From User Training to In-Service Support

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Abstract: User training courses are considered a necessary component in the implementation of information systems. Training is considered to develop user competence to ensure the system is effectively utilised in the organisational context. Training is often supplemented with a phone or e-mail hot-line to help solve glitches not covered by the trainer. Research has shown that this has not always been an adequate solution. The case studied here had also adopted the courses and go strategy, which had led to poor results. An action research effort was made to improve user competence by conducting both courses and in-service support. While the courses had mixed results, courses plus monthly support yielded improvements in organisational performance. Contrastingly, performance did not change in health units that were not provided with training. The findings indicate that initial, interactive training sessions in small groups followed by support provided regularly, embedded in the normal supervision provided by managers or others is likely to improve organisational performance.

Keywords: Learning use of computers, MIS, courses, supervision, evaluation of training

1. Introduction

While user training in courses has been regarded as a normal part of the implementation of an information system in an organisation, studies have shown that courses may fail due to users giving priorities to other tasks than attending courses [1]. In a US state agency, the majority of users chose not to show up even if they had signed up for the courses. In conducting courses in the health sector in Southern Africa, the health staff would often skip scheduled training sessions because they had to see patients, and training in a new system is seen as an additional burden to health workers who were already squeezed for time [2].

Teaching taking place in schools, formal education and courses that are located outside of the work place can bring the learners' attention to concepts, principles and theories which can be useful in their work and which require comprehensive explanations from teachers in a quiet setting. On the job support give little opportunities for learning basic, scientific material. Research on in-service training in the educational system shows that in general, courses providing theory should precede on the job supervision, but that the majority of course participants need support after formal training has ended in order to master new skills [3].

A study of the effect of training for a health management information system in South Africa demonstrated that while courses were well received, training did not result in change in practice [4]. Williamson [4], points to the need for follow-up and support from local managers for health staff to learn the new Health Management Information System.

2.   Objectives

This study aimed at finding a way to carry out training and support such that users changed their practice subsequently. It is limited to in-service training, meaning educational activities that aim at boosting organisational learning for a specific organisation. Education offered to individuals in IT training schools is not considered.

    A review of relevant literature follows. The methodology of action research is presented in section 4. Thereafter, the interventions and results are presented for two levels in the organisation studied, the basic units of clinics in section 5 and the middle level of districts in section 6. Conclusions and implications are drawn in section 7.

3.   Learning in Organisations

Organisations can learn through discussions of daily routines, by hiring staff with new qualifications and in a multitude of other ways.

3.1.   Evaluation

Kirkpatrick [5] proposed four levels of evaluating in-service training. The first level evaluates reaction to training by focusing on the way course design, structure, content and presentation can influence trainee motivation for and interest in the learning process. Evaluation of learning is in the second level where knowledge, skills and attitudes are evaluated. The third level evaluates behavioural change, and it aims at determining whether participants apply the new knowledge and skills gained in training in their daily activities. Training result and outcomes are evaluated in the forth level to determine changes in organizational performance [6].

    Since the aim of this research is to find ways of changing practice in the organisations, evaluation at levels three or four is necessary. While changes in practice may happen regardless of training, evaluation at the two lower levels is included in order to establish the possible causal relation between training and change of practice.

3.2.   Training in Africa

Olowu and Adamolekun [7] argue that, in most African countries, training infrastructures were put in place to develop skills in the public sector but "training has had a rather limited impact, quantitatively or qualitatively". Quantitatively, only a small percentage of African public servants are exposed to any training and qualitatively, with the exception of a few outstanding cases, training as currently practiced in many countries does not seem to add much value. Some of the problems include the way training is perceived and conducted. They continue to argue that, "training is often treated as a discrete event, not part of an overall program of organizational improvement. Many trainees are selected based on bureaucratic politics and patronage rather than on the greatest need. Training evaluations are usually limited to assessing happiness levels rather than the impact on knowledge, attitudes, behaviours, and job performance." (p 99) According to Kirkpatrick's model, evaluation is only taking place at the first level. Olowu and Adamolekun further state that "most training institutions are poorly financed and managed and are usually heavily dependent on the government" (p. 99).

3.3.   Informal Learning

Unlike formal education, informal learning can be either planned or unplanned and structured or unstructured. In the context of health managers, examples of such activities include talking and sharing material with other managers, searching the Internet for health content, and experimenting with new managerial strategies. Researches have indicated that

as much as 90% of new learning is acquired through informal learning activities in the workplace, rather than organisationally planned or sponsored activities away from the workplace [8]. As Livingstone [9] points out that, informal learning can be defined as "any activity involving the pursuit of understanding, knowledge or skill which occurs outside the curricula of educational institutions, or the courses or workshops offered by educational or social agencies" (p. 51).

Informal learning is an important way that individuals construct meaning from their experiences [8]. Wilson points out that, adults do not learn from experience, they learn in it and for them to learn, they "must become embedded in the culture in which the knowing and learning have meaning" [10]. In addition, Greeno [11] argues that, people improve by becoming more attuned to constraints and affordances of different real situations. As thus, training adults need a careful arrangement of environment, groups and training materials to help them participate meaningfully in the training. However, Lohman [12] argues that, lack of time for learning is the most common inhibitor to informal learning.

3.4 Computer Training

When introducing new technologies, most organisations train users to shape their attitudes and intentions to adopt and use the equipment and systems. However, a number of studies show that training has not helped in making users adapt to the new technologies. Some of the reasons include budget prioritization, organizational strategies, the way training is conducted and users' perceptions and expectations [13]. As a result, new technologies are abandoned, underutilized or used for what they were not intended to.

Olfman et. al. [14] argue that, to deliver effective training "requires an integrative and comprehensive set of strategies" (p. 75). In their research, they found out that many organizations had no such kind of training strategy. They conclude that, training can be improved by integrating it with the overall organizational activities by making it a part of the organization's objectives

Although training plays a major part in organizational learning, no agreement exists either in the literature or in practice on how to organize the training resources [14]. Olfman et.al. [14] conducted a study in 16 organisations that were regarded as using 'Best Practices' but not one of them had strategies for organizing training resources. In their study, they integrated the best practices they found and combined them with prior literature and their own experiences to propose a normative framework composed of learning and a training strategy, the two models combine to form a comprehensive strategy together with the overall organizational strategy. They concluded by proposing a strategy formulation model that integrated training with the overall organizational objectives in IT learning.

For the introduction of the use of computer systems for example, Venkatesh [15] suggests that, organizations should consider putting in place general computer training programs that target increasing computer awareness, enhancing computer self-efficacy, and reducing computer anxiety among employees. Such training programs combined with appropriate facilitating conditions should pave the path for acceptance and usage of new systems. In fact, organizations will benefit particularly from system-specific training interventions that enhance user perceptions about the specific system and their general beliefs about new information technologies [16].

3.5 Collaborative User Learning

A number of studies indicate that users learn best when they collaborate in solving real life problems through sharing knowledge and challenging each other [17], [18], [19], [20].

In addition, research indicates that, others with whom users interact can influence individual IT beliefs and IT use [17]. In their study, Gallivan et al. [17], concluded that,

"having co-workers that are knowledgeable and confident IT users does positively influence an employees IT usage" (p. 179). Peer beliefs, norms, and verbal comments shared among users can influence a person's belief and intention to use a specific technology [17]. In their study on analyzing social influences on IT uses in work place they have shown that, users learn to use IT on-job by collaborating with their co-workers because "learning is deeply embedded in doing" (p. 58).

3.6   Support

During implementation of a health information system in Ethiopia, support was provided by computer people who were familiar with the system, and this support seems adequate [21].

In a study of superusers in caring homes in a European country, Almnæs [22] concluded that the selection of people for the superuser role seems to be the most important issue for creating a well functioning support system. The superuser should be selected amongst the peers, so that s/he understands the problems that the users might have. S/he could preferably be one whom people often call for assistance, which would guarantee that she is a caring person. Local managers should be avoided, since they are often too busy and not always available. In addition, people do not like to expose their misunderstandings to their boss. People who are unwilling to take on the role should also be avoided. They may behave hostile or less caring towards their peers, and if so, the users will soon stop consulting them.

3.7   Summary

Learning the use of computer systems occur through normal work practice and through deliberate interventions like training courses and support. Lack of time is a major barrier for learning, improper selection of trainees has been noted in some countries, and separation of training form work practice has not lead to changed practice. Furthermore, interactions and social influences in the organisation improve learning,

The interventions in this research seek to reduce barriers & exploit triggers for learning.

4.   Methodology

This is an action research study done in Zanzibar as part of a larger action research project spanning several countries in the region and in Asia [23]. Ethical clearance was provided by the Zanzibar Research Board.

The study took place from March to November, 2006. An integrated health management information system (HMIS) for monthly reporting had been installed during the six preceding months; computer based at district and national level and paper forms and reports in the clinics. The research employed a concurrent triangulation strategy where data was collected and analyses qualitatively and quantitatively giving priority to qualitatively.

During the initial phase of the research, health workers were observed to not being able to use the newly installed HMIS, and experience with courses had been that too few had reached the desired skill level at the end of the initial training course, and for budget reasons, no more training had been provided. Although budgets may be more generous in industrialised countries, course training has also there had limited effects as noted above. Therefore, an action research approach that aimed at solving current practical problems while expanding scientific knowledge of health workers at the facility and district level was taken. Baskerville & Myers [24] describe action research as an "iterative research process that capitalizes on learning by both researchers and subjects within the context of the subjects' social system" (p. 330). Action research consists of cycles of five phases, diagnosing, planning, action, evaluation and specification of learning. One cycle was competed in the clinics, and another in the district offices.

In addition to noting performance, the diagnosing phase also involved determining the health workers' needs, expectations for training and their perceptions about the HMIS and training in general. Also, their educational background, understanding of health data and indicators, understanding of the functioning of the health information system, arithmetic skills, and English language proficiency were assessed.

In the action planning phase, training objectives were formulated in collaboration with the health workers. These objectives guided the preparation of training places and identification of training groups and timetables, choosing teaching methods and designing training material.

The actions consisted of training in interactive group sessions and support at the workplace. The first author carried out the training.

All four levels of Kirkpatrick's framework were targeted in the evaluation phase, and learning is specified in this paper.

4.1 Data Collection

Out of the 10 districts in Zanzibar, the research took place in three, from the central to the distant rural one. The three districts were chosen because of the easy accessibility of their clinics using local transportation. Staff at all levels in 12 clinics and the district officers in these districts were interviewed, observed and trained; the total numbers indicated in Table 1. Plans and reports were read and forms were reviewed for counting data collection problems. Observations were carried out during meetings and training sessions. The subjects spoke Kiswahili fluently and English to varying degrees. The first author is fluent in Kiswahili, so there was no language barrier.

Table 1 Data Collection Methods Used in Each Phase of Training Cycle

Phase	Interviews	Document and Form Reviews
Diagnosing	56	172
Action Planning		2
Action Taking		
Evaluating	42	372

Notes were taken but no voice recording took place.

A qualitative approach was used to find out why certain events occurred by getting closer to the health workers' perspectives through detailed interviews and observations. A quantitative methodology was used for measuring organisational performance before and after training and support.

4.2 Analysis

The qualitative data was analysed with the aim of finding data at the four levels of Kirkpatrick's framework. Percentages of changes were calculated on the quantitative data for level four measurements.

The triangulation strategy used helped in strengthening the validity of the study. Having co-researchers for discussions during most of the fieldwork and discussing interpretation with the co-authors were the means for improving reliability.

5. The Clinics

5.1 Diagnosis

All the district clinics reported unanimous problems of data completeness and accuracy in their monthly reports, and poor data utilization. The data quality problems were confirmed in the quantitative study of reporting forms. Incompleteness is the number of blanks which were supposed to be filled, and inaccuracy is the number of values that by comparing with other values were obviously wrong. For example, the number of fully immunized children was greater than the number of measles vaccinations administrated. Based on the counting, there were 8% incomplete and 15% inaccurate data, yielding 78% acceptable data. Since no checks against reality were carried out, there may be more inaccuracies.

Reasons raised by most facility workers for doing so were workload, little understanding on data collection tools, design of data collection tools, language, calculations required, changing versions of the form, previous practices used in data collection, and carelessness. For example, for a child to be fully immunised, several conditions need to be met, and one of the health workers said:

> I did not understand if 'fully immunized under 1 year' meant 'watoto waliokamilisha chanjo chini ya mwaka 1' in Kiswahili

The interviews also demonstrated poor results of the initial training courses:

> I don't understand what to fill in; we were not trained on this section

Furthermore, before the reformation of HMIS, the only data collected that was supervised was Immunization, the other reports were being collected but there was no follow up on their submission. As a result, health workers developed the idea that, the only important data was immunization, and they have to finish this report on time and accurately. Other reports were not important, so were either not submitted or submitted late.

Most health workers did not understand why the information was needed in the higher levels or by themselves. Also, available health data was often not used at higher levels, eg, for distributing drugs, medical facilities and staffs. The health workers were also not receiving any feedback on the reports they send monthly to the districts. The following were some of the respondents' views on the use of data collected:

> To bring to the district and vertical programs
> To show visitors who will come and ask for data

5.2 Planning

The importance of colleagues learning together constituted one criterion for the training design. Another important consideration was that to ease transfer of competence from course environment to the workplace, two conditions should be fulfilled. First, users should bring their experience into the classroom. This could be achieved by basing the training on the data from the facility of the participants. Second, the training should be experienced more like a supervisor coming for support than a teacher lecturing by means of a projector.

When training sessions should be similar to support visits, one could wonder why there is any point at all in organising training outside the workplace. The main reason is that the daily work is stressful and filled with interruptions, which constitutes a bad environment for concentrating on learning new concepts and principles.

One two-hour training session was planned for each of the 12 facilities. Training objectives were to improve levels of awareness, understanding and technical skills in relation to data collection, processing, reporting and utilization and to motivate the culture of using data collected for patient and health facility management. The ones who received training would be trainers of the other health workers who were not able to attend this training, so they might transfer the style of training to their home clinic. Group discussions

were planned in order to involve everyone, and exercises were prepared to be given to the health workers after training sessions. The material prepared included explanations of the HMIS and focussed on data entry, also showing common mistakes. Discussions on analysis of data and planning of actions were also included.

5.3   Action

A total of 44 health workers had signed up for the sessions and 39 turned up. One facility was completely absent, and three others had sent only one staff member. One of the sessions was interrupted, and in another the participants were not interested. They were moving in and out of the training room, and they were all gone before the session was over. So, half of the sessions ran smoothly, while the other half had problems.

The clinics were visited monthly for three months after the two-hour session. They were told about their achievement on data quality, also on comparison with other clinics. They received positive feedback on good results, and on mistakes, solutions were identified to make sure these did not happen again.

5.4   Evaluation

Evaluation at level 1, reaction to training, was positive amongst the large majority of the participants, as one health worker responded,

> *I liked the way you conducted training, the discussions have helped me to understand faster and better.*

After the monthly follow up, they became eager to perform better next time.

The health staff performed some exercises in order to evaluate the training at level 2, learning outcome. Before the session, most health workers had problems on choosing the denominators and numerators to use when calculating indicators. However, after training, they were able to formulate their own indicators and calculated them. At level 3 of evaluating behavioural change, they started to use all the data for their own facility purposes by applying the gained knowledge and skills.

Performance change, level 4, is measurable for data quality. The incompleteness was at 4% and inaccuracy at 6%, meaning that useful data has risen from 78% to 90%. Separating the more from the less successful training sessions, the useful data was 94% for the clinics with good or reasonable attendance compared to their size, while for those with bad attendance, interruption and disengagement, the figure was 83%. In the clinic where no one came to the initial training, both incompleteness and inaccuracy had risen.

Even if no measurements were done during the three months of follow up, the instructor remarked improvements each month.
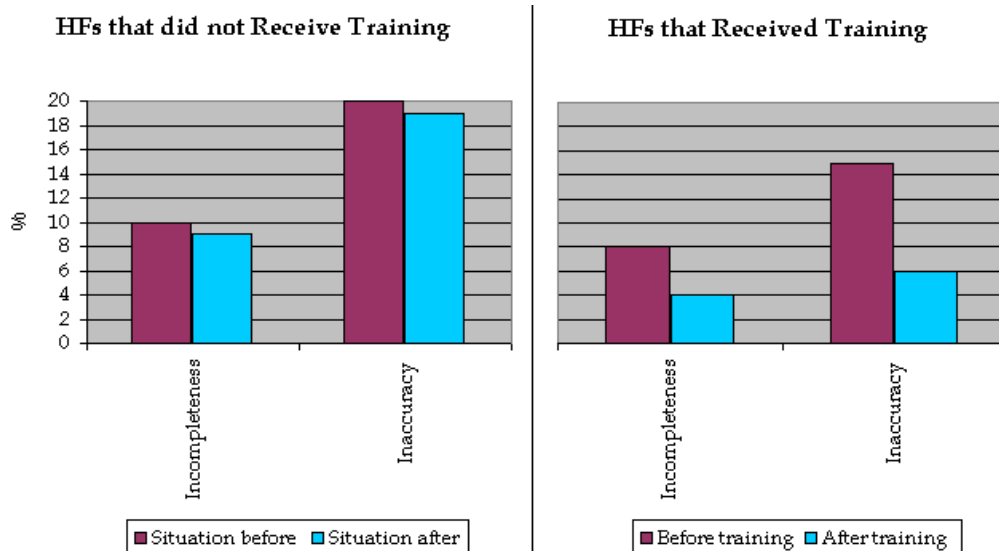
Completeness accuracy was also measured in 10 clinics that did not receive training. First, they had 10% incomplete data, and three months later the percentage was at 9%. Data accuracy has changed from 80% to 81% after a period of three months. This is a slight improvement, of 1%, in data completeness and accuracy. Comparing with the improvements made in facilities that received training, there were improvements of 50% of data completeness and 63% of accurate data collected. This difference is presented above.

6. The District Offices

6.1 Diagnosis

Most of the interviewed health workers at the district did not completely understand how to fill in the data collection tools, which also meant that in many cases they were unable to help the clinic personnel when they supervised them. Computer literacy levels among health workers ranged from none to good. Some struggled with the HMIS software, which was supposed to help them creating their monthly reports:

> We have entered data to the computer for the last six months but how do we get out the reports?

Previous training was obviously not sufficient. Similar to the clinics, data was sent to upper levels and not used for managing the districts.

6.2 Planning

The goal was to improve levels of awareness, understanding and technical skills in relation the use of the HMIS for data collection, reporting, analysis and utilization and to motivate the culture of using data collected for health facility and district management.

The district offices do not receive patients, so that training could take place without too many urgent interrupts. Training the team of 4-6 people would be ideal, so they could support each other both during training sessions and later.

For each of the district offices, a two week course was prepared, having one two-hour session daily in the remote district and a total of six sessions in the more central one.

6.3 Action

A total of 11 staff had signed up for the teaching, but only 4 showed up. In the remote district, only the HMIS officer showed up, while the rest of the management team was attending other seminars, but seven other staff members came to the first week of the training, where basic computer literacy was taught.

In the central districts, the schedule was rearranged four times, and the management members were always cancelling the appointments whenever calls were made to remind them and at last, they stopped answering their phones. Eventually, a session on the HMIS with the district medical officer took place, and a second one was planned. This session was postponed for one month, but she had not opened the application in between. In the other central district, one secretary came for the computer literacy training, and the district medical officer was trained on the HMIS.

6.4 Evaluation

At level 1, the participants were happy about the training. At level 2, they were able to run the HMIS, although with some mistakes. After training health workers entered data in HMIS and used it to create different graphs and tables, which were later used in their monthly and quarterly reports. This indicated behavioural changes at level 3.

Level 4 requires changes in organisational performance. The districts started improving data quality by making sure that the reports from the facilities were accurate and complete. However, HMIS training at the district level should also lead to changes of the outcome of health management. In the remote district, the HMIS focal person started to request the facilities that reported inaccurate and incomplete data to correct their mistakes. Graphs and reports were produced, but no definite use of these in managerial work was observed. One district medical officer explained:

> *We do not have the culture of analysing the data we collect and use it for decision-making; all we do is to send it to the zonal office. But for me I think these data are very useful to us especially in decision-making but I cannot take any actions without the concern of the other team members and higher levels and because we lack teamwork, this will never happen.*

7. Discussion and Conclusion

Training definitely had a positive impact on data quality in the clinics, reducing bad data to half of what it used to be, while untrained clinics did not show any improvement. The clinics where the initial two hours training went as planned improved their performance from 78% to 94% useful data, while those with problems in the training improved to 83%. Three sessions of follow-up were carried out in all these clinics.

Managers doubt the output of systems when ¼ of the data is missing or erroneous. When this ratio is down to under 10%, credibility is increasing that reports can be useful. This was achieved for the clinics where training went smoothly, while in the others, the data quality was still too low, despite the support provided after the training sessions.

The message in the literature on organisational learning is that staff needs to learn in collaboration (see section 3.5). The success of those clinics where this happened compared to those with poor attendance or other problems, confirms this message.

Further, the literature also points to the necessity of initial training sessions followed up by monthly support visits (section 3.5), and the findings are in accordance with this. Support alone did not do the job in this case. However, while Almnæs [22] pointed to the need of selecting co-workers as support staff, in this case the support was carried out by computer scientists who had studied health information and not of health workers who had learnt about HMIS, like also the implementers in Ethiopia [21] did with success.

The training at district level was more of a mixed blessing. Those who attended acquired individual competence on running the software, but there were few traces of organisational change in the sense of use of data in management. Østmo [20] found a similar situation in South Africa, where health staff could master the software, but where the clinic staff did not use the data because they had no room for local decision making. In

Zanzibar, also the districts found themselves short of opportunities for local changes based on the data collected. District staff had learnt analysing and presenting data, but they nevertheless expressed powerlessness.

Initial, interactive training sessions with a small group followed by monthly support visits by the trainer to the work places was found to be effective at improving the data quality of the HMIS to an acceptable level. The local tradition of offering per diem for courses might be necessary in order to achieve sufficient participation in the initial sessions.

Training on use of reports in managerial work is like learning swimming without any sea near by. Decentralisation of the power to allocate resources seem to be necessary in order for the HMIS to do its job in the districts.

Acknowledgement

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