Title	A preliminary investigation of computer based curriculum support services in physical education
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A preliminary investigation of computer based curriculum support
services in physical education

by

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Abstract

The purpose of the study was to determine the potential of computer based support services in physical education and to validate the organization of a computer based curriculum planning in physical education system (CBCP-PE). The study sample included physical education teachers (n=10) from relatively new teachers (3 years experience) to more experienced teachers (25 years experience). A Teacher Interview Guide was developed to help structure the interviews. Teachers were generally supportive of the widescale implementation of computer based support services in physical education. They emphasized the systems potential for in-service in curricula knowledge.The main suggestion, however, was to focus on the instructional design component and emphasize student-teacher planning processes.

Intr.duction

Changes to the Ontario, Canada Ministry of Education guidelines r Physical and Health Education are pending and teachers will be looking for respon e and relevant suggestions for designing courses of study that reflec the Ministry of Education's intentions. Broadly speaking these intentions can be summarized by the notion that all students in the province of Ontario will have equal access to p .ysical and health education curriculum experiences which promote a positive attitude to phy cal activity on a daily basis throughout life. This is to be accomplished by an appropriate organization of courses which reflect the careful consideration of activity experiences and theoretical knowledge to support that experience. It is also to be accomplished by the careful use of teaching methodologies that promote student self direction and self responsibility in the physical activity and wellness setting. This suggests two main challenges to physical and health education over the next two or three years; one challenge is to define the appropriate theoretical and practical knowledge necessary for the course structure that the Ministry has recommended and secondly; the challenge of personalizing instruction to meet the needs of children with different levels of interest and skills in the physical education area. An enc ng challenge that has confronted the physical education profession over the last twenty years (in that sense it is not kne and has not come about through the Ministry's new guidelines) is the need o stay currer in the content-pedagogical knowledge that has grown exponentially in physical education. As a professional development challenge this is as important as the actual course changes themselves especially in light of the current interest in teacher education in this province and across Canada today.

Computer based curricu im planning in physical education (CBCP-PE)

One solution to each of the challenges aformentioned is to make available to all teachers and students computer based curriculum support materials that both support and embellish the existing content of physical education and promote student-self direction in physical education. The CBCP-PE program is organized around the unit approach to the development of curriculum materials. The resource unit is a reservoir of ideas and information that is organized on the basis of the entry level of the student as their perceived needs relate to the content, learning activities, additional resources and evaluation vices. For example, the student might be a beginner, intermediate or advanced performer and the teacher would locate

cular objectives related to that students level in an activity setting. The activity could be anything from volleyball to dance to rock climbing. Having identified a centre of interest for the unit a bank of instructional objectives i be developed for

eac'. topic area and for each objective items of instructional content, learning activities resource materials and measuring devices will be designed. The production of these five components involves a significant amount of professional expertise and imagination in order that literally hundreds of objectives and other data base items will be available to teachers and students.

With the help of the computer the teacher or the student or both are able to locate specific objectives from which they can access information pertaining to the content of the objective, learning activities to facilitate the attainment of the objective, resource materials to enrich the lesson ideas and evaluation devices to determine the level of accomplishment of the student.

Perhaps the most exciting development to date both for the professional and sub-disciplinary elements of physical education is the inclusion of a curriculum planning dimension to the program. This aspect of the program encourages the teacher to reflect conceptually on the important purposes of physical education in the curriculum that go beyond the specific lesson objectives. The process of decision making will eventually lead the teacher to the resource unit information explained earlier but perhaps as importantly allows for an integration of the disciplines of phy al education as well as a coherent application of theoretical/practical lessons in the school curriculum. Such a framework can be applied to physical education curriculum at any grade level and can be used to define the important learning outcomes by course - in particular those recommended at the intermediate senior level by the Ministry of Education.

The most comprehensive decision making curriculum framework in physical - education today is deemed to be the Purpose Process Curriculum Framework (PPCF) developed by Jewett and Mullan (1977) and updated in the Journal of Teaching in Physical Education (April, 1986). Based upon the changing orientation from a practical to a practical/theoretical foundation the PPCF serves to define the theoretical parameters of the field and facilitates an integration of both the play education and the kinesiological models. No other conceptual framework available today has been as thoroughly investigated nor is as comprehensive in its coverage of the entire field of physical education. The model is based upon three key concepts or purposes of human movement namely, fitness in the curriculum, motor skill development and socio-cultural aspects of physical education. These dimensions have each been defined in terms of 7 major concepts and twenty two key purpose elements.

Review of Literature

Research conducted on interactive support systems for teachers dates back to the mid-sixties and is based on the comparatively limited abilities of earlier

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computer technology to make information available to teachers. It was also focused upon subjects other than physical education and on instructional units, for the most part, at the elementary level. However, the early research data on the potential of computer based resource units on teachers and students was very encouraging. Harnack (1976) notes a much greater professional involvement in the teaching process by teachers who use the computer based ideas as well as enriched learning environments for children involved with those teachers. Holden (1966) reports that teachers who use computer based materials became increasingly aware of a greater range of educational ideas and instructional materials. Fields (1977) examined the possibility of on-site terminals linked to a main frame computer for accessing curriculum materials. He concluded that interdisciplinary planning is possible through on-site terminals and the depth of information increases proportionately to the extent that teachers interact with the resources on the main frame.

An important study by Burr (1970) on student participation in the selection of instructional objectives using a computer revealed some interesting findings. Burr concluded that students who participate in the selection of objectives for their use seemed more motivated learners. This finding was supported later by Chapman (1977) who also made reference to the enjoyment and satisfaction on the part of teachers and students when using the computer to plan learning objectives. Burr also commented that teachers and students select different objectives when working from the same collection of objectives independently from one another. The teachers selected a higher percentage of cognitive objectives than did students and teachers who planned together where the balance between affective and cognitive objectives was comparable. Teachers and students who plan together agree more closely on a final grade than those who don't plan together. When collaborative student-teacher planning occurs there is a greater desire for more cooperative planning in the future and a general improvement in the instructional process.

Eisele (1966) undertook an interesting study on the effects of a CBCP facility on the critical thinking skills of students. He concluded that the use of the computer retrieval system can help students to develop critical thinking skills and the computer can help to individualize instruction for critical thinking skills. Holden (1966) expands on the potential of the computer for individualizing instruction in schools in his research on the changes in instructional behaviours of teachers using the computer to individualize instruction. It was found that teachers using computers for planning and instructional purposes demonstrated a significant increase in the following individualized instructional tasks:

    a)   encouraging independent thinking,

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b) creating a positive atmosphere in the classroom,

c) motivating students through appropriate challenges,

d) employing a wider range of instructional materials and instructional methodologies,

e) encouraging more pupil to pupil involvement and greater pupil-teacher interaction.

Goldberg (1966) investigated the pre-planning time of teachers using a computer based resource unit. He also looked at the classroom behaviours of teachers using the unit and the actual differences in the units themselves when planned using a computer and when planned manually. Goldberg concluded that teachers needed considerably more time to plan when using a computer resource unit than those that did not use a resource unit. Teachers using the computer spend more time individualizing instruction than teachers who did not use the computer. Teachers' classroom behaviour changed to include more individual and small group work than lecture presentations. Teachers using the computer were much more effective in developing a complete unit of instruction than those teachers not using the computer. Finally, Goldberg witnessed an increase in the variety and depth of teacher decision making across all aspects of the curriculum unit. Hicken's (1965) research looked at the effects of the use of a computer in assisting teachers in pre-planning a teaching unit on the United States Constitution. His results suggested that the computer generated resource guide had a positive influence on the achievement scores of the experimental study group. He concluded that an increase in student participation in instructional design and student independence in instructional decision making occurred through the use of CBIRU's.

On the basis of these findings as well as on the growing significance of computer's in society and the availability of computer technology in today's schools it seems reasonable to conclude that the use of computer based support systems would:

1. elevate a teachers sense of professional empowerment

2. provide students with more relevant and interesting lesson content that might motivate them to further study.

3. enable the teacher to respond more carefully to individual difference rather than just grade level differences

4. enable relevant research findings in the physical activity and health sciences to be more readily available to teachers and students.

As much as the original research data on the role of computer based support services in schools,

1. did not include physical education

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2. was conducted over twenty years ago in some cases

3. was based on less efficient computer technology

4. was undertaken in an American setting

it was deemed appropriate to undertake a pilot investigation in a Canadian context.

Purpose of the study

The purpose of the study was toelicit feedback from teachers about the use of computer based curriculum planning in physical education in schools.

Method

This qualitative study involved interviewing teachers (n=10) from a large School Board in southern Ontario, Canada using the Teacher Interview Guide. Interviews were considered an appropriate strategy because:

a) they provide an opportunity for the open searching and probing of related ideas to a given theme such as a teachers attitude to planning using a computer.

and

b) Interviews scheduled at a teachers convenience increased the likelihood of the teacher participating in the study.

Content validity for the structure of the interview questions was ascertained by soliciting feedback from three university teacher educators and six graduate students who were practicing teachers on an M.Ed. degree course.

Subjects

Interview sample. The ten teachers in the interview sample covered a range of professional experience from three years to twenty three years of teaching in the school systems of southern Ontario. There were 6 male and 4 female teachers in the group and included 5 heads of department. There academic credentials ranged from the B.P.E. degree to the M.Sc. and M.Ed. with five teachers reporting holding the ATQ specialist certificate in physical education. They were all teaching physical education at the intermediate/senior level.

Instrument

The CBCP-PE Teacher Interview Guide

The CBCP-PE Teacher Interview Guide assessed the teachers attitude toward:

a) computers in physical education curriculum planning

b) there concerns about using the computer as a planning tool

c) the hardware they preferred to use

d) the need for up - to -date information in physical education

e) being able to create the curriculum guide as well as to be able to change it on an on-going basis

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f)   sharing curriculum ideas with colleagues across the system

Procedures

The teachers involved in the study were provided with an in-service session lasting three hours on the computer based curriculum planning idea and the use of the Purpose Process Curriculum Framework. Each interview in the days following the in-service lasted approximately twenty minutes and was based on the questions on the Teacher Interview Guide. The interviews were conducted in the subjects schools either over a lunch break, after school or during a preparation period. A letter from the investigators explaining the purpose of the study and assuring confidentiality and anonymity was provided for each of the teachers who were then asked to complete an "informed consent " form. Each interview was recorded in its entirety and transcribed word for word.

Data Analysis   .

Four interview transcripts were independently identified by three investigators as providing the most detailed analysis of the potential of computer based curriculum services in physical education teaching-learning. The four teachers whose transcripts were independently identified by the researchers for further study ranged in educational experience from a liberal arts B.A with a series of Additional Teachers Qualifications (ATQ) courses in physical education to an M.A. in physical education. The years of teaching experience ranged from four year to nineteen years. Both male and female teachers were in this group. Two research assistants were asked to read the transcripts several times paying attention to aspects of the transcript that might represent the teachers prevailing attitude to computer based support services as well as to its potential or lack of potential for use in schools. The following questions were asked of the research assistants as they read the transcripts:

Is there a sense in the transcript that this subject, given the opportunity to use the computer based support service, seemed excited about using it?
Was there anything in the transcript to suggest that the computer based support system was not going to be of any value?
What was the most important aspect of the computer based support service for a given subject based on the transcript.

Controls for investigator biais

The principal investigator did not interview any teachers or analyze any of the transcript data and the research assistants did not attend the in-service seminar And were not physical education teachers themselves. They did however have an understanding of the purpose of the project and the design of the computer based

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planning system. The interview guide was designed specifically to guide the interviewers through the interview. The research assistants listened to each others tape to ascertain if any of the questions or in fact any of the dialogue was in any way value laden in one direction or another toward the computer based support system. Each investigator interviewed five subjects each and analyzed the tapes of the other subject where they identified three subjects who seemed represrentative of their groups sentiments and ranked them from cne to three. They then analyzed each others groups and annonymously ranked three subjects again. When the subjects ranked by both researchers coincided then these subjects were selected for further study.

It was evident that there were recurring themes in the interviews of all the subjects that clearly represented the subjects feelings about CBCP-PE. These included:

1. Implementation issues
2. Curricula knowledge
3. Professional isolation
4. Student teacher planning
5. Student self directed learning

Results and Discussion

The following material is based upon the interview tapes and subsequent written transcripts of physical education teachers views of the computer based support system.

1. Implementation

All the teachers who were cautiously optimistic about the success of a wide scale implementation because as one teacher said,

I don't have a computer at my home mainly because I get nervous just looking at it. I even have trouble putting my final grades in the school computer! So I don't think every teacher will be interested or able to use the computer for teaching purposes. Maybe the younger teachers should be the people who you really try to get to use it.

(Teacher with 18 years of teaching experience and limited physical education background)

The notion of computer use for professional activities being fun in and of itself sparked our interest in that we were looking for references to motivating experiences. A related comment by one teacher who suggested that the time at the workshop went quickly, "especially after we started to work on the Macintosh" also served to reinforce our belief that the computer could be a professionally motivating facility for teachers if presented in a responsive and meaningful manner.

2.   Curricula knowledge

Shulman (1987) has made reference to the forms of knowledge required of professional teachers in any subject field and suggests it can be classified in terms of content knowledge, knowledge of educational purposes, knowledge of the learners and their characteristics and curricula knowledge. In physical education Jewett and Bain(1985) expand upon the notion of curricula knowledge in an enlightening text called, The Curriculum Process in Physical Education. Reflective practitioners (Calderhead, 1986) make use of curricula knowledge in the development and design of their school programs. What becomes evident from our analysis of the interview transcripts is that the organization of the computer based curriculum planning in physical education facility enhanced the curricula knowledge of in-service teachers. It was by itself an excellent in-service format for teaching contemporary curricula orientations to practicing teachers. As one teacher explained:

> When you ask me about what I liked about the computer stuff ?I guess the first thing that struck me was the levels of organization of the curriculum. I've always thought there were some fitness benefits or whatever you call them - purposes.?I figured that we were into character training and teaching sport skills but the way you had each level organized into curriculum packages or objectives really helped me to focus on my own program and my own preferences. I guess that's like my philosophy of physical education? It really helped too when we did the class activity and were asked to emphasize different aspects of the curriculum by grade level. Then when we had to include schools from different neighbourhoods and think about the kids in those schools it was kind of interesting to see how our curriculum objectives changed to fit the kids. I think I learned more about curriculum in physical education from that session than in my last twelve years of teaching - yes, that was really good.
>
> (Teacher of physical education, BPE, B.Ed. 12 years of teaching experience)

The potential of the computer for enhancing the in-service curricula knowledge of teachers could make for an important contribution to the field in that there is a great deal of curricula autonomy in physical education due to the absence of text books and standardized achievement tests. In describing the American situation Bain (1990, pp.766) notes that, "Although some states have mandated curricula content in physical education, most of the decision making authority rests at the local level." This is rather similar to the circumstance in Ontario and Canada generally.

3.   Professional isolation

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A second trend in the analysis of the interview transcripts in relation to the most important aspects of the computer based support services was the possibilities for teacher collaboration between schools on curriculum ideas. It was clear during the presentation of the workshop to teachers that the problem of professional isolation among physical education teachers was of genuine concern among teachers. The discussion that ensued at the workshop on being able to enter teaching ideas into the system and then to access ideas that other teachers might also suggest was motivating to many teachers. One teacher's comments serve as a particularly appropriate summation of this issue:

> I was never really sure if what I was doing was right or if it was good enough or if other people were doing the same things in class as I was. I work with the kids on my own almost every class and although I have walked through the gym and seen other people teaching I thought if I stayed I would just embarrass them so I didn't stay and watch. In fact most times, when I first started teaching, I didn't really see any skill teaching going on, just games so I figured I'd do just games myself. Then I realized that this couldn't be right! I was taught lesson formats that included drills and I thought I was cheating the students if I didn't at least try to teach them some skills. So, now I do some skills and some games and most classes seem to enjoy it. What gets to me though is that I am sure there are some better ideas out there that people who really know a sport are using and I would love to try them myself. You know, our in-service days don't always give us much new, if any, physical education curriculum information and I have a small family now so I can't do weekend courses like I used to. Such is life! I think that idea of everyone in the Board being able to share their ideas is fantastic and I know I would use it all the time.
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> (Female teacher with seven years teaching experience and a BPE, B.Ed degree)

4.   Student - teacher planning.

Perhaps the most consistent reference in relation to the most important aspect of the computer based support services was the potential for student teacher planning and implementation. As Glenn Hass (1980 pp.258) emphasizes in his chapter on "Who should plan the curriculum?",

> Too little use is made of teacher-student planning. The understanding and skills of planning are among the most important outcomes of education. . . . . While student participation in the choice of topics may be possible only in certain subjects, there is no reason why extensive use of the other aspects of

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teacher -student planning should not be used in all subjects.

In almost every transcript that the research team analyzed and consistent through the six that we selected for indepth review was the teachers interest in the systems application to students. One teacher was clearly aware of the importance of self directed student learning whenever and wherever possible and said:

> . . . .you know I always look for ways of getting students to take some responsibility for their work in the classroom but I could never really figure out how I could do this in physed. What you described to me in the workshop was a fantastic method of getting students to plan their own materials. I could probably get the computer room for a lesson and show the students what objectives they could select from and they could pick their drills - probably for themselves and a partner. Yeah, that's it, partners would be good! And, are there tests on the computer did you say? (Yes) Then they could pick which test they wanted to use to evaluate their work. It sounds super. Yes, I think that could help to change the way we teach physical education for the better in this school.

> (Phed teacher with 11 years teaching experience and a BPE)

5.   Student self directed learning

A second teacher felt more strongly about using the computer, not so much for teacher planning strategies but for student planning. She said,

> I think you are going about this idea all wrong. First off, most teachers have got drills and tests etc. for all kinds of units and don't need to look at the computer for ideas. Also, when do we get the time? I think your best bet if you want to get this in the schools is to design it for students to use on their own or with the teacher in designing their own units and programs. I don't know how you would change it to do just that but I bet it wouldn't be too difficult. Now I think about it you are more likely to get more teachers to buy into the idea if it was set up as an idea for getting computers into the physical education program than to help teachers plan.

> (Female Physical education head of department, 5 years teaching experience)

The six teachers whose transcripts were analyzed in this section were representative of the study sample and all were generally interested in the possibilities and would like to get involved with the implementation of the project. Some teachers would prefer to use the concept for their own planning and presentation of materials, others like the idea of sharing materials with other teachers but almost all of them emphasized the potential for student teacher planning and/or student planning using the computer as being the concepts greatest advantage.

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Conclusions

The results from this study support the continued development of a computer based support service for teachers of physical education at the intermediate/senior level in Ontario. The following conclusions may be drawn from the findings:

1. A user friendly system is essential to successful implementation.
2. An aesthetically pleasing visual display is very important for continued use.
3. Teachers' enjoyed curriculum work on the computer
4. Computer based curriculum planning system could be an excellent in-service facility for the development of curricula knowledge in physical education.
5. Student-teacher planning is a more appropriate focus than just teacher planning.
6. Student self directed planning could be an achievable and measurable goal in physical education with the help of the computer
7. The structure and services offered by the existing software was well supported by the teachers.
8. The terminology of the elements still needs to be simplified, especially for student use.

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