

Implementing Project Oriented and Problem-Based Learning (POPBL) in institutions or sub-institutions

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ABSTRACT: In this article, the author presents the continuation of his research into the practicalities related to the implementation of a new educational model at an institution, sub-institution, school, department, etc, based on a project approach. The article is a part of an overall strategy of writing papers in a series called the *pieces of the puzzle* strategy. In this particular article, the author focuses on how an institution or sub-institution implements a new educational model based on a project approach. The author gives an example of a possible flow in the process of change; this flow is divided into three phases and a final state. To further support the implementation, the author advances a possible action plan related to the development of staff in their preparation to start a new educational approach. The basis for the article is the author's considerable experience as a facilitator of change at universities in many countries, and the empirical data gathered through this work is summarised in this article.

INTRODUCTION

When looking at situations in which an institution, sub-institution, school, department, etc, can consider introducing a new educational model based on contemporary teaching and learning methods, one of which is Project Oriented and Problem-Based Learning (POPBL), it most likely faces many questions on how to actually handle it. Such organisational entities often seek help in finding answers to the most up-front questions; there may also be a touch of anxiety and uncertainty in that questioning as well.

The acronym POPBL is used in this article to indicate that students' work is not merely based on a problem, but based on a wider project orientation approach that includes project work within a theme area. This, in turn, involves more than one content line and generic abilities, with the focus being primarily on developing transferable competences.

The author now gives an example of what a possible approach may look like. The reason for entering this area via a practical approach is because the author, in his role as facilitator of change for institutions worldwide, has gained considerable experience in the processes of change, as well as having headed the School of Basic Studies of Science and Engineering at Aalborg University, Aalborg, Denmark, for almost ten years. His experiences also rely on his position as Vice Director of the *UICEE Centre for Problem-Based Learning (UCPBL)*, a satellite centre of the UNESCO International Centre for Engineering Education (UICEE) where he is responsible for the UCPBL International Consultancy Programme.

This article is one of a series based on the practical aspects of implementing PBL/POPBL and forms part of an overall *pieces of the puzzle* strategy, which relies on gathering theoretical information and empirical data, and presenting it to individuals, as well as institutions or sub-institutions, as support for their

investigations and efforts in introducing a new educational model.

SOME OVERALL COMMENTS

Generating changes in organisations in general involves establishing a new culture. Moreover, changing a well-established educational culture into a completely new one is a big challenge. For any facilitator of change – internal or external – it is important to tune oneself in culturally for the job in order to participate in generating the required change. If the facilitators of change are rejected because of a lack of understanding of the existing culture, any help or assistance will not be of any value, as they are not trusted or the staff do not believe them. The author calls this a lack of cultural alignment.

It is also important to be aware that the reasons for institutions to initiate changes can diverge a lot and there are probably no two identical reasons and designs. This statement is even valid inside an institution between different programmes or different departments. This fact should also be recognised when designing a change process, as the outcome should be a unique model to match the exact situation at the institution or sub-institution in question.

Finally, it is important to have students' participation taken into consideration at a very early stage of the process, as they can contribute significantly to the later implementation as active partners.

AN EXAMPLE OF AN OVERALL PLAN

Trice and Beyer investigated the implementation process in organisations and found that *Every stage of any change process carries the hazard of omission, abandonment, or return to an earlier stage* [1]. This sentence indicates that making a change

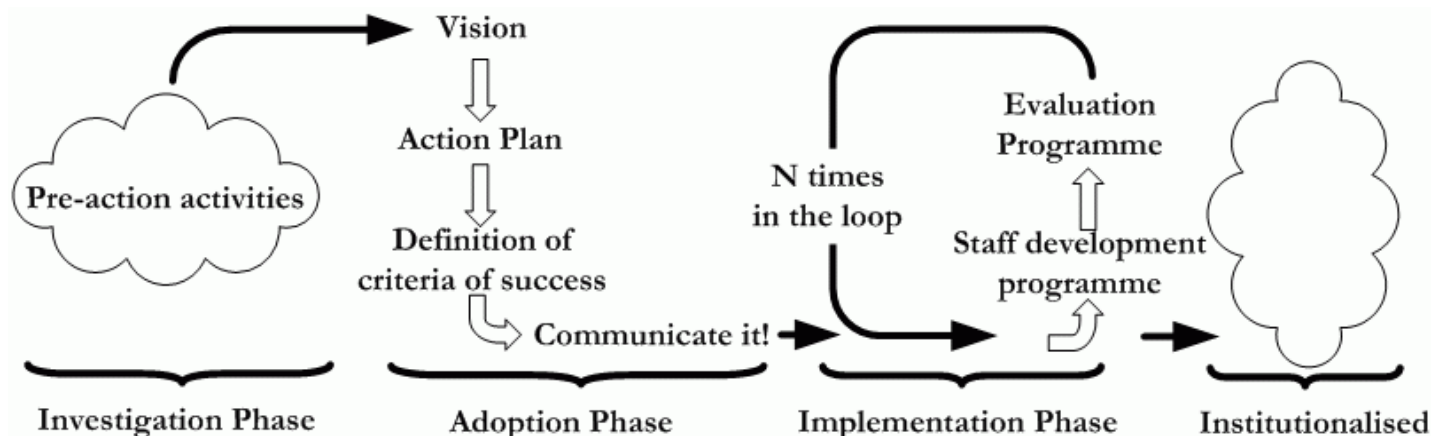


Figure 1: The four-phase implementation flow diagram.

is not easy and that in order to create a lasting change, people have to adopt the ideas and actually live by them in order to create a possible *lasting* change. Otherwise, people tend to fall back into their old routines.

Based on change studies of American organisations, Trice and Beyer point out that *Initial acceptance and enthusiasm are insufficient to carry change forward* [1]. They operate with a simplified model that consists of the following three steps:

- Adoption;
- Implementation;
- Institutionalisation.

Adoption is related to the decision-making process on making a change. Implementation covers the activities necessary to be able to make the desired change(s) happen. Institutionalisation occurs when the change process is in a lasting steady state and where the desired new *culture* at the institution is actually established.

In the three-step model described above, there is a noteworthy omission: what happens before entering the adoption phase? Further, what are the characteristic activities within each phase? In order to answer these questions, the author has developed a new four-phase model of implementation.

Figure 1 compensates for the above-mentioned omissions and introduces an *Investigation Phase* prior to the *Adoption Phase*. At the end, the bulky cloud illustrates the *Institutional State* that succeeds the *Implementation Phase*. The total flow is presented in the extended form in terms of phases, being four elements, in some cases with additional sub-elements, namely:

- Investigation phase:
 - Pre-action activities;
- Adoption phase:
 - Formulation of the *vision*;
 - Defining the criteria of success;
 - Communication of the results;
- Implementation phase:
 - Staff development programme;
 - Evaluation programme;
- Institutionalised state.

The latter has been named *state* instead of *phase*, as it is the outcome (as imagined by the organisation's senior management at the time that they launched the process), whereas the previous phases have been stages or transitional steps towards this final state.

The reason for the vagueness regarding the institutionalised state, as illustrated by the empty bulky cloud to the right of Figure 1, is that the process of change runs for many years. Five to ten years is a realistic period to expect before reaching that state – if ever. Furthermore, the author does not believe that any institution would wish to reach a certain state, and then just settle in there – they will hopefully wish to move on.

Many factors may influence the process in the time-span from launching the programme to the point when the change can be documented in the attitudes and behaviour of staff and students, which reflects that the change has actually been implemented and thus having reached the institutionalised state. These can be influences that have been exerted from the *inside* by staff and students, as well as influences from the *outside*. Thus, the final image of that institutional state might be somewhat different when compared with the image imagined when the senior management initially launched the process.

The phrase *if ever*, used earlier, should not cause concern. It does not necessarily mean accepting a possible failure in the design or failure in the implementation itself. In the time-span between adoption and implementation, and until the institution or sub-institution develops into the institutional state, the staff involved develop, as do societal needs, desires and responses. An ever-changing world calls for *aligned teaching and learning institutions* (alignment in educational design is described by, for example, Gibbs [2]). Thus, the organisation always needs to reformulate its vision and its image of the institutionalised *steady-state* situation to match developments. They are forced to carry this out *incrementally* to satisfy altered needs and desires. Because of these adjustments, the outcome (in the form of an institutionalised state) may vary considerably compared with the image set out in the adoption phase from perhaps 10 years earlier. As a consequence, this situation should not be seen as a token of bad planning or bad design. Instead, it indicates that the organisation is capable of development as environments change.

THE INVESTIGATION PHASE

For some reason, it is commonly perceived – even accepted – that any decision to generate change is a top-down decision. In

some aspects, this is true, but definitely not in *all* aspects. A top-down decision is a powerful way to *force* a change through; however, it may be short-lived if the staff do not accept it. Nevertheless, it is the responsibility of senior management to initiate and lead the change process by deciding and identifying the direction to be taken. This direction needs to be consistent with the institutional vision. Other issues, such as the time to be allocated to the change project, its main structure, etc, can be sensibly and generally described as well. Ultimately, it is the responsibility of senior management to initiate it, as they are the ones responsible in the end. Therefore, this latter aspect is a radical top-down decision.

As in any organisation, senior management will be effective if they have strong alliances with staff at various levels in the organisation, who will – and can – implement the determined policy. Just as any forceful top-down decision is not likely to succeed, so also any bottom-up approach is not likely to succeed on its own in effecting changes either. Unless, of course, it is a revolution – which is rare in the modern world – staff also need the support of senior management to make their plan work. Consequently, if there is an alliance between senior management and enthusiasts at the grass-roots level, both parties relying on each other's support, then change can actually occur dynamically. Figure 2 illustrates the relationship situation for these two levels. By joining forces, change can – and most likely will – happen.

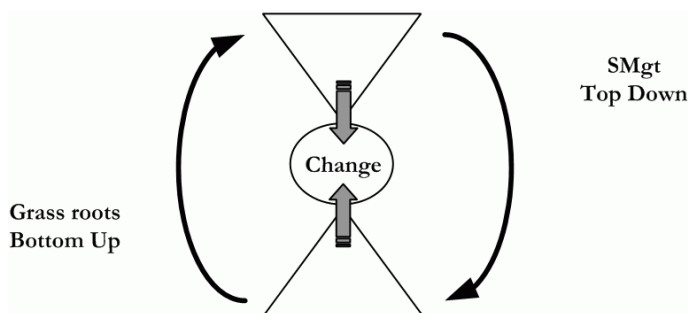


Figure 2: The senior management/grass-roots change initiation circle.

It is open to discussion which of the levels is – or needs to be – the initiators. Perhaps it is best if that question is never really answered, and when those involved are not concerned that it should be answered. In some of the most effective educational developments, it may be hard to tell who is initiating the process, even if over time this may lead to considerations for change at the senior management level. It is most likely that development happens through a combination of initiatives. Dialogue may go on for a longer period in informal circles, before change becomes an official institutional topic for discussion. Such dialogue can go on at different levels and, when people from these different levels come together in informal situations, discussion can bridge these levels. The dialogue might then develop into semi-official meetings before becoming an official topic at the institution or sub-institution. In such conditions, it is often difficult for those involved to allocate credit for the responsibility for leading ideas – simply feeling collectively that *we* did this, or *we* decided.

However, there is a risk that intermediate academic directors, who are the leaders in the midst of it all, may be the ones who are left behind or marginalised in the *discussion* process. They may feel, rightly, that they are told from the top what to do or

that they are forced from the grass-roots to do what *they* want – or even both of these options. Therefore, it is extremely important to involve academic directors in the process from the beginning so that they become active pro-change agents, instead of employees who just work to instructions. The top-down decision should be discussed and even refined with the aid of academic directors, who should then feel ownership of the refined version; then, in parallel with these discussions, a programme can be initiated in which these teachers are a part.

The descriptions made so far seem to rely on an approach that reflects the author's cultural base. This is true in one sense. Although different cultures may have different approaches, the pre-activity phase remains relevant and needs to be addressed. Even though the formulation of the vision is in a form of a radical top-down decision, it is still most likely to be based on reflections and discussions. Even a radical top-down decision can be followed by activities that bear the characteristics of those described in the pre-activity phase. The time at which the vision is formulated can vary, depending upon the cultural setting, but in order to have a successful change, it is the author's opinion that the discussions described in the pre-activity phase are needed before the work enters the formal phase and people are personally committed to it. With reference to Figure 1, the time for a top-down determined vision in different cultural settings can be moved to the left and into the area of pre-activities.

THE ADOPTION PHASE

Moving away from the pre-action activities and into the adoption phase also indicates a change in the seriousness of, or commitment to, the work. In the pre-activity phase, the work carried out is informal and does not commit those people participating in the discussions. However, as illustrated in Figure 1, the situation changes upon entering the adoption phase where it becomes more formal. From this point forward, the work demands commitment to, and from, all parties involved.

In the opinion of the author, the first thing to address is to focus on the vision, which is the key for the work that follows. Here, any planner faces the classical dilemma that important decisions have to be made at a point in the process where the knowledge of what is to be done is limited. As a consequence, it is wise to look at the formulation of the vision as an iterative process. This iteration process is one of the characteristic reiterative activities in the adoption phase.

THE VISION

In the author's opinion, the *vision* is the key to a successful change process. It can be the overall vision for the entire institution, but it can just as well be the vision for a sub-institution, school, department, programme, etc. Senge deals with the vision intensively in his book, *The Fifth Discipline* [3]. He states the following:

Today, vision is a familiar concept in cooperation leadership. But when you look carefully you find that most visions are one person's (or one group's) vision imposed on an organization. Such visions, at best, command compliance – not commitment. A shared vision is a vision that many people are truly committed to, because it reflects their own personal vision [3].

Senge asks the question, *How can a commitment to the long term be fostered?* The answer is, perhaps, given in the text later on the same page, because he says, *It may simply not be possible to convince human beings rationally to make a long-term view. People do not focus on the long term because they have to, but because they want to* [3].

The key then is to create a vision that people can commit themselves to, and what a better way to do this than involving the people who naturally are the ones carrying it out later on in the process? This implication was discussed in the previous section, and this line of thinking has led the author to develop the models to follow.

The author has developed a vertical staff development model, and used it successfully over the last couple of years in international workshops. This is an approach whereby the vision is the driving force. Academic directors and selected key teachers work together in forming the master structure and the learning outcomes, eg for a programme in a department. This has the advantage of establishing a vertical line of communication between the two levels, along which reactions and suggestions flow in both directions. Thus, those concerned collectively form the platform for making the actual change later on in the process.

The decision as to which level (see [4]) the department wishes to be anchored to (which complexity of project work or project model) is taken upfront and as a joint and socially interactive activity, and not as a random result based on the developments decided by individual staff members.

Figure 3 illustrates how academic directors work together with central teachers selected from among the total teaching staff establishment. During the workshop, the participants create a vertical line of communication and so, throughout the process, the two levels take the characteristics, tasks and job contents at both levels into account. In this way, the final product will potentially be of a high quality and permanence, as it is has been derived on the basis of collective efforts that are formed through numerous discussions before reaching consensus for the new model and its details.

... we totally lacked support from senior management ... There was a willingness to set it (the BPR programme) up in the first place, but after that it was never seriously on the agenda [5].

The above example is taken from Business Process Re-engineering (BPR), which is used at a number of UK Higher Education Institutions (HEIs) as a change management strategy. While the focus of these HEIs is on re-engineering administrative services, there are also tentative attempts to redesign teaching and learning. Allen and Fifield adopted a case study approach to determine the applicability of BPR to HEIs [5].

When talking about project-based education, there is a wide variety of interpretations regarding what this actually means when moving away from the theoretical world into the practical world of actual implementation. Because of this, educational developers and institutions often find it necessary to add an additional letter or letters to express the variety of project approaches with different objectives, possibilities, conditions and resources. In order to be able to discuss and work towards the formulated goals, there needs to be a common understanding regarding which variant of project-use or project involvement the organisation is aiming for, and what the consequences are.

In workshops for training executives, academic directors or teachers, the author has worked with a three-level model for describing and discussing types of change. These three levels are as follows:

- The personal level (PBL);
- The system or group level (PBL → POPBL);
- The institutional level (POPBL).

A more detailed description of these three levels and the more significant implications can be found in ref. [4], although a summary is provided here.

The first level, the *personal level*, indicates that any change comes from within, for example, when a project can be attached directly to a course and can be done without anyone else needing to know about it. This situation is not uncommon in the *pre-action* period and may even generate the cause for generating greater change later on. Even though the course itself is moderated, *normal* practice is not changed. It is characterised by being a single performance by the teacher and the examination form is generally not changed. It is a *personal* situation.

The next level in this model is the *system or group level*. The major difference here is a change of culture because the project now forms around two or more courses. At this level, changes in the objectives, as well as in the teaching and learning methods, are likely as well. There is also likely to be some minor changes in the way that examinations are carried out. Changes in the organisation will be noticeable and, at this level, some institutions even begin to formalise the approach for the new educational model.

The final level – the *institutional level* – is when the institution or sub-institution has changed entirely to incorporate the new educational model. This level is characterised by a complete change in culture, as well as the teaching and learning approaches.

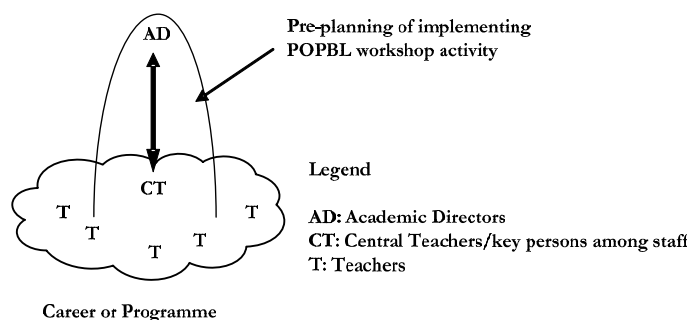


Figure 3: The vertically aligned staff development model.

Regarding the role of senior management, it is very important – even essential – that they constantly follow their own initiative by supporting all groups of staff in their work, and follow the philosophy (vision) themselves. Figure 4 (shown later) does not show much activity by senior management, but this is because they *should not* need to be told how to act in a programme that they launched themselves. However, this is not always the situation, as the following statement clearly expresses; and this is unfortunately not unique. This situation tends to be normal, rather than exceptional:

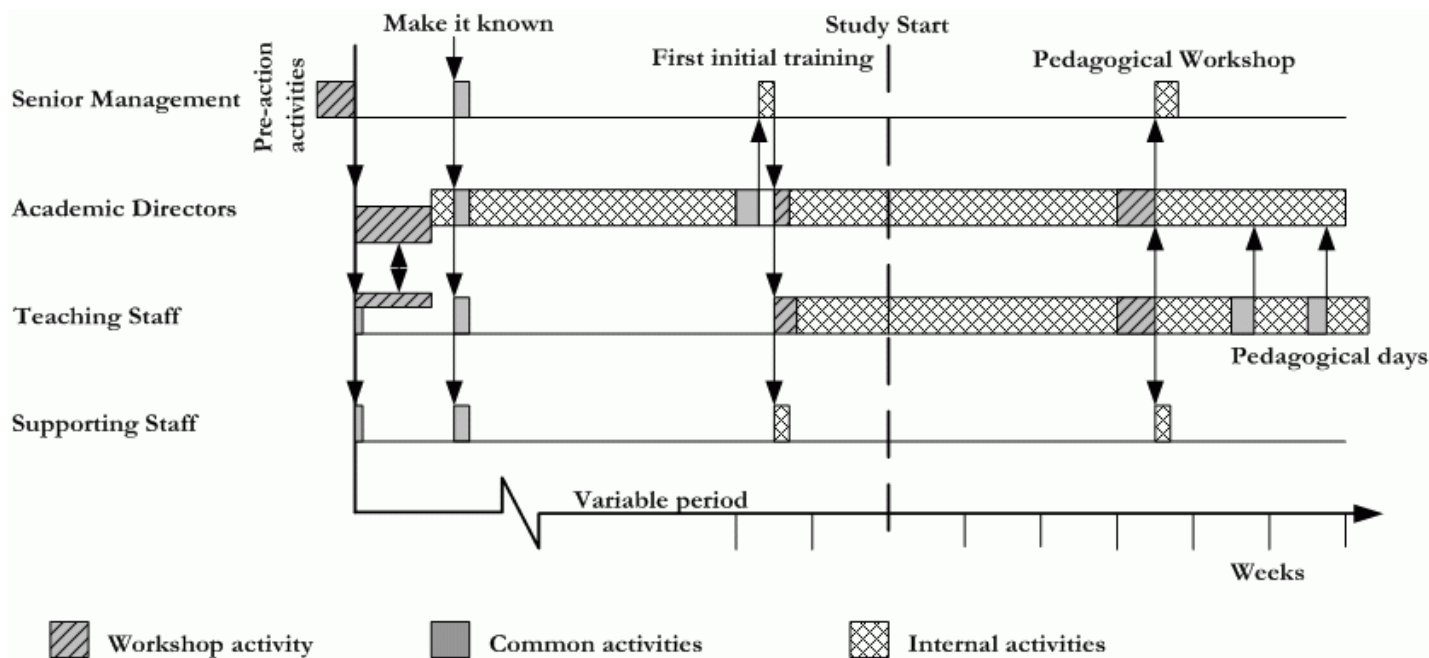


Figure 4: An example of a staff development plan.

It is further characterised by a high degree of student participation in the planning of the education and different study programmes. The teaching and learning at this level is typically cross-disciplinary or interdisciplinary and is experience-based. The design is mainly about generic abilities with the focus being primarily on developing transferable competences.

THE ACTION PLAN

Teachers and supervisors who have participated in the first run of the new programme will generally need pedagogical training. When Campus Esbjerg, Denmark, enrolled in 1995 under the colours of the Aalborg system, various pedagogical workshops and seminars were conducted before the first cohort of students arrived. However, the training did not seem to have the desired effect. Even though much time and effort was put in, staff did not seem to entirely understand what was told (the sessions were more like a series of lectures that did not give them a chance to *experience* the model themselves). The pedagogical training sessions held after they had started teaching under new educational model turned out to be much more constructive. Besides asking trainers to repeat almost all that they had been told previously, they also had many highly valuable questions and comments. The reason for this was that by *this* time, the staff actually had a *base of reference* and had gained *experience*. They sought answers to their questions and wished to learn more about what was behind the theoretical background.

The reason for this change in attitude was that, prior to starting with the new model, they lacked experience or reference points in the new model; thus, the training had little effect because the training was *not real* for them. It was a waste of time and money to give such *deep* training sessions at this time. The effect was too small.

After this additional guidance, which was further based on experiences from training staff internationally, the author changed the set-up into the model shown in Figure 4. The philosophy now is to offer short *need-to-know* sessions on the practicalities they *need* to know before they start teaching the

new cohort of students. This introduction is limited to a one-day or two-day workshop. Teachers need to know how to start with the project groups, how to run the first supervisory sessions, how to make students work by defining their project, their learning goals, their team behaviours, etc. A lot of *practical* information is delivered. Furthermore, this reduces most of the anxiety for staff. The workshop is recommended to be run approximately for two weeks before the studies commence, depending upon the course.

The second pedagogical workshop is a longer workshop arranged approximately four to five weeks after the studies has begun. At this time, participants are *motivated* to learn more and they are, in fact, becoming active learners. Moreover, they are experienced supervisors! They like to know more, they seek to discuss their experiences and problems they have encountered – even potential problems – come up with new ideas, etc. On top of this, they begin to form a type of social coherence out of having common problems or challenges. This is very valuable for the further development of the supervisor teams.

The *new strategy* is to recommend a two-step pedagogical plan, as follows:

1. A short two-day workshop giving practical information primarily on the practicalities needed to start the new students in their work;
2. A three or four-day workshop where the topics are pedagogical issues and the programme delves into theoretical backgrounds. The target is to establish discussion forums where supervisors exchange experiences and develop their involvement further.

This approach has been recently successfully tested in training sessions in Copenhagen in 2005 related to establishing a new campus for Aalborg University in Copenhagen, Denmark.

THE STAFF DEVELOPMENT PLAN IN DETAIL

The set-up in Figure 4 is clear regarding the distinctions between what the foreseen activities are, with assistance from

the outside, and those activities also anticipated and carried out with internal resources and as collective assemblies, as social constructions to facilitate team building, etc.

Figure 4 is an example of a *possible* set-up for a staff development plan, which further serves as an example of an action plan for presentation to staff to communicate the new educational model.

The training plan is initiated with a start-up seminar, which includes a general presentation of the total structure of the plan for all staff at the university, to explain what is going to happen and initiate a workshop for senior management. During the workshop, senior management can gain hands-on experience of some of the problems related to the new educational model, with a special focus on managerial and executive problems; they will also work on developing a vision for the institution as the platform for the rest of the planning tasks. In this process, they can gain a *deeper understanding* for the work that is to be carried out by their staff and, as such, become active supporters in the change process as they are now familiar with the most common and general problems to be dealt with by academic directors, teachers and support staff later on in the process.

When the executives' work is ended, the result is handed over as the platform for further work by the academic directors, who are also expected to undergo hands-on training. However, the focus this time is more on developing a main structure of the education and to develop a curriculum that complies with the objectives stated in the vision.

The outcome of the workshop for academic directors and key teachers is detailed in a (pre-)master plan that forms the basis from which teachers can work.

In the author's experience, it is a good idea to plan the workshop for academic directors and key teachers as a *pre-planning change workshop*, as these participants will be able to deal with the various problems related to POPBL-planning in a controlled and guided environment, and the outcome can be considered as training for the *actual planning activity* afterwards. The benefit of this approach is that the participants have been involved with all the elements in the process and can discuss the pros and cons of any decision they have to make. They have further developed and tested different possible change models and discussed those with their colleagues. These experiences are transferable to the actual planning and, hopefully, there will be no unidentified – although maybe unresolved – problems after the training through the pre-planning workshop. On top of that, it is a splendid activity to create the beginnings of a change culture, and create a common understanding of the objectives and the complete work ahead, and to establish a socially coherent team.

Teachers need to have basic initial training on what they are venturing into. A training session over a few days should be conducted a couple of weeks before they start teaching their students. This should be followed by a main workshop, typically three to four weeks into the process. In the author's experience, this is the best way to initiate new teachers with the new method. Following this line of thinking for staff development programmes, it is recommended that formal pedagogical meetings be established with teachers as they progress so as to make room for the exchange of experiences and provide additional theoretical information when they actually need it.

In parallel to the teacher development programme, it is important not to neglect the less formal training of the support staff. They need to obtain relevant information, as they too are gaining more experience and have questions to be answered as well as the teachers. They also need to be supported in the process at the best possible level. They need information on their progress and feedback on their support, plus further background information as *they* go along. This will make it easier to facilitate a cooperative interaction between teachers and support staff for students' project work, where support staff are an important group of people.

In Figure 4, the arrows pointing upwards are very important, as they describe the spread of information and experience as *upwards* so that academic directors and senior management can follow the process and so academic directors can adjust their planning as the process is running and experience is fed back to them. Sessions with academic directors and key teachers have to be formalised, as well as other training activities.

SUCCESS CRITERIA

In Figure 1, the sub-element, *Defining criteria of success*, is important to bring about a successful adoption by the staff. This is not about the overall criteria of success as it relates to the evaluation programme, but is merely limited to defining the criteria of success for those staff involved in the process. Too often, staff involved in a change process work without any point of reference as to whether they are doing well or not. Moreover, there is an anxiety about *what* is actually expected of them and at which *time* in the process this is expected to happen. By answering these questions, staff are able to prepare and plan for entering the process and be more confident with the role they are foreseen to play in the process.

The action plan, of which Figure 4 can form a part, should, as a minimum, include a list of activities in which the teacher is expected to participate, as well as a time schedule showing at what time these activities will take place and the total workload entailed in following the activities. This is a very simple but necessary activity for those persons who will later communicate the plan. Moreover, staff have good reasons to ask for what is expected of them and planners better have answers if they aim to be successful in having their planning adopted.

An aspect often neglected is the question *What is in it for me?* In the academic tradition, teaching is often regarded as an activity that is additional to the *real* work, which is the research and publication of papers. Publication and research is traditionally the only measure academics can rely on when hoping for benefits for themselves in the form of higher wages or better positions within the organisation. This is also what senior management rely on when looking at promotions, wage rises, etc. Teaching is (normally) a low-ranked activity at most institutions. If senior management does not give any credit to those entering the teaching programme and to those who carry a heavy burden in planning and securing its implementation, then staff who seek these positions will not be undertaking it as a career move.

If senior management decides that working in the pedagogical field by introducing a new educational model and being involved in the planning and implementation can bring personal rewards, it will be a great advantage. If staff are confident that these activities will be given weight when

seeking new positions or applying for a wage rise, it makes sense for them to enter the programme and engage in high quality work. In this way, there is a personal enticement for staff to become involved; and this can create content staff and generate change agents, rather than disappointed teachers working by instruction.

COMMUNICATION OF THE PLANNING

Topics that have been addressed so far have all been related to the investigation phase and the adoption phase. The final and most crucial part of the adoption phase is to make the planning known to all at the institution or sub-institution. If the planning part, including the vision, action plan and success criteria are well designed and rely on activities in the pre-action activities phase, then a majority of staff, hopefully, will genuinely adopt the ideas and work by them. However, the author wishes once again to underline that senior management and other leaders have to live by the plan themselves as role models if they are to have any hope for success.

After this phase, the organisation enters the actual implementation phase, which represents hard work. However, since the structure has now been designed, it is a less stressful period at the academic directors' level, but certainly not for those teachers working on the actual implementation. However, it is not the aim of this paper to go further into detail, other than what has already been described previously under the staff development plan section.

THE IMPLEMENTATION PHASE

The implementation phase is, in some ways, a relatively calm period, yet also a period where many things are happening in the organisation. The training of staff is ongoing, and several turns in the loop shown in Figure 1 are performed. The author has described this process of change in staff behaviours in more details in ref. [4], so this aspect of change is, therefore, not described in this article. However, the overall strategy and planning is over and the academic directors are back into their normal routines overseeing the process and making corrections according to the results of the evaluations.

The staff development plan is described in the previous section on action plans. Continued staff development follows the same philosophy as the development for the first group of teachers and supervisors. However, as described in ref. [4], it will become increasingly challenging to train staff in the later part of an implementation, as more resistance may be anticipated. Not all staff will be as enthusiastic as the first group of staff, who had a greater desire for change.

THE EVALUATION PLAN

It is not within the limits of this article to describe a detailed evaluation plan. However, in general, it is recommended that the evaluation plan is based on pre-formulated goals to identify to what degree they have been fulfilled. In addition to this, the evaluation plan also has to include measuring the new system against the old system, as this will surely be one of the questions asked during, and after, the change, and will be central in the judgement of the new system from the inside and outside.

However, it is not easy to evaluate a POPBL educational model directly against a traditional education system, as the

objectives, goals, methods and means are different in the two situations. However, as examples of personally experienced evaluation benchmarks, the author can give the following examples:

- The rate of pass/non-pass or level of grades must not be poorer than in the *old* system;
- Students' evaluations must not be less satisfactory compared to the old system (but be prepared to get more complaints in the first period of the change process! – it is to be expected);
- The evaluation of teachers' performance must not be less positive compared to the old system;
- The dropout rate must not exceed that under the old system;
- The number of students enrolling for the programme must not be less than under the old system and not relatively lower compared with other similar institutions;
- The alumni must gain employment at a rate not lower than under the old system, and in comparison with those of other similar universities;
- The alumni must not lose jobs more frequently compared with alumni from the old system and alumni from other similar universities;
- The satisfaction level of employers must not decrease compared with the old system;

These are just a few examples and more examples with a different approach can still be formulated.

For those who would like to look further into material on evaluations of a project-based education, *The Aalborg Experiment* gives detailed information supported by data material [6].

A survey conducted by the Danish Engineering Society's newspaper, *Ingeniøren (The Engineer)*, made a comparison in March 2004 between Aalborg University (AAU) and the Technical University of Denmark (DTU), both in Denmark, where the AAU is considered a project teaching University and the DTU is considered a traditional teaching university [7]. Regarding the question of how employers evaluated students' qualifications, the response for *good* and *very good* judgements on *Project and staff management* for the AAU approximated 40% and the DTU about 8%. Concerning the question *Engineering competences and technical competences*, the answers were for the AAU about 85% and the DTU about 84%. This shows that regarding technical and engineering issues, the two educational systems are comparable, but in addition to the technical competences, the AAU programme clearly generates additional competences developed mainly because of the project approach [7].

MERGING THE ELEMENTS

It would be tempting to begin to combine the information given in this article to present a complete and ready-to-follow plan. However, in the experience of the author, generating such a plan will not be possible, as the conditions for the plan's design and later implementation would be so varied that it would risk creating a lot of confusion, rather than being of any help in the change process. Planning is an activity that should be designed *on location* to match local needs.

Instead, the author recommends that interested institutions use this article and some of the references as a tool or inspiration to

initiate analysis and considerations for a change towards a new educational model.

As an example on how a POPBL education *can* be structured, the author has made a detailed description on the structure and content of the first year programme at Aalborg University [8]. That article presents how the training in, and the development of, personal skills and abilities, as well as contextual issues, is integrated as a part of the education programme and project work.

THE INSTITUTIONAL STATE

This is the final state of the change process and the product of a long process from the first steps in the pre-activity phase via the adoption phase and the implementation phase. This is the final goal for senior management when they set out the process. As stated previously, the end result may not look *exactly* like the image they had in mind when launching events years before, but hopefully the overall result matches their vision and the outcomes have been beneficial to all.

Having reached this final stage should not lead the institution or sub-institution to rest in their efforts to make improvements and developments. During the more than 30 years that the project model has been in service at Aalborg University, the model has undergone a constant series of changes. However, even if there have been many changes, the overall philosophy is intact and staff are still consider the overall vision as part of their personal vision. However, the process never ends, as new teachers entering the system need to be trained concerning the model and the *old boys* need a brush-up periodically, so the general model in Figure 1 – the implementation phase – is still ongoing. It is only now that staff development has been institutionalised and is operated by a special pedagogical department established within the University [9].

CLOSING REMARKS

It is important to mention that the model presented in this article is *one way* in the process of making changes. There are *other ways* as well. However, the model presented in this article has the advantage of having been genuinely tested in real settings, and thus carries weight when compared to those of other models, which have yet to be tested.

The development of the models is widely based on the author's experience gained from conducting workshops and from

facilitating change processes at institutions or sub-institutions worldwide and, thus, has been tested in practice. However, this does not mean that the models can be transferred directly to an institution, as these may have other conditions that need to be taken into consideration when planning a change process. Nevertheless, the philosophy of POPBL and the main ideas on how to structure a change process in practice can generally be transferred to almost any institutions.

It is the author's hope that some of the topics discussed in this article may serve as inspiration and possible help for strategic considerations at those institutions or sub-institutions that are considering making a change in their educational model towards a POPBL based teaching and learning model.

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