

A Cost Effective Approach to Traumatic Brain Injury Rehabilitation

The Case for a Systematic PDA Curriculum to Help Our Servicemembers with TBI



whitePAPER

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EXECUTIVE SUMMARY

A proven curriculum package for training individuals with traumatic brain injuries (TBI) to use hand-held computers provides a cost effective solution for treating this signature wound of the wars in Iraq and Afghanistan. An estimated one in five soldiers (or 300,000) return home from Operation Iraqi Freedom and Operation Enduring Freedom in Afghanistan with mild to moderate brain injuries. These injuries result in temporary or permanent cognitive, physical, and psychosocial symptoms. Pentagon and Veterans' Administration officials must develop efficient and effective methods to treat service members with brain injuries. Blast injuries, a new phenomenon caused by improvised explosive devices, are complicating diagnosis and treatment. President Obama has made treatment of these soldiers a priority of his administration. Costs of treating mild traumatic brain injury are estimated at \$30,000 per year per soldier, so finding a cost effective method of rehabilitation is essential.

A curriculum based on the latest educational and neuropsychological research has already been developed and piloted with TBI survivors. In an eight-week training program, survivors used a new PDA textbook specifically designed with brain injury survivors in mind, *Memory Compensation Using the Pocket PC: Making Cognitive Connections for Brain-Injury Survivors*, to learn how to program their own Pharos PDAs with GPSs. They increased self-sufficiency by being able to schedule and to remember their own appointments and tasks and to avoid getting lost, whether on foot or in an automobile. All participants elected to purchase their own PDAs after the training.

The textbook and PDA are both available through the Military Health Program's Computer/Electronic Accommodation Program (CAP). In the textbook, for each PDA function, users:

- Read about what it is and how to do it;
- Follow steps to perform that function on the PDA;
- Make the cognitive connection by learning what cognitive skills are being used to perform the task; and
- Identify real-life examples from outside the realm of the PDA which require use of the same cognitive skill.

A DVD with demonstrations of each PDA function is available as well as an online course to train students to use the PDA to increase self-sufficiency after TBI. Family members, professionals and paraprofessionals involved in providing support to individuals with TBI can also benefit from the training program so that they can facilitate PDA usage for those with TBI.

As the number of soldiers identified with TBI increases, the need to provide cost-effective rehabilitative services will also increase. The co-authors of this curriculum have over three decades of combined experience in developing and delivering curriculum and directing a cognitive rehabilitation program based at Coastline Community College in California. The educational setting (as opposed to a medical one) lends itself to the group approach which can accommodate the large numbers of soldiers and veterans with TBI.

TABLE OF CONTENTS

| | |
|--|----|
| Executive Summary..... | ii |
| Treating 300,000 Soldiers with TBI after OEF/OIF | 1 |
| Scope of the problem..... | 1 |
| Effects of brain injury..... | 1 |
| Costs of treatment..... | 2 |
| PDAs already issued..... | 2 |
| Curriculum and Textbook Are Key to PDA as Memory Prosthetic after TBI | 3 |
| Compensating for memory problems the old-fashioned way..... | 3 |
| Employing technology as a memory prosthetic..... | 3 |
| Cost effective group training via an <i>educational</i> , not a <i>medical</i> model | 3 |
| Low Cost, “Coolness,” Scalability of Online Training Make PDAs the Ideal Solution for Memory Compensation and Cognitive Rehabilitation..... | 6 |
| Double the benefit: Memory compensation plus cognitive retraining for other deficits..... | 6 |
| The “coolness factor.” | 6 |
| Synchronizing data to PC..... | 7 |
| Size does matter | 7 |
| Online training available..... | 7 |
| Technical Specifications..... | 8 |
| PDA Training Available for Soldiers, Vets, Their Families and Their Rehabilitation Providers..... | 11 |
| Mild TBI and moderate/severe TBI both benefit from the PDA..... | 11 |
| Family members benefit..... | 11 |
| Professional and paraprofessional service providers benefit..... | 12 |
| Case Study: PDA Curriculum Already Successfully Piloted with Adults with TBI | 12 |
| Pilot study..... | 12 |
| Testimonials..... | 13 |
| Conclusion..... | 13 |

TREATING 300,000 SOLDIERS WITH TBI AFTER OEF/OIF

SCOPE OF THE PROBLEM. Traumatic Brain Injury (TBI) presents a significant problem for the United States in dealing with soldiers returning from Afghanistan and Iraq. Extrapolating from Veterans' Affairs and Department of Defense (DoD) statistics, the authors of the RAND Report¹ estimated that 1 in 20, or 320,000 veterans so far, report having experienced a probable TBI during deployment in Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF).

Service members suffering brain injuries from shrapnel is not unique to these particular wars. But in addition to at least 1,800 U.S. troops sustaining penetrating head wounds, potentially hundreds of thousands more (at least 30 percent of troops engaged in active combat in Afghanistan and Iraq for four months or more) may have suffered a mild TBI as a result of exposure to blast waves from improvised explosive devices (IEDs). These so-called blast injuries are what make the current TBI situation unlike anything faced before, in terms of scope, diagnosis, and treatment.

Treating wounded service members and veterans with TBI will be a priority of the new administration. As President Barack Obama stated in his speech announcing his intention to nominate retired Army Chief of Staff Gen. Eric K. Shinseki as his Secretary of Veterans' Affairs, "Government must do everything it can to help those veterans who suffer from the signature injuries of the wars in Iraq and Afghanistan – post-traumatic stress disorder and traumatic brain injury."²

EFFECTS OF BRAIN INJURY. Brain injuries can result in various types of physical, cognitive and psychosocial deficits, many of which make return to productive vocational activities and fulfilling interpersonal lives difficult if not impossible. Examples of just some of these deficits are:

- **Physical:** Balance difficulties, fatigue, pain, weakness on one side of body, uneven gait, decreased motor speed, seizures, sensory deficits
- **Psychosocial:** Personality changes, mood swings, lack of emotional responses, depression, substance abuse, decreased ability to tolerate frustration, lack of initiative

¹ RAND Corporation, 2008. *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences and Services to Assist Recovery*, edited by T. Tanielian and L. H. Jaycox, L. H. Available online at http://www.rand.org/pubs/monographs/2008/RAND_MG720.pdf [accessed January 3, 2009]

² Garamone, J. (2008, December 9). Obama taps Shinseki as next Veterans Affairs chief. [Source: American Forces Press Service]. Available online at http://www.armywell-being.org/skins/wblo/display.aspx?ModuleID=f6c229ca-03ae-4c81-8d0a-81a5a0c208f9&Action=display_user_object&CategoryID=77da61e7-0de9-4cac-bf6c-5d604282a9aa&ObjectID=d3ab723c-6ee1-4da9-a401-d710cb8c97fa&AllowSSL=true. [accessed January 3, 2009]

- **Cognitive:** Impairments in attention/concentration, memory, visual or auditory perceptual processing, verbal reasoning, critical thinking/logic, language, awareness/insight³

Several, but clearly not all, of these effects can also be seen in individuals with post traumatic stress disorder or with depression. Therefore, a diagnosis of TBI may be missed. Of course, open head wounds are obvious, but soldiers may walk away from exposure to a blast injury without showing immediate symptoms. Not until leaving the organized structure of military life may a soldier first notice the effects of a mild brain injury. Without a regular schedule to follow, he or she may find that impairments in initiation or organization are exacerbated. He may be unable to recall names of friends or family or to find where he parked his car in a parking lot. Despite the best intentions, keeping doctors' appointments or completing assigned tasks may seem to be impossible. Feelings of being lost, out of control, incompetent or unproductive may lead in turn to conflict with family members or co-workers. Depression may result or, if already present, deepen.

Fortunately, the DoD has established guidelines for screening, and in the future, fewer wounded warriors will fall through the cracks. But as improvements occur in screening of returning service members, more and more individuals with TBI will be needing services, necessitating cost-effective, scalable treatment models. As the RAND Report noted, the Defense Center of Excellence for Psychological Health and Traumatic Brain Injury, housed within the DoD, represents a historic opportunity to prioritize a system-level focus on monitoring and improving quality of care.

COSTS OF TREATMENT. As a result of decentralization both within and between the Department of Defense and the Veterans Health Administration, mental health services for TBI patients vary considerably (Department of Defense Task Force on Mental Health, 2007). Estimates of the one-year cost of mild TBI range from \$27,259 to \$32,759 per case; estimates of moderate or severe TBI costs range from \$268,902 to \$408,519 per case. Clearly, more cost-effective treatment models should be considered.

PDAS ALREADY ISSUED. Some soldiers with TBI are being issued the devices, but many are not receiving adequate training in how to program them. There is currently no standardization of type of device. It is unrealistic to expect clinicians to be expert in every device on the market.

³ Schwartz, S.H. (2002). "Traumatic Head Injury," In Brodwin, M. G., Tellez, F., & Brodwin, S. K. (Eds.), *Medical, psychosocial, and vocational aspects of disability (2nd ed.)*. Athens, GA: Elliott and Fitzpatrick.

CURRICULUM AND TEXTBOOK ARE KEY TO PDA AS MEMORY PROSTHETIC AFTER TBI

COMPENSATING FOR MEMORY PROBLEMS THE OLD-FASHIONED WAY. For many years, brain injury rehabilitation professionals have advised their patients to carry a notebook at all times in order to write down important events, tasks, appointments, etc. as a way to compensate for impairments in memory. Just as amputees improve independence with a prosthetic limb, individuals with memory impairments improve independence with a memory prosthetic. But carrying a notebook is stigmatizing. Few patients complied consistently; more rejected the strategy completely. Most fell in between.

EMPLOYING TECHNOLOGY AS A MEMORY PROSTHETIC. In a recent study funded by the National Institute on Disabilities and Rehabilitation Research (NIDRR),⁴ however, people with TBI who used traditional paper notebooks did not perform as well as those who used hand-held computers (i.e., pocket PCs or personal digital assistants; PDAs), which were programmed by the experimenters' associates to prompt the users to perform various common tasks. Not only did PDA use improve functioning, but use of the PDA also improved sociability, self-esteem and independence.

COST EFFECTIVE GROUP TRAINING VIA AN *EDUCATIONAL*, NOT A *MEDICAL* MODEL. To program PDAs individually for hundreds of thousands of soldiers with TBI would be a daunting and--fortunately unnecessary—task. Individuals with TBI can be taught to program their own PDAs and can learn other important cognitive retraining skills in the process, using a proven, structured curriculum designed and already being used for group instruction. Using a textbook specifically designed for their unique training needs, individuals with TBI⁵ can learn to track their own appointments, create to-do lists, set reminder alarms, store and recall names and addresses, take notes, even plan and record budgets and find directions to avoid getting lost. With this innovative approach, they can also learn to apply the skills they learn in PDA training to the other real-life activities that cognitive rehabilitation programs typically address.

This approach allows treatment (or, teaching and learning, rather) to take place in an educational setting, as opposed to a medical one. Empirical research supports this approach. In an exhaustive review of 20 years of research articles about successful treatment of memory, Ehlhart and her colleagues concluded, "Clinicians typically do not view themselves as the designers and conveyors of curricula. However, this is ultimately

⁴ Gillette, Y. & DePompei, R. (in press). Do PDAs enhance the organization and memory skills of students with cognitive disabilities? *Psychology in the Schools*. (NIDRR Project #H133A030810)

⁵ Wild, M. & Schwartz, S.H. (2008). *Memory Compensation Using the Pocket PC: Making Cognitive Connections for Brain-Injury Survivors*. Laguna Hills, CA, ID 4 the Web.

what must occur in order to implement the instructional procedures supported in the literature.” p. 326⁶

Clearly, Ehlhart would advocate the adoption of an educational model to improve future cognitive retraining programs. Meanwhile, for over 30 years, Coastline Community College’s award-winning Acquired Brain Injury (ABI)⁷ Program in Orange County, California, has been a leader in successfully providing educationally-based cognitive retraining to adults with mild, moderate and even severe TBI.⁸ Adults with brain injuries face a lifetime of learning to use their “new” brains and like the concept of education as “students” rather than as “patients” for life. Learning in a group is also more cost-effective than learning in an individual therapy setting.

In 2008, in a natural progression beyond the results of the NIDRR study, a Coastline ABI Program professor and the former program director showed that adults with TBI can program their own PDAs successfully. Using a textbook designed to combine training in use of the PDA as a memory prosthetic with some broader principles of cognitive rehabilitation, Coastline students have shown remarkable success. Unlike a typical memory workbook or PDA manual, which many users find frustrating and technical, this book is much more than a reference source; it was created through participatory design of the users in a conscious effort to be structured as a learning tool for adults with ABI to attain self-sufficiency. For each PDA function, users:

- Read about what it is and how to do it;
- Follow steps to perform that function on the PDA;
- Make the cognitive connection by learning what cognitive skills are being used to perform the task; and
- Identify real-life examples from outside the realm of the PDA which require use of the same cognitive skill.

This approach is unique because it teaches how to use a PDA by focusing on the cognitive skills (attention to detail, sequencing, etc.) required to program and use the PDA, and then has the user apply those same cognitive skills to their everyday lives.

⁶ Ehlhardt, L. A., et al. (2008). Evidence-based practice guidelines for instructing individuals with neurogenic memory impairments: What have we learned in the past 20 years? *Neuropsychological Rehabilitation*, 18(3), 300-342.

⁷ The program name was changed from TBI to ABI to reflect its service to individuals whose brain injuries were caused by atraumatic (e.g., brain tumor, stroke, anoxia) as well as traumatic (e.g., gunshot, auto collision, fall) causes.

⁸ Schwartz, S. H. (1998). *Acquired brain injury program* [Winning application for state exemplary program award]. (Report No. JC-990-152). Costa Mesa, CA: Coastline Community College. (ERIC Document Reproduction Service No. ED428799). Available at http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_ERICExtSearch_SearchValue_0=ED428799&ERICExtSearch_SearchType_0=no&accno=ED428799 (Accessed January 3, 2009.)

The PDA training, applied in particular to memory compensation techniques, is used as a relevant, real-life activity. Not only do users learn how to use the PDA, but they also complete structured exercises to help make cognitive connections between what they are learning to do with the PDA and what they need to do in their daily lives. So the approach simultaneously provides general cognitive stimulation, attempts to build specific new neural pathways, prepares the user to apply what he or she is learning to real life, and teaches a highly effective memory compensation strategy.

Thus, this approach incorporates both of the two approaches (namely functional-experiential and cognitive-didactic) to rehabilitation which were demonstrated to be effective in a controlled study by researchers at the University of South Florida and the Defense and Veterans’ Brain Injury Center.⁹

In the partially-excerpted table below, just three examples of the many cognitive skills discussed in the book are shown with their connections to applications on the PDA and in real life.¹⁰

| Skill | Definition | PDA Examples | Life Examples |
|---|--|--|--|
| Attention to detail | Paying attention to all parts of a task, no matter how small | Find the GPS button; put the stylus back into its storage location | Check your writing for typographical errors; find spots on laundry to spray before washing; put your keys back into their storage location |
| Recognizing Visual Similarities and Differences | Distinguishing elements that are the same (or different) in color, shape, size or position | Distinguish between the Calendar’s Day and Week views | Distinguish between two similar but unmatched socks; distinguish between closely sized drill bits |
| Visual Memory | Storing and retrieving from memory a previously seen image | Identify the Contacts button | Identify the face of your doctor or the corner where you need to turn to go to her office |

Not only did this approach result in 83% of students demonstrating over 80% competency on how to use the devices, but it also met some important instructional design criteria identified by Ehlhart and her colleagues in their thorough review article.

⁹ Vanderploeg RD, Schwab K, Walker WC, Fraser JA, Sigford BJ, Date ES, Scott SG, Curtiss G, Salazar AM, Warden DL. Rehabilitation of traumatic brain injury in active duty military personnel and veterans: Defense and Veterans Brain Injury Center randomized controlled trial of two rehabilitation approaches.

¹⁰ Wild, M. & Schwartz, S.H. (2008). *Memory Compensation Using the Pocket PC: Making Cognitive Connections for Brain-Injury Survivors*. Laguna Hills, CA, ID 4 the Web, p. 4.

They used the results of their literature review to develop practice guidelines for teaching individuals with memory impairments,¹¹ and the PDA textbook's approach satisfies nearly all of these guidelines. For example, as Ehlhart recommends, the PDA textbook's approach minimizes "errorful" learning by having students copy the steps performed by their instructor. Similarly, as Ehlhart suggests, the students get multiple practice opportunities and these trials are spaced out in time, and the book provides multiple examples of each skill set and reviews after each lesson. In using the book, the students also get the practice they need in integrating the PDAs with other cognitive strategies. Finally, as Ehlhart recommends, the students get practice with feedback in applying their strategies to real-life contexts. The students use the PDAs to schedule their lives and get feedback on their success in such tasks as entering the items in their schedules and setting the alarms.

LOW COST, "COOLNESS," SCALABILITY OF ONLINE TRAINING MAKE PDAS THE IDEAL SOLUTION FOR MEMORY COMPENSATION AND COGNITIVE REHABILITATION

DOUBLE THE BENEFIT: MEMORY COMPENSATION PLUS COGNITIVE RETRAINING FOR OTHER DEFICITS. The PDA textbook's approach achieves two goals simultaneously. It leverages the high motivation of individuals with brain injuries to learn compensation strategies for their often obvious memory challenges to also provide training in other cognitive areas. These critical areas, such as visual processing, attention to detail, and identification of relevant and irrelevant information, are much harder for most individuals with brain injury to recognize, so they are much more difficult to remediate. But with the PDA textbook's Cognitive Connection approach, it incorporates increasing awareness of these skills into the curriculum for memory compensation, thus harnessing a more common motivating force. Thus, it provides the basis for a cognitive retraining program and a memory compensation system in one.

THE "COOLNESS FACTOR." Because all kinds of people--everyone from teenagers to executives--can be found sporting PDAs (e.g., Palms) and PDA phones (e.g., BlackBerrys), there is no stigma to carrying this type of device at all times. Such a device is in no way associated with disability. Therefore, rather than avoiding compliance with this memory prosthetic method, in fact, some individuals with TBI are attracted to the "coolness" of the device, and compliance is much greater than with other memory compensatory systems, and higher success is achieved.

¹¹ Ehlhardt, L. A., et al. (2008). Evidence-based practice guidelines for instructing individuals with neurogenic memory impairments: What have we learned in the past 20 years? *Neuropsychological Rehabilitation*, 18(3), 300-342.

SYNCHRONIZING DATA TO PC. One of the greatest disadvantages of the traditional paper notebook systems for memory compensation was that when individuals lost them, they had in effect lost their memories. Now, with the capability of synchronizing the data on the PDA to a home computer with a personal information program such as Microsoft Outlook, the individual with TBI can limit losses to just one day's worth of data.

SIZE DOES MATTER. The small size of the PDA allows for a very powerful prosthetic device to be available almost at all times. Consistently being able to keep the device in a pocket or purse also makes it easier to avoid losing the device.

ONLINE TRAINING AVAILABLE. Coastline College's ABI program already offers an online course in how to use the PDA, currently taught by one of the PDA textbook's authors. The course is available to soldiers through Coastline's Military Department for a nominal fee.¹²



For veterans or reserve and guard members living in rural areas with scarce resources for brain injury rehabilitation, or if they are able to visit the VA centers only occasionally, the ability to access this training remotely will be beneficial.¹³ In cases in which an Internet connection is not available, the student can obtain the training course on DVD.

As described in the Training section below, this online training can be adapted to "train-the-trainer," so that a trainer can learn alongside the PDA user until he or she has mastered the skills to teach the class independently. The trainer could be a military or VA employee or even a community mental health worker, as in the case of a remote rural location.

¹² Coastline Community College was recently honored by the Council of College Military Educators with its 2009 Institution Award in recognition of the college's significant contributions to the cause of military education.



¹³ Prior to the current wars, the federal government recognized the difficulty of treating TBI in rural areas and through the Health and Resources and Services Administration (HRSA) had established the Traumatic Brain Injury Program, which through planning and implementation grants helps states to establish TBI networks for treatment and information dissemination. The TBI Program has already begun to encourage telehealth technology solutions for individuals with TBI in rural areas. Source: Using telehealth technology to better treat TBI: rural providers gain expertise to help this growing patient population. [Behavioral Healthcare](http://goliath.ecnext.com/coms2/gi_0199-7992673/Using-telehealth-technology-to-better.html) 01-MAY-08 Available online at http://goliath.ecnext.com/coms2/gi_0199-7992673/Using-telehealth-technology-to-better.html Accessed on January 3, 2009.

TECHNICAL SPECIFICATIONS

| Pharos/Windows Mobile TBI Packages | |
|--|---|
| Pharos 535 GPS/PDA | Pharos Traveler 127 Smartphone |
|  <p>MSRP: \$654.60</p> | <p><u>TBI Package contents</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pharos Traveler GPS 535p PDA <input checked="" type="checkbox"/> <i>Memory Compensation Using Windows Mobile</i> book & training DVD <input checked="" type="checkbox"/> Pharos GPS Software <input checked="" type="checkbox"/> 2 GB SD card with: US maps and <input checked="" type="checkbox"/> TBI-related programs: <ul style="list-style-type: none"> * SPB Diary * SPB Backup * SPB Finance * SPB Time * SPB Wallet * SPB Brain Evolution <input checked="" type="checkbox"/> PDA Holder <input checked="" type="checkbox"/> AC Vent Mount Adapter <input checked="" type="checkbox"/> Car Charger <input checked="" type="checkbox"/> Windshield Pedestal <input checked="" type="checkbox"/> AC Adapter <input checked="" type="checkbox"/> Charger Adapter <input checked="" type="checkbox"/> USB Cable <input checked="" type="checkbox"/> Battery <input checked="" type="checkbox"/> User Manual <input checked="" type="checkbox"/> Manual CD <input checked="" type="checkbox"/> Quick Start Guide (QSG) <input checked="" type="checkbox"/> Quick Reference Guide (QRG) <input checked="" type="checkbox"/> Getting Started CD <input checked="" type="checkbox"/> Headphone |
| <p><u>Product features</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> 624 Mhz Intel XScale PXA270 Processor <input checked="" type="checkbox"/> 3.5" transfective, 480x640 VGA TFT color LCD <input checked="" type="checkbox"/> Built-in GPS, Wi-Fi, Bluetooth, and IrDA <input checked="" type="checkbox"/> Windows Mobile with Office Mobile, Outlook Mobile, Media Player <input checked="" type="checkbox"/> Access the Internet and email at Wi-Fi Hotspot <input checked="" type="checkbox"/> Compact size, easy to fit in pocket or |  <p>MSRP: \$734.60</p> <p><u>TBI Package contents</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pharos Traveler 127 device <input checked="" type="checkbox"/> <i>Memory Compensation Using Windows Mobile</i> book & training DVD <input checked="" type="checkbox"/> 2 GB SD card with: US maps and <input checked="" type="checkbox"/> TBI-related programs: <ul style="list-style-type: none"> * SPB Diary * SPB Backup * SPB Finance * SPB Time * SPB Wallet * SPB Brain Evolution <input checked="" type="checkbox"/> AC charger <input checked="" type="checkbox"/> Battery <input checked="" type="checkbox"/> USB cable <input checked="" type="checkbox"/> Stereo Headphone with mic <input checked="" type="checkbox"/> Getting Started CD <input checked="" type="checkbox"/> Quick Start Guide <input checked="" type="checkbox"/> Warranty Card <input checked="" type="checkbox"/> Microsoft License Card <p><u>Product features</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Qualcomm MSM7201-90, 400MHz Processor <input checked="" type="checkbox"/> QWERTY keyboard and 2.5" touch-screen QVGA display <input checked="" type="checkbox"/> Unlocked 3.5G smartphone for use on any GSM network <input checked="" type="checkbox"/> Tri-band 850/1900/2100 MHz, UMTS/HSDPA/HSUPA: 384K/7.2M/2M bits per sec |

| | |
|--|--|
| <ul style="list-style-type: none"> handbag <input checked="" type="checkbox"/> Voice, graphic and text prompted turn-by-turn driving directions <input checked="" type="checkbox"/> 2 GB SD with entire US and Canadian maps <input checked="" type="checkbox"/> Use Live Search with the GPS to get real-time location, find business locations, restaurants, get maps and driving directions | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Quad-band 850/900/1800/1900 MHz, GSM/GPRS/EDGE <input checked="" type="checkbox"/> Built-in GPS, Wi-Fi, Bluetooth <input checked="" type="checkbox"/> 2MP camera for picture or video; 0.3MP front camera for video conference <input checked="" type="checkbox"/> Free real-time traffic, gas price, movie and weather information <input checked="" type="checkbox"/> Talk time: GSM: up to 7.5 hours; WCDMA: up to 5 hours; 200 hours of standby <input checked="" type="checkbox"/> Microsoft Word, Excel and PowerPoint, and Windows Media Player <input checked="" type="checkbox"/> Outlook Contacts, Calendar and Tasks <input checked="" type="checkbox"/> Email and Internet Explorer |
|--|--|

| | |
|---------------------------------------|---------------------------------------|
| Pharos Traveler 117 Smartphone | Pharos Traveler 600 Smartphone |
|---------------------------------------|---------------------------------------|

| | | | |
|--|---|--|---|
|  <p>MSRP: \$734.60</p> | <p style="text-align: center;"><u>Package contents</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pharos Traveler 117 device <input checked="" type="checkbox"/> <i>Memory Compensation Using Windows Mobile</i> book & training DVD <input checked="" type="checkbox"/> 2 GB SD card with: US maps and <input checked="" type="checkbox"/> TBI-related programs: <ul style="list-style-type: none"> * SPB Diary * SPB Backup * SPB Finance * SPB Time * SPB Wallet * SPB Brain Evolution <input checked="" type="checkbox"/> AC charger <input checked="" type="checkbox"/> Battery <input checked="" type="checkbox"/> USB cable <input checked="" type="checkbox"/> Stereo Headphone with mic <input checked="" type="checkbox"/> Getting Started CD <input checked="" type="checkbox"/> Quick Start Guide <input checked="" type="checkbox"/> Warranty Card <input checked="" type="checkbox"/> MSFT License Card |  <p>MSRP: \$854.60</p> | <p style="text-align: center;"><u>Package contents</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pharos GPS Phone 600 <input checked="" type="checkbox"/> <i>Memory Compensation Using Windows Mobile</i> book & training DVD <input checked="" type="checkbox"/> 2 GB SD card with: US maps and <input checked="" type="checkbox"/> TBI-related programs: <ul style="list-style-type: none"> * SPB Diary * SPB Backup * SPB Finance * SPB Time * SPB Wallet * SPB Brain Evolution <input checked="" type="checkbox"/> AC Adapter <input checked="" type="checkbox"/> Battery <input checked="" type="checkbox"/> Car charger <input checked="" type="checkbox"/> Car mount/holder <input checked="" type="checkbox"/> User manual <input checked="" type="checkbox"/> Quick Start Guide <input checked="" type="checkbox"/> Getting started CD <input checked="" type="checkbox"/> Headset <input checked="" type="checkbox"/> USB cable <input checked="" type="checkbox"/> 2GB Micro SD Card with US and Canadian maps <input checked="" type="checkbox"/> Leather carrying case <input checked="" type="checkbox"/> Microsoft Street & Trips |
|--|---|--|---|

| Product features | Product features |
|---|---|
| <ul style="list-style-type: none"> ☑ Qualcomm MSM7201-90, 400MHz Processor ☑ 2.8" VGA 480 x 640, 65K color (can be expanded to 262K) TFT LCD with touch panel ☑ Unlocked 3.5G smartphone for use on any GSM network ☑ Tri-band 850/1900/2100 MHz, UMTS/HSDPA/HSUPA: 384K/7.2M/2M bits per sec ☑ Quad-band 850/900/1800/1900 MHz, GSM/GPRS/EDGE ☑ Built-in GPS, Wi-Fi, Bluetooth ☑ 2MP camera for picture or video; 0.3MP front camera for video conference ☑ Free real-time traffic, gas price, movie and weather information ☑ Talk time: GSM: up to 7.5 hours ; WCDMA: up to 5 hours; 200 hours of standby ☑ Microsoft Word, Excel and PowerPoint, and Windows Media Player ☑ Outlook Contacts, Calendar and Tasks Email and Internet Explorer | <ul style="list-style-type: none"> ☑ 400 MHz Samsung SC3-2442 Processor ☑ Voice prompted turn-by-turn directions ☑ Preloaded with U.S. and Canadian Maps ☑ Route to addresses from Outlook Contacts ☑ Highly sensitive SiRFstarIII GPS ☑ Millions of POI (points of interest) locations ☑ Quad band GSM 850/900/1800/1900 MHz ☑ High speed GPRS/EDGE for wireless Internet ☑ Built-in GPS, Wi-Fi, Bluetooth ☑ Unlocked for use on any GSM network ☑ Up to 5 hours talk time, 160 hours standby ☑ Windows Media Player, FM tuner ☑ 2 mega pixel digital camera/camcorder with flash ☑ Microsoft Word, Excel and PowerPoint ☑ Outlook Contacts, Calendar and Tasks ☑ Internet Explorer and Email ☑ EZ-Dial ☑ SPB Full Screen Keyboard and Mobile Shell ☑ Microsoft Live Search with the GPS to get real-time location, find business locations, restaurants, get maps and driving directions |

The book/PDA package is available through Dell Computers as well as through the Military Health Program's Computer/Electronic Accommodation Program (CAP). CAP provides assistive technology, devices, and services free of charge to employees of federal agencies that have a partnership agreement with CAP.

The book is designed to work with all hand-held computers that run on Windows Mobile operating systems. Individuals who have already purchased a PDA separately may order the book alone at www.pda4memory.com.

PDA TRAINING AVAILABLE FOR SOLDIERS, VETS, THEIR FAMILIES AND THEIR REHABILITATION PROVIDERS

MILD TBI AND MODERATE/SEVERE TBI BOTH BENEFIT FROM THE PDA. The PDA curriculum is designed to address the needs of individuals with mild as well as with moderate or severe brain injuries. Servicemembers as well as veterans with mild TBI will find the PDAs useful for tasks as varied as scheduling appointments, tracking family budgets, finding new places and recalling names of people. Those with more severe injuries may find that having an alarm prompt to get off the couch and go take medication makes the difference between needing constant supervision vs. being able to be left at home alone.

FAMILY MEMBERS BENEFIT. As independence is maximized for the servicemembers with a TBI, quality of life for their family members will also be increased. For example, a parent who is struggling with the awkwardness of supervising an adult child who lacks the initiation to get off the couch may find relief in being able to get out for a few hours or even to return to work. An overwhelmed spouse will find marital tension decreased if the wounded spouse can take over more family responsibilities, from chores as seemingly simple as emptying the dishwasher to more complex tasks like paying the bills.

Because of the potential for improving life for the injured servicemembers as well as for the servicemembers' entire families, many family members will want to facilitate PDA use, especially when the family lives some distance from where services are available. The PDA text, along with Coastline's online PDA class, can help train the family members to assist the individuals with TBI in learning to program, synch and retrieve information from the PDAs as well as to make Cognitive Connections to real-life examples of activities which use the same cognitive skills as the PDA functions require.

Another benefit of family member participation is also in development. Section 744 of the Department of Defense Authorization Act for FY2007 requires the establishment of a panel to develop training curricula for family members on techniques, strategies, and skills for care for TBI patients. The Wounded Warrior Project (WWP) has expressed a desire to work with the Department of Veterans Affairs on creating a Traumatic Brain Injury Family Caregiver Personal Care Attendant (PCA) training and certification program. "Through this program, family members who serve as the primary caregivers for severely traumatically brain injured service members would receive certification from the Department of Veterans Affairs (VA) as a personal care attendant and can then receive VA payment for services rendered to the TBI veteran in their care. This program would be offered through the four Tier I VA Polytrauma centers on a rotating and regular basis."¹⁴

¹⁴ Woundedwarriorproject.org. PCA training. Available online at: <https://www.woundedwarriorproject.org/content/view/487/901/> Accessed on January 3, 2009.

PROFESSIONAL AND PARAPROFESSIONAL SERVICE PROVIDERS BENEFIT. Few VA and military service providers have experience with training individuals with TBI to use PDAs. Rather than re-inventing the proverbial wheel, it makes sense for them to receive training in using a proven method for PDA use. One model which has been discussed with service providers from Fort Campbell is to have a group of soldiers enroll simultaneously in the Coastline class. The nurse who supervises their rehabilitation would gather them in a computer lab where they would all proceed through the steps of the training in Coastline's online class together. She could then help as needed and conduct discussions about the Cognitive Connections with the group. At some point, she would have developed enough expertise in the process to be able to conduct it on her own. This model could be employed regardless of whether the provider's background is in nursing, psychology, occupational therapy, speech therapy, assistive technology, or education.

CASE STUDY: PDA CURRICULUM ALREADY SUCCESSFULLY PILOTED WITH ADULTS WITH TBI

PILOT STUDY. This PDA curriculum has already been shown effective.¹⁵ Forty adults (aged 19 to 58), who enrolled in a community college brain injury program, were given 12 hours of PDA training over 5 weeks. They used Pharos 535 GPS (Windows Mobile 5) PDAs to compensate for memory and organization deficits plus a textbook designed specifically to promote connections between the PDA and particular cognitive retraining skills (e.g., attention to detail, recognizing visual similarities and differences, visual organization, memory cues, critical thinking, sequencing, categorization, problem-solving, planning, decision-making, following directions).

Thirty-five students completed the program and took a short-answer knowledge test plus an application test of PDA competency.

All five students with mild impairment, 11 of 13 (85%) students with moderate impairment and 6 of 10 (60%) students with severe impairment achieved the 80% competency level. All seven students with severe aphasia (language impairments) reached the 80% level.

In addition, all students demonstrated a resounding positive reaction to the PDA trial period using a *gratis* device had ended.

¹⁵ Wild, M. & Schwartz, S. H. (2008). Memory compensation using the pocket PC: Making cognitive connections for brain injury survivors. *Journal of Head Trauma Rehabilitation, 23*, 352-353.

TESTIMONIALS. A quality engineer in his 50s sustained a brain injury after falling down a flight of stairs. He participated in an 8-week group training session at Coastline College in using the Pharos 535 PDA and GPS for memory compensation. He now uses his PDA "as my memory" and says "I call it 'my brain.'" Not only does he use the PDA daily for appointments, events and alarms, but he also writes notes about what he does each day so that he can go to his device and see what he did at any time. The former engineer and his wife credit the PDA and GPS with enabling her to return to work and not worry about him missing appointments or getting lost.

Another Coastline student, a banker in her 40s who sustained a brain injury in an auto accident, also participated in the training. "The Pocket PC has been a transformative tool in my life," she said. "It has strengthened my ability to be independent, efficient, and productive. It has given me hope and a concrete vehicle with which to create a new fulfilling and fruitful future for myself."

CONCLUSION

Over 300,000 servicemembers are returning from OIF and OEF with traumatic brain injuries, the signature injury of these wars. They can receive cost effective cognitive rehabilitation using hand-held computers and a PDA curriculum which already has been proven to help adults with TBI with memory compensation and cognitive retraining. This curriculum, incorporating the latest neuropsychological and educational research, along with input from TBI users, includes a textbook with accompanying videos on DVD. An online course is also available, and an e-learning version is under development. Finally, training for trainers is available from college professors who have been providing cognitive retraining to adults with TBI for decades.