

**COMPUTER ASSISTED SCHOOL ADMINISTRATION
(CASA): FACTORS CRUCIAL FOR THE SUCCESS OF ITS
IMPLEMENTATION AT FULLY RESIDENTIAL SCHOOLS IN
KEDAH DARUL AMAN**

**This Project Paper is submitted to the Graduate School in partial
fulfilment of the requirements for the degree Master of Science
(Management), Universiti Utara Malaysia**

by

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ABSTRACT

(BAHASA MALAYSIA)

Kajian **ini bertujuan** menyiasat tahap pembangunan ‘Pentadbiran Sekolah Berbantuan **Komputer**’ atau ‘Computer Assisted School Administration’ (CASA), **faktor-faktor** genting dalam kejayaan mengimplementasinya, dan kekuatan serta kelemahannya di sekolah-sekolah berasrama penuh (SBP) dalam negeri Kedah **Darul Aman**. Metodologi yang digunakan termasuk kajian **kes**, tinjauan dan ulasan karya. Tiga kes (**SBP1**, **SBP2** dan SBP3) dikaji dan dibuat perbandingan. Latarbelakang kajian **ini** kebanyakannya didapati dari ulasan karya. Sejumlah 21 **subjek**, pentadbir-pentadbir sekolah dari pengetua hingga ke guru-guru kanan matapelajaran, terlibat dalam tinjauan **ini**. **Analisa** deskriptif digunakan **untuk** memproses data. Dapatan menunjukkan SBP 1, SBP2 dan SBP3 **masing-masing** berada **pada** tahap pengembangan, integrasi dan permulaan. Ketiga-tiga kes mendedahkan bahawa hanya sikap staf dipersepsikan sebagai faktor genting dalam kejayaan mengimplimentasi CASA. Kekuatan CASA dikenalpasti sebagai kemudahan komputer yang memadai, taburan demografi pentadbir yang **sama** rata, penggunaan penuh rangkaian komputer (LAN), pentadbir-pentadbir yang **celik** komputer dan **laluan** kepada INTERNET. Kelemahannya **pula masing-masing** adalah bertentangan dengan kekuatannya, kecuali bidang-bidang aplikasi komputer tidak diintegrasikan dan perilaku pengurusan yang tidak menggalakkan. Keputusan daripada dapatan-dapatan **ini** dapat membantu sekolah-sekolah lam (khususnya SBP) yang dalam **pertimbangan untuk** melibatkan sistem pentadbiran mereka dengan CASA.

ABSTRACT

(ENGLISH)

The purpose of this study is to investigate the developmental stage of Computer Assisted School Administration (CASA), factors crucial to the success of its implementation, and its strengths and weaknesses at fully residential schools (SBPs) in the state of Kedah Darul Aman. The methodology used included case study, survey and literature review. Three cases (SBP1, SBP2 and SBP3) were studied and compared. Much of the background of this study is obtained from the literature review. A total of 21 subjects, school administrators ranging from principals to senior subject teachers, were involved in the survey. Descriptive analysis was used to process the data. It was found that SBP1, SBP2 and SBP3 are in the expansion, integration and initiation stages respectively. All three cases revealed that only staff attitude is perceived to be a crucial success factor of CASA implementation. The strengths of CASA were identified as adequate computer facilities, fair distribution of administrators' demography, fully utilised computer networking (LAN), computer literate administrators and access to the INTERNET. Its weaknesses, however, are in contrast to its strengths except for no integration among the areas of computer application and an uninitiated managerial behaviour. The result of the findings can aid other schools (SBPs, in particular) considering to indulge their administrative system with CASA.

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Muhammad Zaini Bin Mohd Zain
November, 1997.

dedicated to

my mother

HAIJAH JAM BINTI ABDUL HAMID

for introducing me to this world and showing me faith,

my loving wife

ZAINI BINTI RAZAK

whose encouragement and support I dearly cherish,

my beautiful and adorable children

MUHAMMAD AFIFI

AISYATUL AFIFAH

MUHAMMAD ADIL WAFI

MUHAMMAD ADIL WAHI

*whose existence shed new life and meaning to my endless
quest for knowledge,*

and my mother-in-law

NAH BINTI CHE HUSSIN

*whose affection and care kept us together when the going
gets rough.*

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LIST OF ABBREVIATIONS

ACT	Automatic Computerised Timetabling
AFT	American Federation of Teachers
AI	artificial intelligence
CAI	computer-assisted instruction
CAL	computer-assisted learning
CASA	Computer Assisted School Administration
CBI	computer-based instruction
CLASS	Computerised Local Administration System for Schools
DEO	District Education Office
EPRD	Educational Planning, Research and Development
IBM	International Business Machine
INTERNET	International Network
IT	information technology
JAWS	Jadual Waktu Sepadu
LAN	local area network
LEA	Local Education Authority
LRM	Local Resource Management
MARA	Majlis Amanah Rakyat
MCKK	Malay College Kuala Kangsar
MIS	Management Information System
MOE	Ministry Of Education
MRSM	Maktab Rendah Sains MARA
MSC	Multimedia Super Corridor
OASIS	Office Automation and School Information System
PC	personal computer
PMR	Penilaian Menengah Rendah
RDBMS	Relational Database Management System
SBP	Sekolah Berasrama Penuh
SCHOLIS	School Information System
SED	State Education Department
SIMS	School Information Management System
SMSAH	Sekolah Menengah Sultan Abdul Halim
SMSPS	Sekolah Menengah Sains Pokok Sena
SMSSMJ	Sekolah Menengah Sains Sultan Mohamad Jiwa
SMT	Senior Management Team
UAA	User Acceptability Audit
UPSR	Ujian Penilaian Sekolah Rendah
USM	Universiti Sains Malaysia



**Sekolah Siswazah
(Graduate School)
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knowledge of the field is covered by the project paper).*

Nama Penyelia
(Name of Supervisor): Dr. Wan Rozaini bt. Sheikh Osman

Tandatangan
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Tarikh
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: 20 Okt 1997

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Malaysia's Vision 2020 is to be a **fully** developed nation by the year 2020. This vision also demands contribution from every educational institution according to the principles of efficiency and effectiveness. The mission to increase efficiency and effectiveness by disallowing room for waste and **fully** utilizing scarce resources, if successful, will minimise the cost of education, thereby producing an education system with world-class management, superbly organised, effectively run and acutely responsive to changing needs and situations. One of the ways this can be made possible is if our education system is ensconced whereby teacher training, school administration, school aspiration and practical facilities are complete (Tajul **Ariffin Nordin** and Nor **Aini Dan**, 1992).

The Malaysian Ministry of Education (MOE) Federal Budget of 1993 revealed 76.48% of the Programme Management Fund will be spent mostly on primary and secondary education (**69.53%**), technical and vocational education (3.43%) and general administration (3.52%). A **full** display of the budget is shown in Appendix A. Looking into more details (Appendix B), we see that 55.14% of the general administration component will be spent on educational administration

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BIBLIOGRAPHY

- Ab. Rahim Selamat (1993) Wawasan Tiada Kecacatan KPM: Tinjauan *Rintisan*. *Paper presented at the 3rd National Seminar on Educational Management*, IAB, Malaysian Ministry of Education.
- Abdul Shukor Abdullah (1993) Membina Sekolah yang Berkesan: Pengurusan Setempat, Empowerment dan Kepimpinan sebagai Inisiatif Polisi. *Paper presented at the 3rd National Seminar on Educational Management*, IAB, Malaysian Ministry of Education.
- ‘ _____ ’ (1994) Penilaian Semula Situasi Pengurusan Sekolah. *Paper presented at the 4th National Seminar on Educational Management*, IAB, Malaysian Ministry of Education.
- Abu Hassan Kassim, Abdul **Hamid** Yeop Zainuddin and Mohamad Bilal **Ali** (1992) Penggunaan Komputer dalam Meningkatkan Kecemerlangan Pengurusan dan Pentadbiran Pendidikan, *Paper presented at the 2nd National Seminar on Educational Management*, IAB, Malaysian Ministry of Education.
- Ahmad Atory Hussain** (1996) *Pengurusan Sumber dalam Organisasi Awam dan Swasta*, K. Lumpur, Utusan Publications & Distributors Sdn. Bhd.
- Anderson, L.S. (1993) The Relationship between Instructional Computing Implementation and Administrative Computing Literacy Skills of Super-intendants in Selected School Districts, *Dissertation Abstracts International*, Vol.54 No. 1, pp.33.
- Ardill, T. (1989) A Strategy for Administrative Computing: The Experience of Hampshire Local Education Authority, *International Journal of Educational Management*, Vol.3 No.1, pp. 30-32.
- As'shaari Kusnan (1995) Rekabentuk Sistem Sokongan Keputusan (**DSS**) di dalam Pengurusan Sekolah-Sekolah di Daerah Sabak Bemas, *Masters thesis presented at Universiti Utara Malaysia*.
- Benson, P.A. (1996) School Administrator's Acceptance and Use of Computers, *Dissertation Abstracts International*, Vol.57 No.6, pp.2282.
- Bird, P. (199 1) Computer Assisted School Administration in England, *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 20-39.
- Bluhm, H.P. (1987) *Administrative Uses of Computers in Schools*, Englewood Cliffs, NJ, Prentice Hall.

- Bozeman, W.C., S.M. **Raucher** and D.W. **Spuck** (1991) Applications of Computer Technology to Educational Administration in the United States, *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 62-77.
- Carter, R.B., S. Nilakanta and D. Norris (1991) Strategic Planning for IS: The Evidence from a Successful Implementation in an Academic Setting, *Journal of Research on Computing in Education*, Vol.24 No.2, pp. 280-288.
- Chong C.K. (1995) A Study on the Use of Computers by Secondary School Administrators in **Kuala Langat** District, *Masters thesis presented at Universiti Utara Malaysia*.
- Cuban, L. (1986) The Promise of the Computer, *Social Issues in Computing: Putting Computing in its Place*, Edited by Huff, C. and T. Finholt, McGraw-Hill.
- Curran, C. and R. Saunders (1992) The Use of Computer-Based Systems in the Resource Management of a Developing National Distance Education Programme, *Education and Computing*, Vol.8 No. 1-2, pp. 33-39.
- Dale, D.M. and A.G. Habib (1991) Administrative Computing in the Australian Education System, , *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 120-145.
- Davis, S. and J. Botkin (1994) *The Monster Under the Bed*, New York, Simon and Schuster.
- Dorr, B. and W. Donald (1986) Information Use in Secondary Schools: A Case Study of the Development of a Comprehensive Information System, *Research Report (143)*, *Center for Study of Evaluation*, California University, Los Angeles.
- Dwight, J. (1989) Computers in Educational Administration, *Computer Education*, June 1989, pp. 26.
- Ginige, I.L. (1993) Toward a Policy for Administrative Computing in the National Schools of **Sri Lanka**, *Dissertation Abstracts International*, Vol.54 No.3, pp. 752.
- Gustafson, T. J. (1985) *Microcomputers and Educational Administration*, Englewood Cliffs, NJ, Prentice Hall.
- Hanson, E.M. (1996) *Educational Administration and Organisational Behaviour*, 4th Edition, Allyn & Bacon, USA.
- Hemmings, P. (1993) School Management: The Role of Information Technology, *The School Management Handbook* 1993, Edited by Howard Green, Kogan Page, UK.

- Hittleman, D.R. and A.J, Simon (1997) *Interpreting Educational Research: An Introduction for Consumers of Research*, 2nd Edition, Englewood Cliffs, NJ, Prentice Hall, Inc.
- Horne, S. (1992) Organisation and Change Within Educational Systems: Some Implications of a Loose-Coupling Model, *Educational Management and Administration*, Vol.20 No.2, pp. 88-97.
- Isaac, S. and W.B. Michael (1976) *Handbook in Research and Evaluation*, 7th Edition, San Diego, EDITS Publishers.
- Lederman, T. (1995) Local Area Networks for K-12 Schools, *ERIC Clearinghouse on Information and Technology*, Syracuse, NY.
- Lily, E.R. (1989) Implementation of Computer Based Management Information System: A Behavioural Prospective, *Computer Education*, February 1989, pp. 24-27.
- Liong, K.C. (1994) The Status of CASA and Strategies for its Further Development in Negeri Sembilan Secondary Schools, *M.Sc Thesis*, Universiti Pertanian Malaysia.
- Liong, K.C., S.L. Gan and Noran Fauziah Yaakub (1993) Factors in the Implementation and Use of Computer Assisted School Administration: A Case Study of Negeri Sembilan Secondary Schools, *Jurnal Pendidikan Kementerian Pendidikan Malaysia*, Jld.38 Keluaran 83, pp. 24-3 1.
- Lunenberg, F.C. and A.C. Ornstein (1996) *Educational Administration: Concepts and Practices*, 2nd Edition, Wadsworth Publishing Co.
- Martinsons, M.G. and K.C. Kwan (1993) Intelligent Time Tabling Using a Microcomputer, *International Journal of Educational Management*, Vol.7 No.5, pp. 9-17.
- McMullan, T. and J. Gardner (1992) Administrative Informatics in Schools: The Northern Ireland CLASS Project, *Education and Computing*, Vol.8 No. 1-2, pp. 89-95.
- Merriam, S.B. (1988) *Case Study Research in Education: A Qualitative Approach*, San Francisco, Jossey-Bass Publishers.
- Merrill, P.F. *et al* (1996) *Computers in Education*, 3rd Edition, Allyn & Bacon, USA.
- Mitchell, S.P. and P. Wild (1993) A Task Analysis of a Computerised System to Support Administration in Schools, *Educational Management and Administration*, Vol.21 No.1, pp. 53-61.

- Moonen**, J. and B. Collins (1992) Changing the School: Experiences from a Dutch “technology-enriched **school**” Project, *Education and Computing*, Vol.8 No. 1-2, pp. 97-102.
- Murray, D. (1992) The School’s Curriculum, Management and Administration: An Integrated Approach, *Computer Education*, June 1992, pp. 3 1.
- Nogy, J.A. (1993) Comparative Analysis of User Experiences with Centralised vs. **Decentralised** Management of Academic Computing and Telecommunication Functions within an Institution of Higher Education, *Dissertation Abstracts International*, Vol.53 No.9, pp. 3070.
- Nolan, R.L. (1979) Managing the Crisis in Data Processing, *Harvard Business Review*, Vol.57 No.2, pp. 115-126.
- Omardin Ashaari (1996) *Pengurusan Sekolah: Satu Panduan Lengkap*, K. Lumpur, Utusan Publications & Distributors Sdn. Bhd.
- Ong C.S. and F.H. Tie (1995) Teknologi Maklumat dalam Pengurusan Pendidikan: Suatu Cabaran, *Jurnal Pendidikan Kementerian Pendidikan Malaysia*, Jld.39 Keluaran 83, pp. 1-8.
- Pelgrum, W.J. and T. Plomp (1993) *The IEA Study of Computers in Education: Implementation of an Innovation in 21 Educational Systems*, Oxford, Pergamon Press.
- Peterson, K.D. and J.E. Allen (1992) Uses of Microcomputers in School Teacher Evaluation, *Journal of Research on Computing in Education*, Vol.24 No.3, pp. 392-398.
- Pfennig, D.R. (1994) A Study of the Relationship between Administrative Computing and Instructional Leadership, *Dissertation Abstracts International*, Vol.55 No.5, pp. 1160.
- Radin, S. and H.M. Greenberg (1983) *Computer Literacy for School Administrators and Supervisors*, Toronto, Lexington Books.
- Reyes, M.E. and M.A. Murray-Lasso (1991) Administrative Applications of Computers to Education in Mexico, *Journal of Research on Computing in Education*, Vol.24 No.1, pp. 107-1 19.
- Schlosstein, S. (1989) *The End of the American Century*, Chicago, Congdon and Weed.
- Simpson, G. and T. Franklin (1989) Some Experiences of Introducing Computers into Administration, *Computer E&cation*, June 1989, pp. 26-27.

- Stewart, R.W. (1993) Selection and Use of Administrative Microcomputer Software by Oklahoma Secondary School Principals, *Dissertation Abstracts International*, Vol.54 No.5, pp. 1628.
- Streatfield, D. (1992) The Long March Towards Technology: Administrative and Management Computing in LEAs and Schools in England and Wales, *International Journal of Educational Management*, Vol.6 No.1, pp. 17-24.
- Szymanski, R.A., D.P. Szymanski and D.M. Pulshen (1995) *Computers and Information Systems*, Englewood Cliffs, NJ, Prentice Hall.
- Tajul Ariffin Noordin dan Nor Aini Dan (1992) *Pendidikan dan Wawasan 2020*, K. Lumpur, Arena Ilmu Sdn. Bhd.
- Vachon, P. (1992) Impacts of Informatics on the Organisation of School Boards and Provincial Projects in Canada. A Case Study: the Province of Quebec, *Education and Computing*, Vol.8 No.1-2, pp. 167-174.
- Visscher, A. J. (1991a) School Administrative Computing: A Framework for Analysis, *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 1- 19.
- ‘ _____ ’ (1991b) Computer Assisted School Administration - The Dutch Experience, *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 91 - 106.
- ‘ _____ ’ (1995) A Fundamental Methodology for Designing Management Information System for Schools, *Journal of Research on Computing in Education*, Vol.27 No.2, pp. 231-249.
- Visscher, A. J. and D.W. Spuck (1991) Computer Assisted School Administration and Management - The State of the Art in Seven Nations, *Journal of Research on Computing in Education*, Vol.24 No. 1, pp. 146-168.
- Walsh, D. (1993) Implementing Electronic Registration in Schools, *The School Management Handbook* 1993, Edited by Howard Green, Kogan Page, UK.
- Wiersma, W. (1995) *Research Methods in Education: An Introduction*, 6th Edition, Boston, Allyn & Bacon.
- Wild, P., J.E. Scivier and S.J. Richardson (1992) Evaluating Information Technology-Supported Local Management of Schools: The User Acceptability Audit, *Educational Management and Administration*, Vol.20 No. 1, pp. 40-48.
- Yi, Chin-Cheh (1995) A Study on Computerisation of the Public Vocational High School Administration and the Curricular Needs for Staff Training in Taiwan, *Dissertation Abstracts International*, Vol.56 No.2, pp. 527.

- Zhang, R. W. (1993) Administrative Utilisation of Microcomputers in the Public Secondary Schools of Georgia, *Dissertation Abstracts International*, Vol.54 No.2, pp. 399.
- Zisman, M. (1978) Office Automation Revolution or Evolution ?, *Sloan Management Review*, Vol. 19 No.3, pp. 1-16.
- Zuhaimy **Ismail** (1996) A Computerised Timetabling System and Case Studies, *Technical Report (LTM Bil. 2/1996) for Mathematics Department*, Universiti Teknologi Malaysia.