and cons of using constructed-response or essay format items does not seem to be conclusive, we performed a factor analysis on all the item scores. The outcome was surprising, in the context of previous surveys reported in several journals (see e.g. Walstad & Becker, 1994). Two different factors were found, in contrast to one latent factor found in most other tests of our assessment system, such as the Knowledge Test, and also to most other studies. The true/false items were primarily loading at the first factor, almost without exception. At the other side, the essay items were loading on both factors. What did this fact prove? Although we cannot be entirely sure, it is tempting to formulate the following conjecture: the first factor represents the basic cognitive behaviours of knowledge and comprehension, whereas the second factor represents the hierarchically higher levels of application, synthesis, and evaluation. Without being able to formally test this conjecture, we were able to do some additional research. We added to the scores on the different items of the OverAll Tests the scores on the different items of the Knowledge Tests and again applied factor analysis to this enlarged data set.
The outcome of the factor analysis confirmed our conjecture or, more properly, did not falsify it: the items of the Knowledge Tests, all of them being of true/false format, did in fact load on the same factor as the true/false items in the OverAll Tests. This appears to indicate that in the context of an open-book test such as the OverAll Test consisting of items based on articles that the students can review in advance, constructed-response items and essay format items do measure different aspects of cognitive behaviour.

As a conclusion of this contribution, I will give some typical illustrations of the OverAll Test.

8. AN ACCOUNTING EXAMPLE OF THE OVERALL TEST

The greatest obstacle, and half the work, in constructing a high quality OverAll Test is to find a few fine articles on which the items can be based. Ideally, such articles are adopted from a scientific journal, to confront students at as early stage as possible with samples of scientific reasoning. Ideally, these articles demonstrate a multidisciplinary approach, since multidisciplinarity is an important objective of our educational system. Finally and most importantly, such articles guarantee that we reach the highest levels of knowledge command: those of genuine application and synthesis. Asking students to use their insights gathered within one domain such as finance and to apply them in another domain e.g. accounting, excludes any mere reproduction of knowledge.

It is probably no surprise to establish that these ideal articles are very scarce. Most contributions to scientific journals are rather specialised, far beyond the level of undergraduate students and of a monodisciplinary type. There are a few exceptions, and we find ourselves in a permanent quest after those exceptions.

A fine example of such an exception is Harold Bierman's "Extending the Usefulness of Accrual Accounting" (Bierman, 1988). It discusses accrual accounting earnings and cash flow types of measures in a range of activities, both of the management accounting and the financial accounting type. And, above all, it is a plea for the revaluation of the use of accrual earnings, against the growing dominance of cash flow projections: "... some analysts have given up on accrual accounting and concluded that cash flows are a more useful measure. ... The objective of this paper is not to fault the appropriate use of cash flow, but to take the position that accounting earnings is a very significant measure that deserves attention both by financial analysts and operating managers. A cash flow is not a near
substitute for an income statement." (Bierman, 1988, pp. 10-11). In the remainder of his paper, Bierman highlights important differences between the two quantities. Which gives us the opportunity to pose questions like:

- Give an example of a typical situation, in which you would prefer accruals above cash flow, and
- give an example of a typical situation, in which you would prefer cash flow above accruals.
- Under which conditions does the amount of cash flow diverge greatly from the amount of accruals?
- Sketch a situation in which cash flows and accruals coincide.
- Give arguments that support the following proposition: the distinction between accruals and cash flows is more important for management accounting purposes, than for financial accounting purposes.

9. AN MACROECONOMICS EXAMPLE OF THE OVERALL TEST

A second example is from macroeconomics and statistical modelling. In the box below you will find part of the text distributed to our students two weeks before, and at the examination.

**Article**


**Study guide**

The article of Stein, including the short comment of the well-known economist Mishkin, is published in the public information journal of one the American 'Federal Reserve Banks', St. Louis. Such journals mostly publish articles about monetary economics or the effectiveness of monetary policy as an instrument of macro-economic policy: the hobbyhorse of central banks. The level of those articles is somewhat lower than that of scientific journals, but still higher than undergraduate textbooks. Thus: this article is a tough one. As an aid, the most difficult paragraphs are left out or, in case of shorter parts, put between brackets. Those parts need not to be prepared. The remaining parts deserve conscious and repeated study. In the first place: try to understand the essence of the article and the methods used in it: during the test, questions will be posed on the main features and the correspondence (or lack of it) between the article and the textbook on macroeconomics by Mankiw. Besides that, this article will be used for the
questions regarding Quantitative Methods. So as a second objective of your preparation: take care you understand the methodological aspects of the paper (thereby omitting those paragraphs that elaborate on statistical techniques you haven't met in your course QM; also those paragraphs are put between brackets). Main focus of your preparation has to be the correspondence between the economic assumptions and the regression models.

One additional clarification is needed ... Finally: the correspondence between Stein's (and Mishkin's) contribution and Mankiw is the kernel of the preparation. What is the relationship of the 'two empirical facts', already mentioned in Stein's introduction, and the theory of Mankiw? How does Stein's phase-diagram relate to one, or perhaps several, of the models in Mankiw? And so on ... .

Test items
(C1)
From Mankiw we know that there are different ways to model expectations of inflation of economic subjects. Examples are adaptive expectations and rational expectations.

C1. \( t?\neg t \) Equation (5) (Stein, p. 182) is an example of an adaptive expectation.

C1. true Mankiw, p. 305, 310. See also Mishkin, p. 206.

O1.
The 'empirical facts' that form the fundament of the article, can be found in different parts of the article, including the first page. They are, fact 1: "We know that there is a long-run relationship between the ratio of Money/real GDP and the GDP deflator." (equation (a)). And fact 2: "It has been amply demonstrated by monetarists that neither the growth of M1 nor of M2 produces a stable and reliable relationship of the form (b) or (c)."

Assignment:
O1a. Give a theoretical explanation of fact 1. Make use of the theoretical models in Mankiw when giving this explanation.

O1b. Give a theoretical explanation of fact 2. Make again use of the theoretical models in Mankiw when giving this explanation. And since the author rejects fact 2: give an alternative relation that does succeed in explaining p.

O1c. Both facts refer to the same variables, to know the development of the price level (expressed as P or as p), and the development of the stock of money (expressed as M2 or as m). Give an characterisation of the differences between the 'fact 1'-relationship and the 'fact 2'-
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