Indian air force

CHAPTER I

INTRODUCTION

1. Indian Air Force is undergoing a major shift in the field of technology and information warfare which requires the steady infusion of new technology and modernization and replacement of equipment. However, material superiority alone is not sufficient. Of greater importance is the development of doctrine, organizations, training and education, leaders and people that effectively take advantage of the technology. While fancy gadgets are nice, technology will not achieve full spectrum dominance without knowledgeable people. Professional continuing education can bridge that gap.

2. In the bilateral exercises with the air forces of USA, UK, FRANCE, SOUTH AFRICA, SINGAPORE and RUSSIA, our men and machines put up outstanding performances making the world take notice of our exceptional professionalism. Besides exercises, the contribution of IAF detachments in peace keeping operations too has been exemplary[ii]. At the same time, IAF is undergoing unprecedented historical changes. From being a sub- continental force, it is transforming itself to become a force having continental reach and effect. We are acquiring state of the art equipment and technology and are linking ourselves with space. The modernization process includes acquisition of AWACS, additional Air to Air Refuellers, Aerostats and high technology aircraft and precision weapon system[iii]. All this is planned to be achieved by year 2022. Obviously, the technological environment surrounding military members will be very different than the one today[iv].

3. A full-fledged war is unlikely[v]. The expected nature of conflict could be asymmetric warfare. The military conflicts that do occur will probably be limited in terms of objective, area, force utilization and time; but the perpetrators and the responders will both use the military only as one part of a closely integrated multidimensional effort[vi]. Civil and military interaction would be inescapable. Psychological warfare (PSYOPS) and effective utilization of the media would be the indelible ingredients of the coercion process[vii].

4. All this would require the officers to handle a large amount of information which would be time consuming and tiring both physically and mentally. They would be required to understand the political, economic, diplomatic, technical and military environment. Most of the operations would be joint and a cyber war would add another challenge. Therefore, there is today a need to evolve an effective Professional Military Education (PME) program to develop future Aerospace leaders who are able to quickly understand the complexities of the prevailing situation and appropriately apply the highly potent capabilities of Aerospace power to achieve the desired results most cost effectively.

1. METHODOLOGY
STATEMENT OF THE PROBLEM

5. This paper focuses on Professional Military Education (PME) requirements of the officer cadre in view of the transformation of the Indian Air Force by 2030.

1. HYPOTHESIS

6. India is likely to grow ten times bigger by the year 2050[viii]. In consonance with the emergence of an economically strong and technologically advanced India, its role in global affairs is likely to increase further. The young officers would get more exposure in working along with air forces of the other countries. They may be required to project India's views on complex issues in international fora. This would require them to possess greater cognitive skills and better cultural awareness of international politics in general and of South Asia in particular. With the technology advancement in the inventory of the IAF there would be a requirement of exploiting technology to its maximum effect. Also, the large scale data base of information would pose difficulties to the officer in decision making. While hardware is important, it is converted into capabilities by people. Aerospace power requires highly-skilled and impeccably trained personnel. Also, in aviation, optimum performance usually lies close to safety margins, which brings in the concern of costs - both in human and material terms. Attracting quality youth, training and retaining them is another of IAF's challenges. Inculcating qualities of leadership and innovativeness and ushering in meritocracy and productivity are important on our agenda. However, the expanding civil aviation sector exerts a huge 'pull' on this resource and we are doing our best to blend personal aspirations with organisational compulsions. We need Government support to make this happen. Updating of skills is an associated challenge, for which international exposure has been very useful. But in the long run we might need an Air University. Again, if

our manning is adequate, we would be able to send our people on sabbaticals of higher learning. As the hardware changes, new capacities and capabilities are generated that sometimes radically alter the way we do business. And it is hard to do things differently with the old processes, interfaces and organisational structures. Keeping pace and adapting to the changes, as an organisation, is another challenge.

1. JUSTIFICATION OF THE STUDY

7. India will emerge as a major regional power in the early 21st century and IAF organisation's capabilities will, to a significant degree influence the outcome of future wars in our region[ix].

8. No other profession demand more of a human being, than the military profession[x]. It is noteworthy that, despite the responsibilities attached to the man in uniform, very little has been written about the kind of education that he undergoes.

9. While IAF's vision 2020 gives the force structure in the future battlefield scenarios it neither talks about how the IAF would be providing PME to the future leaders nor the infrastructural requirements to meet the demands.

10.   Today, we stand astride a transitional period, as the machine age moves into the information age[xi]. New technologies are increasing our military capability almost daily which has resulted in exponential increase in the complexity of the modern battlefield. The challenges before us place an enormous intellectual demand upon our military professionals[xii].

11.   In our urgency to adopt technological transformation, we are neglecting the human side of the equation. We have plans to advance our weapon technologies, but a similar commitment is not seen to advance our officers' understanding of the art of warfare. The complexity of the modern battlefield requires a deeper understanding of the operational art of war for which we need to push the joint professional military education system to meet that need. It must give students the intellectual tools they need to fight the next war- not the war they are fighting today.

1. SCOPE

12.   This study addresses the PME requirements of the officer cadre in view of the emerging technological changes brought out in the organization by year 2030 as a result of Revolution in Military Affairs.

1. OPERATIONAL DEFINITIONS

13.   PME Is intended to provide the student with three critical kinds of knowledge: the ethos, culture and core values of his or her service; the technical and tactical skills appropriate to how that service wages war; and most importantly, the wisdom and judgement to be applied in a multiplicity of situations[xiii].

14.   Military education and training is a process which intends to establish and improve the capabilities of military personnel in their respective roles. Military education can be voluntary or compulsory duty. Before any person gets authorisation to operate technical equipment or be on the battle field, they must take a medical and often a physical test. If passed, they may begin primary training[xiv].

15.   The military concept of Revolution in Military Affairs (RMA) is a theory about the future of warfare, often connected to technological and organizational recommendations for change in the United States military and others. Especially tied to modern information, communications, and space technology, RMA is often linked to current discussions under the label of Transformation and total systems integration in the US military[xv].

16.   Continuum of Learning links Education, Training and Experience through an officers' career to produce the right person at the right place and time to achieve AF missions[xvi].

17.   Knowledge management is the end-to-end continuous process that describes the systematic creation, acquisition, integration, distribution, application and archiving of knowledge to drive behaviour and actions which support organisational objectives and mission accomplishment.

1. METHOD OF DATA COLLECTION

18.   Despite being a very contemporary topic, not many books/ publications have been written on it. The data for this paper has been collected mainly from the books, periodicals, college lectures and various sites on the internet. Bibliography is placed at the end of the text.

1. ORGANISATION OF THE DISSERTATION

19.   It is proposed to study the subject in the following manner:-

- Chapter 1- Introduction and Methodology.

- Chapter 2- Transformation of the IAF by 2030.

- Chapter 3- Recent Training Developments in IAF.

- Chapter 4- PME and Technological Challenges.

- Chapter 5- Concepts on Future of Air Force Education and Training.

- Chapter 6 - Desired Traits in Future Leaders.

- Chapter 7- Officer's Professional Military Education Policy: US Armed Forces.

- Chapter 8- Limitations in PME.

- Chapter 9- Recommendations: Educational Requirements

- Chapter 10- Conclusion.

CHAPTER III

TRANSFORMATION OF THE IAF BY 2030

Enhancing Combat Power

1. Two eventful developments have made it easier to predict the shape of the IAF in 2030. First was the emergence of India as the new economic powerhouse; second, was the IAF's growing aspirations to transform itself from a mere sub-continental, strategic aerospace power in conformity with other leading air forces in the world[xvii].

2. The IAF would be required to acquire comprehensive capabilities cauterised by flexibility, quick response, mobility and transportability of all forms of national power, as well as, long reach and precision targeting firepower with minimal collateral damage.

3. The IAF is at present struggling with a depleted strength of around 30 squadrons[xviii]. Therefore, IAF will have to embark on a modernisation plan coupled with a comprehensive inventory augmentation programme to build up its combat force to the desired levels.

4. The aim would be to augment the squadron strength to 45 squadrons by 2030[xix]. This would amount to approximately 900 combat aircraft[xx]. In addition to this the IAF would induct large no of Heavy Lift and Medium Transport Aircraft. The helicopter fleet would induct sophisticated platforms like Apache AH-64 and the LCH. The force multipliers would include the IL-78, FRA, AWACS, AEWC aircraft. UAVs would play an important role in not only war but also in Operations Other Than War.

5. The IACCS, AFNET and the Defence communication Network would provide large information to the user and require 24 hour monitoring. To cater for this large inventory the requirement would be of focussed logistics and the maintenance setup which again would be dominated by the technology.

6. By 2030 new areas of expertise and specialisation may be necessary. In 2030, we may find it necessary to deploy space warriors, or hackers, instead of (or in addition to) a more traditional military force.

1. Future Warfare

7. The first important consideration is that all military action against the two major adversaries, China and Pakistan, would be taken under the shadow of proclaimed nuclear capabilities. Secondly, the operating environment and manoeuvre space for the armed forces will be increasingly restricted due to various factors, such as need to minimise collateral damage, legal and international issues and media glare. Last, but not the least, would be the increased relevance of technological

dominance in the conduct of operations, irrespective of the level of conflict[xxi].

8. A typical air campaign will be executed at a very high intensity and with reduced 'Decision Cycles'[xxii]. All assets would be networked to such an extent, that they will provide total transparency of the battle-space, so as to dominate the operational environment, through control over the domains of 'Information', 'Space' and 'Cyberspace'. ISR assets on station would provide real time intelligence and targeting assessment that would permit switching of responses instantaneously, as the battle progresses. Such flexibility and responsiveness would be possible only by the networking of all elements on a secure and robust architecture, which will enable distribution and access to all kinds of data. Possession of these capabilities and flexibility in their employment will hold the key to success in both conventional and sub-conventional scenarios.

CHAPTER IV
RECENT TRAINING DEVELOPMENTS IN IAF

1. In the year 2005, a review of training courses was carried out by Air HQ and HQ TC to overcome some of the existing limitations[xxiii]. The aim was to reduce the duration of absence of officers from the operational units, streamline the course syllabi and provide 'Just in Time' training. It was felt that the basic learning should be carried out more by 'Distance Education' with a short contact programme. Distance Education leverages existing technology to provide learning to wider audience at different locations and that too at low cost[xxiv]. In

addition, all the courses were graded and the Grade Point Average is now linked with promotions. In the new system, instead of JCC, there is Basic Air Staff Course at AFAC for all officers with minimum 03 years service, Basic Professional Knowledge Course for all aircrew with minimum 4. 5 years service, Intermediate Air Staff Course at AFAC for all officers with minimum 07 years service, QFI/FCL/TP courses between 08-11 yrs, Advance Professional Knowledge Course with minimum 9. 5 years service, Advance Air Staff Course between 10-12 years and HACC between 19-21 years of service. The main benefits of the new training policy is that in a methodical manner, wider number of officers benefit from these courses, as some of them are mandatory for all officers to attend, current issues get speedier dissemination to a wider audience and knowledge bank gets continuously updated as information eventually would be available at Air Force WAN.

2. There would be two sets of mandatory courses each year that itself will constitute two parts; the first part would be Distance Learning (DL) and the second part Contact Program (CP) at an appropriate location.

3. The Air Force Academy shoulders the prime responsibility of initiating the leadership development program in the IAF[xxv]. The essential focus at AFA is on teaching basic flying skills, enhancing knowledge on flying related subject and air and space issues and developing physical and mental toughness.

4. When the young officers reach the operational units, the responsibility for continuing with their leadership development process lies with the Commanding Officer/Station Commander. For the pilots, initially the

officer focuses on learning how to fly an advanced ac and how to use it as weapon system. Subsequently, he is taught how to lead in air. Flying itself relates to an unknown environment and to an extent develops physical courage. Whilst they are learning advanced flying skills, they are also exposed to secondary duties that deal with administrative aspects like Adjutant, UFSIO or Oi/c messes, though in an adhoc fashion. During the formative years, there is very little structured exposure for the pilots towards administering and leading men on ground. This deficiency stand out when they become Commanding Officers and have to perform administrative functions too[xxvi].

5. After few years of service, the young officer is eligible to undergo BASCO/BPKC[xxvii]. The AFAC teaches him basis aspects related to administration, AF Law, Psychology, Leadership and Airpower. CAW teaches aspects related to airpower employment to flying branch officers. At TACDE, the fighter and helicopter aircrew learn qualities of leadership in air, while undertaking FCL/FSL/HCL/MFC/SAGW courses. Subsequently, the officer undergoes ISCO/APKC. However, the training of young leaders till now deals only at the tactical level. The next step in the officer's leadership development program is to undertake the Air Staff Course at DSSC, Wellington. The course exposes officers to perform effectively in Command and Staff appointments tenable by Sqn Ldrs to Group Captain ranks.

6. After the officer has finished command of a unit, he could be detailed for Higher Air Command (HACC)/Higher Command/ Naval Higher Command Courses at College of Air Warfare / Army War College /

College of Naval Warfare or for Higher defence Management Course (HDMC) at CDM. The aim of HACC is to train selected officers of the three services to occupy senior Command and Staff appointments, who will be involved in planning and conduct of operations and for command of stations. However, only selected officers undergo such courses.

7. NDC is the last structured course on national security and strategic studies in the leadership development process[xxviii]. This is pitched at the grand strategic and strategic level to provide insight into issues related to national security and higher leadership requirements.

CHAPTER V
PME AND TECHNOLOGICAL CHALLENGES

The new military soldiers, who use their brains, can deal with a diversity of people and cultures, who can tolerate ambiguity, take initiative, and ask questions, even to the point of questioning authority. ... The willingness to ask and think may be more prevalent in the US armed forces than in many businesses. ... As in the civilian economy, fewer people with intelligent technology can accomplish more than a lot of people with the brute-force tools of the past[xxix].

-- Alvin Toffler

The challenge before us is to absorb new technologies and translate them into operational effectiveness. Managing this period of transition is the task before all of us and we are confident that we shall find new and innovative ways to fully exploit our new inductions[xxx] .

--Air Chief Marshal PV Naik

1. Technology is one of the factors necessary to meet the capability requirements of PME 2030. Trends in technology today, in general indicate the technological fields of the future will be tremendously fertile and highly affordable[xxxi] .

2. This would help people to connect to each other easily, access data and to train computer networks to automatically gather and analyze data based on user demands. Virtual reality is being used now as one solution to the information overload[xxxii]. Automated assistants with even greater capabilities will ensure current and relevant information tailored to his or her needs and background.

3. The military services are actively developing artificial intelligence and expert systems to aid humans digest information and act on it[xxxiii]. For example, the systems are been developed for analysing radar signatures, labelling automatically generated situations and air-to-air encounters, planning for contingencies, diagonising maintenance problems on aircraft, playing the role of intelligent opponent in war games, developing attack strategies for complex targets, helping to detect the counter C3 countermeasures, providing advice on allocation decisions and even predicting likely locations and times of outbreaks of violence.

4. The pace of technological improvements will continue to accelerate. Exponential change will be the norm. Increases in computing power, graphics and bandwidth will lead to advancements in visualisation, modelling, simulation and animation[xxxiv]. Therefore, our PME system

must respond to the exploding technological and informational environment, evolving personnel characteristics and the fiscal constraints.

5. Obviously, the technological environment surrounding military members will be very different than the one today[xxxv]. It will include commonplace use of artificial intelligence, intense miniaturisation, expert systems, virtual and artificial realities and automated computer assistants. Therefore PME 2030 must harness this technology to educate the entire military force.

6. Since, the rate of change in technology and the rate of growth in available information increase every day, all the technological advances mean that by 2030, information needs will grow exponentially and the amount of new information will be astronomical. Without careful planning and information- handling skills, the decision makers of the future will be susceptible to " analysis paralysis"[xxxvi].

7. Handling Space would be another challenge in any future vision of the IAF. In his book The Next Hundred Years, George Friedman predicts the possibility of the next Great War being fought almost entirely in space. By about 2050, he suggests the US would operate huge space stations- which he calls " Battlestars" after the popular TV series-that would serve not only as weapon platforms but as command and control centres to manage conflicts on the Earth's surface[xxxvii]. One system of satellites alone generates more than 10 quadrillion bytes of information about the Earth, " equal to about 10 billion books[xxxviii] .

8. This will pose difficulties to military analysts in determining and locating the critical information which can mean life-or-death and success-or-failure in the combat environments of 2030. The military education system must help analysts and operational units by determining which methods and technologies will be needed.

CHAPTER VI

CONCEPTS ON FUTURE OF AIR FORCE EDUCATION AND TRAINING

We have all heard the phrase 'flexibility is the key to airpower'. I would like to add that Knowledge- Enabled Airmen are the key to flexibility[xxxix].

- Michael W. Wyne

The concepts that are essential to meet the needs of the future Air Force and defines one approach to the future of education and training are[xl]:-

- Knowledge Management.

- Continuous Learning.

- Precision Learning.

1. The requirement is to develop and field systems that are not just network-centric, but knowledge-centric. For the air force of the 21st century to be agile, adaptive and learning organisation it must embrace change, accept risk, cope with reverses and learn to reinvent itself constantly[xli]. To achieve this we need to transform our existing education and training system to build a future learning organisation employing new learning concepts and leveraging new technology.

2. The future Air Force must successfully operate in and dominate not only the domains of air, space and cyberspace, but the cognitive

domain as well[xlii]. The cognitive domain exists in the human mind and involves information processing. Therefore, IAF must focus its transformation efforts to achieve superiority in the cognitive domain and to achieve cognitive and learning superiority; the air force must develop a new learning culture.

1. **Future Learning**

   Knowledge Management

3. Knowledge management is the end-to-end continuous process that describes the systematic creation, acquisition, integration, distribution, application and archiving of knowledge to drive behaviour and actions which support organisational objectives and mission accomplishment[xliii]. Knowledge management captures both existing and newly created information and knowledge, stores it in an enterprise knowledge base through which information can be distributed, shared and accessed by the officers to support both learning when and where needed and the application of knowledge and skills to perform assigned tasks and solve problems.

4. Officers need to be more creative and innovative to solve tomorrow's problems. Therefore, access to a dynamic knowledge base will provide closer integration between training and operations. In the IAF there is a requirement of a major cultural change to become a learning organisation. Air force knowledge management system will be revolutionary, leveraging existing efforts and rapid technological advancements. The requirement is not only to train the way we fight

but to fight the way we train using the same knowledge databases, networks and technologies.

5. With the development of the AFNET, The IAF has a unique opportunity to leverage new technologies to advance the knowledge management concept. This can serve as a potential platform for the delivery of services supporting future learning systems and the distribution and application of knowledge. As the culture of learning is instituted in the organisation, it would be easier to master the cognitive domain.

1. Continuous Learning

6. In the future wars highly skilled and educated Air warriors would be required[xliv]. The key to personal and organisational growth in the Air Force, and development of officers dealing with complex missions operating in air, space and cyberspace is continuous learning.

7. Continuous learning focuses on the development of the officer from before commissioning through retirement and beyond. This concept is consistent with the continuum of learning. It allows the officer to individually recognise the right skills, knowledge and the aptitude they need to accomplish assigned tasks and missions. This requires a systematic and holistic approach so as to provide the right education, training and experiences at the right time.

8. The basic principles embodied in continuous learning include[xlv] :-

9. (a) Recruit the best and brightest candidates who can learn and operate in the future Air Force.

(b) Offer effects- based learning opportunities based on learning objectives and outcomes.

(c) Provide career long progression through deliberate education, training and experimental opportunities to enable officers reach their full potential.

(d) Provide learning opportunities on demand.

(e) Provide a push and pull system to make learning opportunities available when and where appropriate to enable a sustainable military advantage.

(f) Leverage operational competence and tactical expertise through timely education, training and experience.

(g) Development supported by leaders who internalise and visibly espouse the vision, values, climate, motivation and behaviours that constitute the new learning environment.

10.   Training, education and experimental learning power continuous learning[xlvi]. Therefore, it would be important to use these means to develop the appropriate combination of specialists and generalists to meet the mission requirements.

11.   Future officers would be required to perform a wide variety of functions, enabled by new technologies, new learning paradigms and robust knowledge management systems. Continuous education offer a good opportunity to reduce skill decay, keep skills current and remain informed of the latest technological changes and developments in the field.

12.   Two factors which epitomise the need for continuous learning are critical thinking and problem solving skills[xlvii]. With the process of

continuous learning the critical thinking will no longer be restricted to the senior Air Force leaders.

13.   One of the most challenging skills to develop is leadership at the tactical, operational, and strategic levels. Successful application of human judgment to orchestrate mission success requires much more than force of personality. In the future, it will require a greater ability to multi-task, prioritize subordinate actions, and assimilate vast amounts of information while fostering collaboration. Some leadership scenarios must be executed in an atmosphere of maximum situational awareness, while others may impose an information-limited setting. Application of modern leadership will necessitate new methods in the way we train and educate current and future leaders.

14.   All education and training programs, including advanced operational training and Professional Military Education (PME), will adapt to the needs, skills and training proclivities of Generation Y- the Millenials. According to Mark Prensky, Millenials are considered Digital Natives because they:

15.   "... are all 'native speakers' of the digital language of computers, video games and the Internet. Those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology are Digital Immigrants. Digital Natives are used to receiving information really fast. They like to parallel process and multi-task. They prefer their graphics before their text rather than the opposite. They prefer random access (like hypertext). They function best when

networked. They thrive on instant gratification and frequent rewards. They prefer games to 'serious' work."

16.   To address these needs, courseware that is interactive and multi-media enhanced will be available through a next generation distributed learning system that will offer live, virtual, and constructive scenarios for development of all officers. These capabilities will enhance the decision-making, communication, and negotiation skills that are critical for senior leadership. Distance learning will evolve from basic enrolment in computer and web-based courses to virtual learning environments that support online collaboration and classes taught by both live and virtual instructors.

1. Precision Learning

17.   Precision learning delivers the appropriate education, training, or experience at the right time and place, in the right format, to generate the right effect. Precision learning relies on customised learning, mass collaboration, push and pull learning systems, distributed learning opportunities, increased use of simulated and virtual technology, and enhanced use of visualization technologies. It focuses learning on the learner[xlviii].

18.   This would provide the officer access to the knowledge base through mobile or internet and organised by the advanced knowledge management systems. Precision learning has the potential to enrich the learning experience and increase effectiveness while reducing the cost of instruction and increasing efficiency.

19.   The delivery of training and education must be flexible and permit schedule, delivery and media formats tailored to individual needs. It will deliver customised course material based on each student's ability to learn.

CHAPTER VII
DESIRED TRAITS IN FUTURE LEADERS

Professional attainment, based upon prolonged study, and collective study at colleges, rank by rank and age by age-those are the title reeds of the commanders of future armies, and the secret of future victories[xlix].

-Winston Churchill, 1946

1. Having seen the variables that are likely to affect future leadership, let us examine the traits that need to be present in future leaders to overcome these uncertainties. Although these traits were required earlier too in